Department of Defense
Fiscal Year (FY) 2014 President's Budget Submission

April 2013

Army

Justification Book

Research, Development, Test & Evaluation, Army

RDT&E - Volume I, Budget Activity 3

Department of the Army

FY 2014 RDT&E Program

President's Budget 2014

Exhibit R-1

Summary

20-Feb-2013

Summary Recap of Budget Activities	Thousands of Dollars				
	FY2012	FY2013	FY2014	FY2014 OCO	FY2014 Total
Basic research	408,842	444,071	436,725	0	436,725
Applied Research	929,984	874,730	885,924	0	885,924
Advanced technology development	1,067,459	890,722	882,106	0	882,106
Advanced Component Development and Prototypes	513,368	629,981	636,392	26,625	663,017
System Development and Demonstration	3,135,367	3,286,629	2,857,026	0	2,857,026
Management support	1,341,545	1,153,980	1,159,610	0	1,159,610
Operational system development	1,303,974	1,664,534	1,126,602	0	1,126,602
Total RDT&E, Army	8,700,539	8,944,647	7,984,385	26,625	8,011,010

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Line No	Program Element Number	Act	Item	Thousands of Dollars FY2012	FY2013	FY2014	FY2014 OCO	FY2014 Total
			Basic research					
1	0601101A	01	IN-HOUSE LABORATORY INDEPENDENT RESEARCH	20,395	20,860	21,803		21,803
2	0601102A	01	DEFENSE RESEARCH SCIENCES	207,983	219,180	221,901		221,901
3	0601103A	01	UNIVERSITY RESEARCH INITIATIVES	78,380	80,986	79,359		79,359
4	0601104A	01	UNIVERSITY AND INDUSTRY RESEARCH CENTERS	102,084	123,045	113,662		113,662
			Total: Basic research	408,842	444,071	436,725	0	436,725
			Applied Research					
5	0602105A	02	MATERIALS TECHNOLOGY	37,707	29,041	26,585		26,585
6	0602120A	02	SENSORS AND ELECTRONIC SURVIVABILITY	42,189	45,260	43,170		43,170
7	0602122A	02	TRACTOR HIP	14,207	22,439	36,293		36,293
8	0602211A	02	AVIATION TECHNOLOGY	43,430	51,607	55,615		55,615
9	0602270A	02	ELECTRONIC WARFARE TECHNOLOGY	15,667	15,068	17,585		17,585
10	0602303A	02	MISSILE TECHNOLOGY	65,591	49,383	51,528		51,528
11	0602307A	02	ADVANCED WEAPONS TECHNOLOGY	19,392	25,999	26,162		26,162
12	0602308A	02	ADVANCED CONCEPTS AND SIMULATION	20,356	23,507	24,063		24,063
13	0602601A	02	COMBAT VEHICLE AND AUTOMOTIVE TECHNOLOGY	62,339	69,062	64,589		64,589
14	0602618A	02	BALLISTICS TECHNOLOGY	60,507	60,823	68,300		68,300
15	0602622A	02	CHEMICAL, SMOKE AND EQUIPMENT DEFEATING TECHNOLOGY	4,753	4,465	4,490		4,490
16	0602623A	02	JOINT SERVICE SMALL ARMS PROGRAM	8,010	7,169	7,818		7,818
17	0602624A	02	WEAPONS AND MUNITIONS TECHNOLOGY	53,883	35,218	37,798		37,798
18	0602705A	02	ELECTRONICS AND ELECTRONIC DEVICES	74,518	60,300	59,021		59,021
19	0602709A	02	NIGHT VISION TECHNOLOGY	54,002	53,244	43,426		43,426
20	0602712A	02	COUNTERMINE SYSTEMS	32,226	18,850	20,574		20,574
21	0602716A	02	HUMAN FACTORS ENGINEERING TECHNOLOGY	21,540	19,872	21,339		21,339
22	0602720A	02	ENVIRONMENTAL QUALITY TECHNOLOGY	20,389	20,095	20,316		20,316
23	0602782A	02	COMMAND, CONTROL, COMMUNICATIONS TECHNOLOGY	25,703	28,852	34,209		34,209
24	0602783A	02	COMPUTER AND SOFTWARE TECHNOLOGY	8,433	9,830	10,439		10,439
25	0602784A	02	MILITARY ENGINEERING TECHNOLOGY	75,465	70,693	70,064		70,064

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26	0602785A	02	MANPOWER/PERSONNEL/TRAINING TECHNOLOGY	18,623	17,781	17,654		17,654
27	0602786A	02	WARFIGHTER TECHNOLOGY	46,864	28,281	31,546		31,546
28	0602787A	02	MEDICAL TECHNOLOGY	104,190	107,891	93,340		93,340
	Total:		Applied Research	929,984	874,730	885,924	0	885,924
			Advanced technology development					
29	0603001A	03	WARFIGHTER ADVANCED TECHNOLOGY	55,679	39,359	56,056		56,056
30	0603002A	03	MEDICAL ADVANCED TECHNOLOGY	101,655	69,580	62,032		62,032
31	0603003A	03	AVIATION ADVANCED TECHNOLOGY	60,333	64,215	81,080		81,080
32	0603004A	03	WEAPONS AND MUNITIONS ADVANCED TECHNOLOGY	75,607	67,613	63,919		63,919
33	0603005A	03	COMBAT VEHICLE AND AUTOMOTIVE ADVANCED TECHNOLOGY	142,833	104,359	97,043		97,043
34	0603006A	03	SPACE APPLICATION ADVANCED TECHNOLOGY	4,158	4,157	5,866		5,866
35	0603007A	03	MANPOWER, PERSONNEL AND TRAINING ADVANCED TECHNOLOGY	10,063	9,856	7,800		7,800
36	0603008A	03	ELECTRONIC WARFARE ADVANCED TECHNOLOGY	67,673	50,661	40,416		40,416
37	0603009A	03	TRACTOR HIKE	8,142	9,126	9,166		9,166
38	0603015A	03	NEXT GENERATION TRAINING & SIMULATION SYSTEMS	14,970	17,257	13,627		13,627
39	0603020A	03	TRACTOR ROSE	12,577	9,925	10,667		10,667
40	0603105A	03	MILITARY HIV RESEARCH	22,552	6,984			
41	0603125A	03	COMBATING TERRORISM - TECHNOLOGY DEVELOPMENT	21,939	9,716	15,054		15,054
42	0603130A	03	TRACTOR NAIL	4,271	3,487	3,194		3,194
43	0603131A	03	TRACTOR EGGS	2,257	2,323	2,367		2,367
44	0603270A	03	ELECTRONIC WARFARE TECHNOLOGY	23,046	21,683	25,348		25,348
45	0603313A	03	MISSILE AND ROCKET ADVANCED TECHNOLOGY	87,749	71,111	64,009		64,009
46	0603322A	03	TRACTOR CAGE	10,299	10,902	11,083		11,083
47	0603461A	03	HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM	176,533	180,582	180,662		180,662
48	0603606A	03	LANDMINE WARFARE AND BARRIER ADVANCED TECHNOLOGY	30,687	27,204	22,806		22,806
49	0603607A	03	JOINT SERVICE SMALL ARMS PROGRAM	7,473	6,095	5,030		5,030
50	0603710A	03	NIGHT VISION ADVANCED TECHNOLOGY	41,283	37,217	36,407		36,407
51	0603728A	03	ENVIRONMENTAL QUALITY TECHNOLOGY DEMONSTRATIONS	15,247	13,626	11,745		11,745
52	0603734A	03	MILITARY ENGINEERING ADVANCED TECHNOLOGY	40,496	28,458	23,717		23,717

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53	0603772A	03	ADVANCED TACTICAL COMPUTER SCIENCE AND SENSOR TECHNOLOGY	29,937	25,226	33,012		33,012
	Total:		Advanced technology development	1,067,459	890,722	882,106	0	882,106
			Advanced Component Development and Prototypes					
54	0603305A	04	ARMY MISSLE DEFENSE SYSTEMS INTEGRATION	23,463	14,505	15,301		15,301
55	0603308A	04	ARMY SPACE SYSTEMS INTEGRATION	9,557	9,876	13,592		13,592
56	0603619A	04	LANDMINE WARFARE AND BARRIER - ADV DEV	16,399	5,054	10,625		10,625
57	0603627A	04	SMOKE, OBSCURANT AND TARGET DEFEATING SYS-ADV DEV	4,357	2,725			
58	0603639A	04	TANK AND MEDIUM CALIBER AMMUNITION	40,201	30,560	30,612		30,612
59	0603653A	04	ADVANCED TANK ARMAMENT SYSTEM (ATAS)	62,343	14,347	49,989		49,989
60	0603747A	04	SOLDIER SUPPORT AND SURVIVABILITY	13,720	29,933	6,703	26,625	33,328
61	0603766A	04	TACTICAL ELECTRONIC SURVEILLANCE SYSTEM - ADV DEV	5,757	8,660	6,894		6,894
62	0603774A	04	NIGHT VISION SYSTEMS ADVANCED DEVELOPMENT		10,715	9,066		9,066
63	0603779A	04	ENVIRONMENTAL QUALITY TECHNOLOGY - DEM/VAL	4,788	4,631	2,633		2,633
64	0603782A	04	WARFIGHTER INFORMATION NETWORK-TACTICAL - DEM/VAL	177,122	278,018	272,384		272,384
65	0603790A	04	NATO RESEARCH AND DEVELOPMENT	4,612	4,961	3,874		3,874
66	0603801A	04	AVIATION - ADV DEV	6,879	8,602	5,018		5,018
67	0603804A	04	LOGISTICS AND ENGINEER EQUIPMENT - ADV DEV	12,107	14,605	11,556		11,556
68	0603805A	04	COMBAT SERVICE SUPPORT CONTROL SYSTEM EVALUATION AND ANALYSIS	5,090	5,054			
69	0603807A	04	MEDICAL SYSTEMS - ADV DEV	34,809	24,384	15,603		15,603
70	0603827A	04	SOLDIER SYSTEMS - ADVANCED DEVELOPMENT	23,516	32,050	14,159		14,159
71	0603850A	04	INTEGRATED BROADCAST SERVICE	1,494	96	79		79
72	0604115A	04	TECHNOLOGY MATURATION INITIATIVES	11,839	24,868	55,605		55,605
73	0604131A	04	TRACTOR JUTE		59			
74	0604319A	04	INDIRECT FIRE PROTECTION CAPABILITY INCREMENT 2-INTERCEPT (IFPC2)		76,039	79,232		79,232
75	0604785A	04	INTEGRATED BASE DEFENSE (BUDGET ACTIVITY 4)	3,926	4,043	4,476		4,476
76	0305205A	04	ENDURANCE UAVS	51,389	26,196	28,991		28,991
	Total:		Advanced Component Development and Prototypes	513,368	629,981	636,392	26,625	663,017

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			System Development and Demonstration					
77	0604201A	05	AIRCRAFT AVIONICS	115,890	78,538	76,588		76,588
78	0604220A	05	ARMED, DEPLOYABLE HELOS	80,323	90,494	73,309		73,309
79	0604270A	05	ELECTRONIC WARFARE DEVELOPMENT	33,164	181,347	154,621		154,621
80	0604280A	05	JOINT TACTICAL RADIO			31,826		31,826
81	0604290A	05	MID-TIER NETWORKING VEHICULAR RADION (MNVR)	47,000	12,636	23,341		23,341
82	0604321A	05	ALL SOURCE ANALYSIS SYSTEM	7,400	5,694	4,839		4,839
83	0604328A	05	TRACTOR CAGE	23,535	32,095	23,841		23,841
84	0604601A	05	INFANTRY SUPPORT WEAPONS	81,081	96,478	79,855		79,855
85	0604604A	05	MEDIUM TACTICAL VEHICLES	3,835	3,006	2,140		2,140
86	0604611A	05	JAVELIN	9,655	5,040	5,002		5,002
87	0604622A	05	FAMILY OF HEAVY TACTICAL VEHICLES	5,239	3,077	21,321		21,321
88	0604633A	05	AIR TRAFFIC CONTROL	22,218	9,769	514		514
89	0604641A	05	TACTICAL UNMANNED GROUND VEHICLE (TUGV)		13,141			
90	0604642A	05	LIGHT TACTICAL WHEELED VEHICLES	68,442				
91	0604661A	05	FCS SYSTEMS OF SYSTEMS ENGR & PROGRAM MGMT	257,513				
92	0604663A	05	FCS UNMANNED GROUND VEHICLES	34,845				
93	0604710A	05	NIGHT VISION SYSTEMS - ENG DEV	55,412	32,621	43,405		43,405
94	0604713A	05	COMBAT FEEDING, CLOTHING, AND EQUIPMENT	2,008	2,132	1,939		1,939
95	0604715A	05	NON-SYSTEM TRAINING DEVICES - ENG DEV	29,206	44,787	18,980		18,980
96	0604716A	05	TERRAIN INFORMATION - ENG DEV	1,593	1,008			
97	0604741A	05	AIR DEFENSE COMMAND, CONTROL AND INTELLIGENCE - ENG DEV	57,050	73,333	18,294		18,294
98	0604742A	05	CONSTRUCTIVE SIMULATION SYSTEMS DEVELOPMENT	27,530	28,937	17,013		17,013
99	0604746A	05	AUTOMATIC TEST EQUIPMENT DEVELOPMENT	13,932	10,815	6,701		6,701
100	0604760A	05	DISTRIBUTIVE INTERACTIVE SIMULATIONS (DIS) - ENG DEV	15,357	13,926	14,575		14,575
101	0604780A	05	COMBINED ARMS TACTICAL TRAINER (CATT) CORE	21,541	17,797	27,634		27,634
102	0604798A	05	BRIGADE ANALYSIS, INTEGRATION AND EVALUATION		214,270	193,748		193,748
103	0604802A	05	WEAPONS AND MUNITIONS - ENG DEV	13,384	14,581	15,721		15,721
104	0604804A	05	LOGISTICS AND ENGINEER EQUIPMENT - ENG DEV	173,902	43,706	41,703		41,703
105	0604805A	05	COMMAND, CONTROL, COMMUNICATIONS SYSTEMS - ENG DEV	79,188	20,776	7,379		7,379

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106	0604807A	05	MEDICAL MATERIEL/MEDICAL BIOLOGICAL DEFENSE EQUIPMENT - ENG DEV	26,316	43,395	39,468		39,468
107	0604808A	05	LANDMINE WARFARE/BARRIER - ENG DEV	73,955	104,983	92,285		92,285
108	0604814A	05	ARTILLERY MUNITIONS - EMD	45,821	4,346	8,209		8,209
109	0604818A	05	ARMY TACTICAL COMMAND & CONTROL HARDWARE & SOFTWARE	91,490	77,223	22,958		22,958
110	0604820A	05	RADAR DEVELOPMENT	3,093	3,486	1,549		1,549
111	0604822A	05	GENERAL FUND ENTERPRISE BUSINESS SYSTEM (GFEBS)	787	9,963	17,342		17,342
112	0604823A	05	FIREFINDER	12,032	20,517	47,221		47,221
113	0604827A	05	SOLDIER SYSTEMS - WARRIOR DEM/VAL	41,680	51,851	48,477		48,477
114	0604854A	05	ARTILLERY SYSTEMS - EMD	116,293	167,797	80,613		80,613
115	0604869A	05	PATRIOT/MEADS COMBINED AGGREGATE PROGRAM (CAP)	377,610	400,861			
116	0604870A	05	NUCLEAR ARMS CONTROL MONITORING SENSOR NETWORK	7,160	7,922			
117	0605013A	05	INFORMATION TECHNOLOGY DEVELOPMENT	35,714	51,463	68,814		68,814
118	0605018A	05	INTEGRATED PERSONNEL AND PAY SYSTEM-ARMY (IPPS-A)	66,612	158,646	137,290		137,290
119	0605028A	05	ARMORED MULTI-PURPOSE VEHICLE (AMPV)			116,298		116,298
120	0605030A	05	JOINT TACTICAL NETWORK CENTER (JTNC)			68,148		68,148
121	0605380A	05	AMF JOINT TACTICAL RADIO SYSTEM (JTRS)			33,219		33,219
122	0605450A	05	JOINT AIR-TO-GROUND MISSILE (JAGM)	123,100	10,000	15,127		15,127
123	0605455A	05	SLAMRAAM	1,186				
124	0605456A	05	PAC-3/MSE MISSILE	86,139	69,029	68,843		68,843
125	0605457A	05	ARMY INTEGRATED AIR AND MISSILE DEFENSE (AIAMD)	262,032	277,374	364,649		364,649
126	0605625A	05	MANNED GROUND VEHICLE	434,977	639,874	592,201		592,201
127	0605626A	05	AERIAL COMMON SENSOR	31,415	47,426	10,382		10,382
128	0605766A	05	NATIONAL CAPABILITIES INTEGRATION (MIP)			21,143		21,143
129	0605812A	05	JOINT LIGHT TACTICAL VEHICLE (JLTV) ENGINEERING AND MANUFACTURING D		72,295	84,230		84,230
130	0303032A	05	TROJAN - RH12	3,914	4,232	3,465		3,465
131	0304270A	05	ELECTRONIC WARFARE DEVELOPMENT	13,798	13,942	10,806		10,806
	Total:		System Development and Demonstration	3,135,367	3,286,629	2,857,026	0	2,857,026
			Management support					
132	0604256A	06	THREAT SIMULATOR DEVELOPMENT	25,838	18,090	16,934		16,934

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133	0604258A	06	TARGET SYSTEMS DEVELOPMENT	10,973	14,034	13,488		13,488
134	0604759A	06	MAJOR T&E INVESTMENT	47,972	37,394	46,672		46,672
135	0605103A	06	RAND ARROYO CENTER	19,730	21,026	11,919		11,919
136	0605301A	06	ARMY KWAJALEIN ATOLL	141,365	176,816	193,658		193,658
137	0605326A	06	CONCEPTS EXPERIMENTATION PROGRAM	27,923	27,902	37,158		37,158
138	0605502A	06	SMALL BUSINESS INNOVATIVE RESEARCH	208,324				
139	0605601A	06	ARMY TEST RANGES AND FACILITIES	366,327	369,900	340,659		340,659
140	0605602A	06	ARMY TECHNICAL TEST INSTRUMENTATION AND TARGETS	68,968	69,183	66,061		66,061
141	0605604A	06	SURVIVABILITY/LETHALITY ANALYSIS	42,088	44,753	43,280		43,280
142	0605605A	06	DOD HIGH ENERGY LASER TEST FACILITY	18				
143	0605606A	06	AIRCRAFT CERTIFICATION	5,555	5,762	6,025		6,025
144	0605702A	06	METEOROLOGICAL SUPPORT TO RDT&E ACTIVITIES	7,062	7,402	7,349		7,349
145	0605706A	06	MATERIEL SYSTEMS ANALYSIS	19,498	19,954	19,809		19,809
146	0605709A	06	EXPLOITATION OF FOREIGN ITEMS	5,435	5,535	5,941		5,941
147	0605712A	06	SUPPORT OF OPERATIONAL TESTING	68,311	67,789	55,504		55,504
148	0605716A	06	ARMY EVALUATION CENTER	62,845	62,765	65,274		65,274
149	0605718A	06	ARMY MODELING & SIM X-CMD COLLABORATION & INTEG	3,312	1,545	1,283		1,283
150	0605801A	06	PROGRAMWIDE ACTIVITIES	82,015	83,422	82,035		82,035
151	0605803A	06	TECHNICAL INFORMATION ACTIVITIES	52,085	50,820	33,853		33,853
152	0605805A	06	MUNITIONS STANDARDIZATION, EFFECTIVENESS AND SAFETY	53,530	46,763	53,340		53,340
153	0605857A	06	ENVIRONMENTAL QUALITY TECHNOLOGY MGMT SUPPORT	4,801	4,601	5,193		5,193
154	0605898A	06	MANAGEMENT HQ - R&D	17,480	18,524	54,175		54,175
155	0909999A	06	FINANCING FOR CANCELLED ACCOUNT ADJUSTMENTS	90				
	Total:		Management support	1,341,545	1,153,980	1,159,610	0	1,159,610
			Operational system development					
156	0603778A	07	MLRS PRODUCT IMPROVEMENT PROGRAM	64,609	143,005	110,576		110,576
157	0607141A	07	LOGISTICS AUTOMATION			3,717		3,717
158	0607665A	07	BIOMETRICS ENTERPRISE	44,155				
159	0607865A	07	PATRIOT PRODUCT IMPROVEMENT		109,978	70,053		70,053

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160	0102419A	07	AEROSTAT JOINT PROJECT OFFICE	317,382	190,422	98,450		98,450
161	0203726A	07	ADV FIELD ARTILLERY TACTICAL DATA SYSTEM	28,649	32,556	30,940		30,940
162	0203735A	07	COMBAT VEHICLE IMPROVEMENT PROGRAMS	35,046	253,959	177,532		177,532
163	0203740A	07	MANEUVER CONTROL SYSTEM	39,282	68,325	36,495		36,495
164	0203744A	07	AIRCRAFT MODIFICATIONS/PRODUCT IMPROVEMENT PROGRAMS	144,904	280,247	257,187		257,187
165	0203752A	07	AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM	800	898	315		315
166	0203758A	07	DIGITIZATION	7,771	35,180	6,186		6,186
167	0203801A	07	MISSILE/AIR DEFENSE PRODUCT IMPROVEMENT PROGRAM	52,811	20,733	1,578		1,578
168	0203802A	07	OTHER MISSILE PRODUCT IMPROVEMENT PROGRAMS			62,100		62,100
169	0203808A	07	TRACTOR CARD	42,487	63,243	18,778		18,778
170	0208053A	07	JOINT TACTICAL GROUND SYSTEM	27,586	31,738	7,108		7,108
171	0208058A	07	JOINT HIGH SPEED VESSEL (JHSV)		35			
172	0301359A	07	SPECIAL ARMY PROGRAM					
173	0303028A	07	SECURITY AND INTELLIGENCE ACTIVITIES	2,763	7,591	7,600		7,600
174	0303140A	07	INFORMATION SYSTEMS SECURITY PROGRAM	15,282	15,961	9,357		9,357
175	0303141A	07	GLOBAL COMBAT SUPPORT SYSTEM	155,813	120,927	41,225		41,225
176	0303142A	07	SATCOM GROUND ENVIRONMENT (SPACE)	11,765	15,756	18,197		18,197
177	0303150A	07	WWMCCS/GLOBAL COMMAND AND CONTROL SYSTEM	22,658	14,443	14,215		14,215
178	0305204A	07	TACTICAL UNMANNED AERIAL VEHICLES	26,508	31,303	33,533		33,533
179	0305208A	07	DISTRIBUTED COMMON GROUND/SURFACE SYSTEMS	31,401	40,876	27,622		27,622
180	0305219A	07	MQ-1 SKY WARRIOR A UAV	121,846	74,618	10,901		10,901
181	0305232A	07	RQ-11 UAV	1,935	4,039	2,321		2,321
182	0305233A	07	RQ-7 UAV	31,896	31,158	12,031		12,031
183	0305235A	07	MQ-18 UAV	4,000	2,387			
184	0307665A	07	BIOMETRICS ENABLED INTELLIGENCE	15,018	15,248	12,449		12,449
185	0708045A	07	END ITEM INDUSTRIAL PREPAREDNESS ACTIVITIES	57,607	59,908	56,136		56,136
		Total:	Operational system development	1,303,974	1,664,534	1,126,602	0	1,126,602
Total:	RDT&E, Army			8,700,539	8,944,647	7,984,385	26,625	8,011,010

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Budget Activity 03: Advanced Technology Development (ATD)
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Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	55.679	39.359	56.056	-	56.056	65.433	53.068	42.567	42.547	Continuing	Continuing
242: *Airdrop Equipment*	-	3.755	3.222	3.768	-	3.768	3.812	3.361	4.421	3.859	Continuing	Continuing
543: *Ammunition Logistics*	-	2.125	2.308	2.505	-	2.505	2.524	2.261	2.300	2.341	Continuing	Continuing
C07: *Joint Service Combat Feeding Tech Demo*	-	2.400	2.180	3.737	-	3.737	4.005	2.123	2.088	2.097	Continuing	Continuing
J50: *Future Warrior Technology Integration*	-	41.127	28.616	38.215	-	38.215	47.386	37.010	28.282	28.675	Continuing	Continuing
VT5: *Expeditionary Mobile Base Camp Demonstration*	-	6.272	3.033	7.831	-	7.831	7.706	8.313	5.476	5.575	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 increases support for Technology Enabled Capability Demonstrations (TECDs) 1.b (Force Protection Soldier/Small Unit), 2.a (Overburdened Physical Burden) and 4.a (Basing Sustainment and Logistics).

A. Mission Description and Budget Item Justification

This program element (PE) provides Soldiers and Small Combat Units with the most effective personal clothing, equipment, combat rations, shelters and logistical support items with 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.

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

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 (Electronic Warfare Advanced Technology), PEs 0602623A and 0603607A (Joint Service Small Arms Program) and PEs 0602784A (Military Engineering Technology) and 0603734A (Military Engineering Advanced Technology).

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army	DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603001A: *Warfighter 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.

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	52.896	39.359	42.186	-	42.186
Current President's Budget	55.679	39.359	56.056	-	56.056
Total Adjustments	2.783	0.000	13.870	-	13.870
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	4.247	-			
• SBIR/STTR Transfer	-1.464	-			
• Adjustments to Budget Years	-	-	13.870	-	13.870

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
242: *Airdrop Equipment*	-	3.755	3.222	3.768	-	3.768	3.812	3.361	4.421	3.859	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Advanced Precision Aerial Delivery of Cargo	2.814	0.000	0.000
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 2012 Accomplishments:*** Matured, demonstrated and transitioned sensor technologies for real-time monitoring of weather to PM-FSS Joint Precision Aerial Delivery Systems (JPADS); matured advanced rotary wing aerial delivery sling load net technologies for low cost one-time-use.			
Title: Advanced Airborne Insertion (Personnel Airdrop)	0.941	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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 2012 Accomplishments:*** Matured technologies for cargo/jumper locators and demonstrated payload-to-payload, jumper-to-jumper and payload-to-jumper in-flight communications.			
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. In FY13 and 14 this effort supports Technology Enabled Capability Demonstration 2a Overburdened Physical Burden for tactical aerial resupply technologies. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will integrate and demonstrate net-centric in-flight collision avoidance and wind sharing technologies into the precision aerial delivery system for the Ultra Light Weight (<500 pounds) payload weight class to prevent midair collisions of payloads and to optimize aerial re-supply to Soldiers as a means of reducing carried weight; mature and demonstrate technologies to create the capability for multiple airdrops from a single helicopter via sling load release that increases effectiveness and efficiency for logistic delivery of personnel and equipment; mature and demonstrate sensor technologies and software algorithms for real-time monitoring and systems communication between payloads and ground stations to support tactical aerial resupply; demonstrate accuracy of parafoil to increase accuracy of payload resupply, reduce cost as well as equipment retrograde/retrieval weight and volume to decrease the burden of Soldiers engaged in airborne operations.	0.000	3.222	3.768
Accomplishments/Planned Programs Subtotals	3.755	3.222	3.768

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
543: *Ammunition Logistics*	-	2.125	2.308	2.505	-	2.505	2.524	2.261	2.300	2.341	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Automated Material Handling Technology	1.241	2.308	0.391
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 Accomplishments: Applied automated capabilities to a manually operated forklift and evaluated 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.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will provide preliminary design architecture of an autonomous material handling applique kit for the 5000 lb capacity tactical forklift.			
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 Accomplishments:*** Selected concepts and preliminary designs for re-arm system designs.	0.884	0.000	0.000
Title: Adaptive Packaging ***Description:*** This effort demonstrates a lightweight multi-modal pallet with embedded container restraint systems. The system automatically locks down onto the top surface of a redesigned advanced cargo platform to form a multimodal distribution capability for rapid, more efficient deployment and sustainment operations. ***FY 2014 Plans:*** Will complete material market survey and initiate prototype pallet and platform designs.	0.000	0.000	1.714
Title: Explosive Safety for Automated Base Camp Planning ***Description:*** This effort integrates explosives safety site planning software with automated base camp planning tool to reduce time to plan base camps and improve soldier safety. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection – Basing. ***FY 2014 Plans:*** Will complete preliminary system integration and engineering tests of automated base camp planning software that incorporates explosives safety.	0.000	0.000	0.400
Accomplishments/Planned Programs Subtotals	2.125	2.308	2.505

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
C07: *Joint Service Combat Feeding Tech Demo*	-	2.400	2.180	3.737	-	3.737	4.005	2.123	2.088	2.097	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Joint Combat Feeding Equipment Technology	1.192	0.940	2.488
Description: Beginning in FY13, this effort will be renamed from Combat Feeding Equipment Technologies to Joint Combat Feeding Equipment Technology Demonstrations. This effort demonstrated equipment and energy technologies to enhance effectiveness and reduce logistics footprint of field feeding systems.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Demonstrated a fully integrated Battlefield Kitchen with improved habitability and safety, as well as reduced fuel consumption; demonstrated 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:*** Conduct technology demonstration of kitchen appliances with an integrated fuel fired, low cost, rugged burner that enables high efficiency operation and is logistically supportable. ***FY 2014 Plans:*** Will conduct technical demonstrations of new refrigeration technologies to improve fuel efficiency, increase operation in hot environments, and reduce failure rates as well as procurement and maintenance costs; integrate new power technologies to demonstrate self-sustaining appliances that reduce reliance on field generators in field kitchens as well as to reduce fuel costs and reduce resupply demands.			
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 2012 Accomplishments:*** Demonstrated ration packaging permeability models that will be used to develop better ration packaging systems to decrease battlefield waste and packaging weight; demonstrated 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:*** 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. ***FY 2014 Plans:*** Will demonstrate reduction of secondary packaging by utilizing emerging polymer materials and manufacturing methods to reduce packaging bulk/weight, and eliminate field waste; validate increased availability and stability of anti-oxidants within ration components to improve Warfighter performance and recovery time; verify safety, acceptability, cost, and shelf-life of meat/seafood processed in novel drying processes for application to group rations options and expanded shelf-life.	1.208	1.240	1.249
Accomplishments/Planned Programs Subtotals	2.400	2.180	3.737

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
J50: *Future Warrior Technology Integration*	-	41.127	28.616	38.215	-	38.215	47.386	37.010	28.282	28.675	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures, demonstrates and integrates lightweight, multifunctional materials and components to provide Soldier and Small Units with the most effective personal protection, electronics connectivity and mission specific equipment while evaluating the potential to reduce physical weight, cognitive burden and sustainment needs within the required protection and functional capabilities required for the Small Unit. This project develops, matures and maintains a Soldier systems engineering architecture commensurate with other major Army platforms. 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; and 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), PE 0603008A (Electronic Warfare 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 2012	FY 2013	FY 2014
Title: Soldier/Small Unit Ballistic and Blast Protection	7.874	0.000	0.000
Description: Beginning in FY13, this effort will be captured in the Soldier /Small Unit Integrated Protection 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,			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
0602618/Project 61 and 0602787A/Project 878 Demonstrated technologies transition to Product Manager-Soldier Protection and Individual Equipment and/or industry partners. ***FY 2012 Accomplishments:*** Improved the body armor assessment protocol by validating range of motion measurements with operationally-relevant Soldier agility assessment techniques; demonstrated head and face protection retrofit for existing helmets and will transition detailed specification and prototypes; synchronized and focus Modeling and Simulation programs to analyze existing data (mobility, protection, payload, lethality) and established 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	4.936	10.820	10.940
Description: This effort is one component of the previously named Soldier/Small Unit Integrated Protection and Load Management. In FY14, the load management component will transition to Soldier and Small Unit Load Management. This effort matures and demonstrates proven components and material advancements 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. In FY13 and FY14 this efforts supports Technology Enabled Capability Demonstration 1b Force Protection-Soldier/Small Unit. ***FY 2012 Accomplishments:*** Continued to refine and improve the integrated Soldier-centric headgear design and conduct system evaluations; selected promising Flame Resistant, visual, thermal, ballistic and concealment/signature management technologies; and baselined mission specific equipment for modular Soldier as a System protection variants. ***FY 2013 Plans:*** 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 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. ***FY 2014 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will mature and demonstrate lightweight multifunctional materials for protective clothing and individual equipment to increase protection to vital areas such as pelvis, torso, extremity, head and face; validate protective area of coverage and weight balance for shoulders and hips to optimize Soldier protective armor design; mature hearing protection that mitigates impulse noise exposure without diminishing auditory situational awareness; conduct field assessments and modeling and simulation to optimize the design of multi threat protective components incorporating capabilities such as signature management, environmental protection (flame/thermal, cold/wet, insect) hygiene management; transition technologies, metrics and tools matured in this effort to PEO Soldier Product Managers, TRADOC for future requirements development and into the Soldier systems engineering architecture.			
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 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 2012 Accomplishments:*** Focused on a holistic approach to identify capabilities that enable the Small Unit to efficiently shoot or move across varying terrain; devised measures to assess the impact of load on marksmanship performance; conducted field validation of mobility aids to exploit Soldier's use and application of spatial information; developed Soldier/Small Unit applications to be incorporated into mission planning tools for load management, Soldier cross-loading and resupply analysis.	3.953	0.000	0.000
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, PE 0602624A/Project H18, PE 0603005/Project 497, PE 0603008A/TR1 and PE 0603004/Project 232. In FY13-14 this efforts supports Technology Enabled Capability Demonstration 2a Overburdened Physical Burden. ***FY 2012 Accomplishments:*** Integrated gunfire detection and target identification into the Soldier network; increased Wireless Personal Area Network (WPAN) Application Specific Integrated Circuit (ASIC) functionality to connect a wide range of Soldier-borne hardware components (such as sensors for weapon target pairing) and optimized form factor for efficient operation and layout; developed and demonstrated user interface technologies for mission command networking of Soldier and unmanned sensors; conducted field demonstrations	6.806	7.212	4.949

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
of capabilities Small Units employ during intelligence gathering, training, and other operations; optimized Soldier acceptance parameters including form factor graphical user displays for efficient task completion and power management. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will mature and demonstrate Soldier/Small Unit load planning tool and decision support software for reducing individual Soldier load by distributing mission specific combat loads across the unit based on mission and physical metrics (e.g. mission environment, terrain, physical condition, load as a percentage of body weight, etc.); building on work completed in FY13, demonstrate information portrayal integration from handheld un-manned air and ground sensors relayed to Soldier-borne electronic devices.			
Title: Soldier and Small Unit Power and Energy	2.944	3.441	0.000
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. In FY13-14 this efforts supports Technology Enabled Capability Demonstration 2a Overburdened Physical Burden. Beginning in FY14, efforts for power and energy demand management will be captured within the effort titled Soldier and Small Unit Load Management. ***FY 2012 Accomplishments:*** Demonstrated central conformal headgear power source; demonstrated wireless power transfer from body to weapon or helmet; and mature multi-fueled (JP8, DF, kerosene) man-packable tactical power source and battery charger; evaluated 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:*** 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			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
power source; investigate energy harvesting models and concepts; analyze energy efficiency improvements in power sinks to optimize battery size; demonstrate power centric software.			
Title: System Integration Laboratory for Evaluation of Emerging Technological Capabilities	4.903	7.143	12.236
Description: This effort (previously titled Small Unit Systems Engineering, Integration and Demonstration) develops and matures a Soldier systems engineering architecture and system integration laboratory environment in which current and emerging Soldier systems can be assessed to determine viability and military utility. This capability is used to assess new and emerging Soldier clothing and equipment components as well as configurations against established baselines using Human-in-the-Loop principles. This effort also matures and integrates human performance assessment measures, evaluation devices required at various testing locations and develops standardized methodologies required for demonstrations to provide operationally relevant assessments. This effort is coordinated with PE 0602716A/Project H70, PE 0602786A/Project H98, 060315A/Project S28 and 0603004A/Project 232. In FY13-14 this efforts supports Technology Enable Capability Demonstration 1b Force Protection Soldier/Small unit and 2a Overburdened Physical Burden.			
FY 2012 Accomplishments: Developed, integrated, and demonstrated embedded laboratory data collection tools for assessing cognitive burden associated with information management algorithms and physical burden associated with hardware and network component interfaces; continued assessing maturity of Soldier-borne technologies and power centric architectures in simulated field relevant environments.			
FY 2013 Plans: 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; 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.			
FY 2014 Plans: Will develop and mature a Soldier systems engineering architecture with an established Soldier baseline platform developed using the laboratory diagnostic tool suites defined in FY13; will apply system integration tools to conduct lab and field assessments in relevant environments to demonstrate and validate integrated load planning tools with capabilities such as equipment cross-loading options across the small unit, expedited route planning, metabolic cost estimation and initial validation for heat strain prediction; will build on FY13 body armor system integration laboratory assessment tools, assess emerging body armor systems for improved Soldier combat effectiveness and survivability relative to system sizing, weight and configuration; will provide			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
knowledge products such as empirical component and systems performance data, TRL assessments, trade-off analyses, and standardized performance metrics for capability demonstrations and acquisition decisions and future requirements development.			
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. ***FY 2012 Accomplishments:*** Defined a Small Combat Unit representative load baseline; surveyed Government and Industry to identify and harvest opportunities to reduce or better manage loads; identified tools necessary to diagnose and visualize load effects of equipment as well as measure mission effectiveness and mobility; developed concept and technology assessment plan with methods, metrics and measures; conducted a technology assessment of the representative baseline; conducted a concept assessment of the best collection of soldier technologies identified in survey; identified impact to capabilities created by the concept and identify tradeoffs required to make a difference in Small Combat Unit Load.	9.711	0.000	0.000
Title: Soldier and Small Unit Load Management ***Description:*** This effort (previously conducted under Soldier/Small Integrated Protection and Load Management and Small Combat Unit Load Reduction) matures and demonstrates proven components and strategies for materiel weight reduction, load management mission planning tools and off-loading approaches which have potential to reduce Soldier physical carried load. 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. In FY12-FY14 this efforts supports Technology Enabled Capability Demonstration 2a Overburdened Physical Burden. Technologies, metrics and tools developed in this effort will transition to PEO Product Managers, TRADOC and integrate into the Soldier systems engineering architecture and Systems Integration Laboratory environment. ***FY 2014 Plans:*** Will mature and demonstrate weight reduction technologies and load management concepts identified in FY12 and FY13 that reduce the physical carried load of dismounted Soldiers at the squad level without negatively impacting Soldier performance and squad effectiveness; demonstrate reductions in Soldier carried load through integration of technologies such as materiel weight reductions (e.g. clothing and equipment, power and energy, and weapons and ammo) gained from lightweight multifunctional materials and reduction of size and cube of Soldier carried items; demonstrate the impact of incorporating Soldier performance	0.000	0.000	10.090

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
prediction capabilities into the mission planning process as a means to manage individual and squad carried loads in concert with emerging tactical aerial resupply or off-loading options; validate human performance and musculoskeletal injury reduction metrics and tools to diagnose and visualize load effects of equipment as well as measure mission effectiveness and mobility; mature and demonstrate select off-loading technologies such as augmentation and weight distribution devices and determine the applicability of these technologies in dismounted and forward operations missions.			
Accomplishments/Planned Programs Subtotals	41.127	28.616	38.215

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 VT5: *Expeditionary Mobile Base Camp Demonstration*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
VT5: *Expeditionary Mobile Base Camp Demonstration*	-	6.272	3.033	7.831	-	7.831	7.706	8.313	5.476	5.575	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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. The Army envisions continuing to conduct this full range of operations worldwide, particularly in the Asia Pacific and Middle East regions. 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 2012	FY 2013	FY 2014
Title: Expeditionary Base Camp (EBC) Technology Demonstrations	6.272	3.033	7.831
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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 4a Basing Sustainment and Logistics.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Assessed maturing power, waste and water technologies and defined an operationally effective architecture for a basic base camp demonstrator; began system integration of best performing components, and validated system effectiveness measures; began to 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:*** 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. ***FY 2014 Plans:*** Will mature self-sustaining contingency basing and system technologies that are modular and man-portable to support the needs of the Squad and Small Unit by providing a high quality of living in efficient, expeditionary systems; demonstrate technical performance parameters identified in FY13 to assess basing manpower needs, operational energy efficiency, water demand and waste remediation and sub-system interoperability; demonstrate contingency basing technologies to assess the performance of an integrated basing system with reduced sustainment requirements that limit delivery of water and fuel as well as the need for collecting, managing and disposing of solid and liquid waste.			
Accomplishments/Planned Programs Subtotals	6.272	3.033	7.831

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	101.655	69.580	62.032	-	62.032	65.167	65.900	64.619	66.367	Continuing	Continuing
810: *Ind Base Id Vacc&Drug*	-	18.234	19.574	17.413	-	17.413	17.022	16.000	13.779	15.374	Continuing	Continuing
814: *NEUROFIBROMATOSIS*	-	12.780	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
840: *Combat Injury Mgmt*	-	37.561	37.396	31.544	-	31.544	32.485	33.696	34.459	34.695	Continuing	Continuing
945: *BREAST CANCER STAMP PROCEEDS*	-	0.695	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
97T: *NEUROTOXIN EXPOSURE TREATMENT*	-	15.975	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
FH4: *Force Health Protection - Adv Tech Dev*	-	1.493	1.690	1.662	-	1.662	1.692	1.730	1.799	1.788	Continuing	Continuing
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	5.991	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
MM3: *Warfighter Medical Protection & Performance*	-	8.926	10.920	11.413	-	11.413	13.968	14.474	14.582	14.510	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding decrease to support higher priority efforts.

A. Mission Description and Budget Item Justification

This program element (PE) maturates and demonstrates advanced medical technologies including drugs, vaccines, medical devices, diagnostics, and developing medical practices and procedures to effectively protect and improve the survivability of U.S. 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 effectiveness and safety information before they can be tested in human 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. Following Phase 1, Phase 2 clinical trials to provide expanded safety data and evaluate the effectiveness of a drug, vaccine, or medical device in a larger population of patients having the targeted disease or medical condition. 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 1 and 2 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 where large Phase 3 pivotal trials will be conducted for licensure. Activities in this PE may include completion of preclinical animal studies and Phase 1 and 2 clinical studies involving human subjects according to FDA and EPA requirements. Promising medical technologies that are not regulated by the FDA are modeled, prototyped, and tested in relevant environments.

Blast research and research into maturing field rations 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 the Department of Defenses biomedical research and development community, as well as its associated enabling research areas.

Project 810 maturates and demonstrates 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 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 maturates, 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 DoDs ability to monitor and protect against adverse changes in health, especially mental health effects caused by changes in brain function. Force Health Pr

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*			R-1 ITEM NOMENCLATURE PE 0603002A: *MEDICAL ADVANCED TECHNOLOGY*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	102.810	69.580	70.759	-	70.759
Current President's Budget	101.655	69.580	62.032	-	62.032
Total Adjustments	-1.155	0.000	-8.727	-	-8.727
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.674	-			
• SBIR/STTR Transfer	-1.829	-			
• Adjustments to Budget Years	-	-	-8.727	-	-8.727

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
810: *Ind Base Id Vacc&Drug*	-	18.234	19.574	17.413	-	17.413	17.022	16.000	13.779	15.374	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project maturates and demonstrates 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 the studies for safety and effectiveness testing on small study groups after which they transition to the next phase of development for completion of expanded safety and initial studies for effectiveness in larger populations. If success is achieved for a product in this project, the effort will transition into Advanced Development. 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 EPA.

Research conducted in this project focuses on the following five areas:
(1) Drugs to Prevent/Treat Parasitic (living in or on another organism) Diseases
(2) Vaccines for Prevention of Malaria
(3) Bacterial Disease Threats (diseases caused by bacteria)
(4) Viral Disease Threats (diseases caused by viruses)
(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 Walter Reed Army Institute of Research (WRAIR) and the U.S. Army Medical Institute of Infectious Disease (USAMRIID) and coordinated with 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.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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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 Walter Reed Army Institute of Research, Silver Spring, MD, and its overseas laboratories; USAMRIID, Fort Detrick, MD; and the Navel Medical Research Center (NMRC), Silver Spring, MD, and its overseas laboratories. Significant work is conducted under a cooperative agreement with the Henry M. Jackson Foundation, Bethesda, MD.

Efforts in this project support the Soldier portfolio and the principal area of Military Relevant Infectious Diseases.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Drugs to Prevent/Treat Parasitic Diseases	2.287	2.932	2.247
Description: This effort selects promising malaria and leishmaniasis (a disease transmitted by sand flies) drug candidates for testing in humans, prepares data packages required for FDA approval of testing in humans, and conducts 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 2012 Accomplishments:*** Initiated safety and effectiveness studies in human volunteers on the most promising candidate identified from preclinical studies. ***FY 2013 Plans:*** Evaluate effectiveness of new anti-parasitic drugs through testing in human populations exposed to malaria and leishmania infections. ***FY 2014 Plans:*** Will assess effectiveness of new and refined anti-parasitic drugs through testing in human populations exposed to malaria and leishmania infections world-wide.			
Title: Vaccines for Prevention of Malaria	4.804	5.556	5.401
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), prepares technical data packages required for FDA approval of testing in humans and conducts 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 2012 Accomplishments:*** Formulated new candidate vaccines against Plasmodium falciparum and Plasmodium vivax malaria and tested them in uninfected adults for safety, immunogenicity (ability to produce an immune response), and effectiveness; further tested the most promising			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
vaccine candidates in adults and children in larger test populations where malaria occurs naturally; and transferred vaccine candidate to the Advanced Development program. ***FY 2013 Plans:*** 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, transition to Advanced Development. ***FY 2014 Plans:*** Will conduct clinical trials of new formulations of vaccine candidates to assess safety and effectiveness in humans and will assess vaccine performance for suitability for transition to Advanced Development.			
Title: Bacterial Disease 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 2012 Accomplishments:*** Conducted human trials of live attenuated Shigella vaccine and E. coli vaccine to determine their effectiveness, and completed transfer of meningococcal vaccine technology to commercial partner. ***FY 2013 Plans:*** 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 FY2012 human trial results; and evaluate results of Campylobacter clinical trial conducted in FY2012. ***FY 2014 Plans:*** Will produce best vaccine candidates by using Good Manufacturing Practices developed by the FDA; will conduct safety trials of multiple vaccine candidates against three diarrheal pathogens (infectious agents) of interest (Shigella, Campylobacter, and E. coli) in human volunteers.	7.438	5.508	5.277
Title: Viral Disease Threats ***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-	1.787	3.359	2.756

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 810: *Ind Base Id Vacc&Drug*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2012 Accomplishments:*** Further developed the hantavirus vaccine with support of a commercial partner to include evaluation of vaccine delivery methods to improve effectiveness and safety and transitioned to Advanced Development program. ***FY 2013 Plans:*** Demonstrate the concept of a prime-boost dengue virus 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; and prepare and conduct safety studies in human volunteers with new HIV vaccine candidates at multiple sites worldwide. ***FY 2014 Plans:*** Will evaluate the alternative strategies to deliver vaccine candidates in human muscle and skin to develop a needle-free injection; will explore the concept of using our DNA vaccines to produce antibodies that could be used to treat or prevent the diseases caused by hantaviruses; and will further evaluate human safety and effectiveness of best vaccine candidates against all dengue types present 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 (infectious agents) 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 2012 Accomplishments:*** Completed the evaluation of repellent products; assisted the commercial partners in fielding FDA-approved rapid human diagnostics (point-of-care tests) for Q-fever and evaluated 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:*** 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 field evaluations on prototype rapid diagnostic kits developed for the detection of selected vector-borne pathogens (pathogens	1.918	2.219	1.732

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
transmitted by insects, such as malaria, leishmania, and dengue virus); complete the development of an enteric assay to transition the assay to Advanced Development; and complete field evaluations and FDA-required 510K clearance on the Dengue Rapid Diagnostic Device. ***FY 2014 Plans:*** Will initiate new field evaluations under the biosurveillance portion of the next-generation diagnostic system (NGDS) managed by Program Manager, Chemical Biologic Medical Systems, specifically for assays targeting vectors (organisms that transmit disease, such as a mosquito) transmitting medically relevant diseases; will conduct field evaluation of the new alternate repellent products in overseas field locations; and will evaluate the NGDS assays (tests) for use in diagnosing pathogens (infectious agents) in humans.			
Accomplishments/Planned Programs Subtotals	18.234	19.574	17.413

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 814: *NEUROFIBROMATOSIS*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
814: *NEUROFIBROMATOSIS*	-	12.780	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurofibromatosis research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Neurofibromatosis (NF) Research Program	12.780	0.000	0.000
Description: This congressionally directed project conducted research on Neurofibromatosis (NF). ***FY 2012 Accomplishments:*** This congressionally directed project conducted research on Neurofibromatosis (NF).			
Accomplishments/Planned Programs Subtotals	12.780	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
840: *Combat Injury Mgmt*	-	37.561	37.396	31.544	-	31.544	32.485	33.696	34.459	34.695	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 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 United States Army Dental & Trauma Research Detachment (USADTRD) and the U.S. Army Institute of Surgical Research (USAISR), Fort Sam Houston, TX; 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 principal areas of Combat Casualty Care and Military Operational Medicine.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Title: Damage Control Resuscitation	11.159	9.722	7.118
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 2012 Accomplishments:*** Initiated limited clinical studies of coagulation factor and platelet function in burn patients; conducted studies of acute coagulopathy (clotting or bleeding disorder) of traumatic shock; and evaluated currently available blood products in a large animal (pig) model. ***FY 2013 Plans:*** Continue coagulation (blood clotting) factor and platelet function studies of ways to stop bleeding and study the use of compounds to reduce inflammation as a therapy for bleeding caused by trauma. ***FY 2014 Plans:*** Will evaluate devices, biologics (medical products derived from living organisms), and techniques to control life-threatening internal bleeding caused by injuries to the chest and abdomen; will continue studies of drugs and biologics to reduce inflammation as therapy for traumatic bleeding and develop laboratory assays and clinical practice guidelines for diagnosis of impaired blood clotting ability caused by trauma; and will validate an improved blood platelet storage technology for far-forward use.			
Title: Combat Trauma Therapies	3.466	5.658	5.173
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 transitioned to Traumatic Brain Injury in FY2012. ***FY 2012 Accomplishments:*** Conducted studies in wound healing, as well as skin, muscle, and bone repair; transferred skin and muscle work to more relevant animal models and continued in-house human trials; FY2012 - work in neuroprotection research transitioned to Traumatic Brain Injury. ***FY 2013 Plans:*** Conduct small-scale clinical trials for most promising therapies for loss of large volumes of muscle and wound healing agents. ***FY 2014 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will transition biofilm diagnostics, drugs that disrupt biofilm formation, and therapies to clinical evaluation and will evaluate a FDA-approved, point-of-care, stem cell implant device in a clinical trial to determine whether it improves muscle function following large-volume muscle loss.			
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 started in FY2012. In FY2013 and FY2014, this effort supports Technology-Enabled Capability Demonstration 7.d, Brain in Combat. ***FY 2012 Accomplishments:*** Sought to complete the FDA effectiveness study of the candidate neuroprotective drug for treatment of TBI and completed the pivotal trial for a bench-top assay for use in hospitals using candidate biomarkers for the detection of TBI; made preparation for transition to Advanced Development; continued development of a smaller, deployable diagnostic device for brain trauma as well as a hand held version; and evaluated progesterone (steroid hormone) and nitrite as therapeutic interventions for blast injury. ***FY 2013 Plans:*** Identify combination therapeutics for Advanced Development/clinical trials for TBI that substantially mitigate or reduce TBI-induced non-convulsive seizures and brain damage. ***FY 2014 Plans:*** Will continue/finish clinical pivotal study to validate assay (test) to diagnose presence and severity of TBI at or near point of injury; will continue clinical trial of candidate drug for treatment of TBI; and will continue work to identify combination therapeutics that mitigate or reduce effects of TBI for Advanced Development and clinical trials.	4.164	3.255	3.398
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. ***FY 2012 Accomplishments:*** Began collection of continuous waveform data (output from vital signs monitors) in burn and trauma patients with blood loss to refine algorithm and evaluated 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:***	2.974	3.973	4.350

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Start 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) and transition vital signs technology to Advanced Development for further test and evaluation, FDA licensure, and for fielding. ***FY 2014 Plans:*** Will seek FDA clearance for advanced algorithms that measure tissue blood flow, metabolism, and oxygenation and will evaluate ventilation strategies to improve neurologic (brain) status in casualties (those injured) with TBI.			
Title: Clinical and Rehabilitative Medicine ***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, bone tissue, and soft tissue (including the genitalia and abdomen), 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 caused by swelling), replacement skin, and facial reconstruction. ***FY 2012 Accomplishments:*** Continued 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; continued preclinical and initial clinical studies of strategies for maxillofacial reconstruction, including wound healing control and tissue engineering/regeneration techniques, to restore facial features; began a pilot clinical trial of a drug that reduces the spread of burn damage; finished preclinical research on engineered implants; started a pilot clinical trial on bone regeneration using scaffold and stem cell technologies; and continued an ongoing clinical trial in muscle regeneration. ***FY 2013 Plans:*** 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, scarless wound, soft tissue, and bone repair strategies; continue development and testing of stem cell therapies and scaffolds (tissue-engineered grafts) in animal models; and continue the evaluation of candidate strategies for craniomaxillofacial (head, neck, face, and jaw) reconstruction, including wound-healing control and tissue engineering/regeneration techniques to restore facial features. ***FY 2014 Plans:*** Will evaluate the preclinical safety and effectiveness of promising drug delivery, diagnostic, tissue repair, and/or treatment strategies for traumatic eye injury; will continue to conduct clinical research for rehabilitation strategies for traumatic eye injury; will incrementally build upon past successes to develop novel drug delivery, diagnostic, reconstructive, and regenerative strategies; will utilize and refine cell-based therapies (including stem cells) and tissue scaffolds (tissue-engineered grafts) to assess soft	10.634	10.588	9.328

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
and hard tissue repair and regeneration safety and effectiveness; and will also build upon promising approaches from FY2013 by continuing the clinical evaluation of candidate strategies for burn, scarless wound healing, bone and soft tissue repair, and strategies to repair extremities (arms and legs), craniomaxillofacial (head, neck, face and jaw), genital, and abdominal regions.			
Title: Under Body Blast Injury Assessment ***Description:*** This 1-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 challenge for the Department of Defense (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 Accomplishments:*** Initiated 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 and accelerated development and integration of human tolerance limits and injury prediction tools to enhance the LFT&E communitys ability to accurately assess ground-combat vehicle occupant survivability in UBB events.	5.164	0.000	0.000
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 5 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 FY2012 to be closed out over the POM. ***FY 2014 Plans:*** Will continue funding for scientific expertise, legal, contracting, research protections, regulatory affairs, and resource support personnel to manage active projects in FY2013 to be closed out over the POM.	0.000	4.200	2.177
Accomplishments/Planned Programs Subtotals	37.561	37.396	31.544

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
945: *BREAST CANCER STAMP PROCEEDS*	-	0.695	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Breast Cancer Stamp Proceeds	0.695	0.000	0.000
Description: This is a Congressional Interest Item. ***FY 2012 Accomplishments:*** This is a Congressional Interest Item.			
Accomplishments/Planned Programs Subtotals	0.695	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
97T: *NEUROTOXIN EXPOSURE TREATMENT*	-	15.975	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Neurotoxin Exposure Treatment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Peer-Reviewed Neurotoxin Exposure Treatment Parkinsons Research Program	15.975	0.000	0.000
Description: This congressionally directed project conducts research for the Neurotoxin Exposure Treatment Parkinsons Research Program. ***FY 2012 Accomplishments:*** Conducted research for the Neurotoxin Exposure Treatment Parkinsons Research Program.			
Accomplishments/Planned Programs Subtotals	15.975	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
FH4: *Force Health Protection - Adv Tech Dev*	-	1.493	1.690	1.662	-	1.662	1.692	1.730	1.799	1.788	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project maturates, 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 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; USARIEM, Natick, MA; and the Naval Health Research Center (NHRC), San Diego, CA.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Health Research	1.493	1.690	1.662
Description: This effort supports validation of interventions 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.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Validated potential intervention strategies for reduction of mental health symptoms and factors associated with suicide, with a goal to reduce the suicide rate, and validated sensor components to include whole-body acceleration (tertiary blast injury) and headform acceleration (TBI). ***FY 2013 Plans:*** 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 work will lead to a greater appreciation of 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. ***FY 2014 Plans:*** Will assess modifiable behaviors and emerging health concerns among Service members using survey data and other health outcome measures and will assess validity of health screening instruments/surveys and other health measures. These data will lead to a greater understanding of the impact of physical and mental health issues for Service members. This effort will potentially provide screening and preventive strategies to decrease negative health consequences and inform DoD polices.			
Accomplishments/Planned Programs Subtotals	1.493	1.690	1.662

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	5.991	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Medical Advanced Technology Initiatives.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Military Burn Trauma Research Program.	5.991	0.000	0.000
Description: This is a Congressional Interest Item.			
FY 2012 Accomplishments: Military Burn Trauma Research Program.			
Accomplishments/Planned Programs Subtotals	5.991	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
MM3: *Warfighter Medical Protection & Performance*	-	8.926	10.920	11.413	-	11.413	13.968	14.474	14.582	14.510	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 myriad environmental and 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 (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 United States Army Research Institute of Environmental Medicine (USARIEM), Natick, MA, and United States Army Aeromedical Research Laboratory (USAARL), Fort Rucker, AL.

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Physiological Health and Environmental Protection (Sleep Research/Environmental Monitoring)	1.534	1.597	1.573
Description: This effort supports and maturates laboratory products, nutritional interventions, and decision aids for the validation of physiological status and prediction of Soldier performance in extreme environments. This effort supports Technology-Enabled Capability Demonstration 1.b, Force Protection--Soldier and Small Unit in FY2013-2014, and also supports Technology-Enabled Capability Demonstration 2.a, Overburdened-Physical Burden in FY2013-2014.			
FY 2012 Accomplishments:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Completed field studies of the heat strain decision-aid with the U.S. Army Ranger School to reduce the risk of heat injuries during training and validated a computational model for predicting performance affected by chronic sleep restriction in the operational environment. ***FY 2013 Plans:*** Evaluate real-time 'thermal strain monitoring and management' system in Brigade Modernization exercise or similar operationally relevant field environment and identify model factors accounting for individual differences in vulnerability to sleep loss and model stimulant countermeasure effects. These results serve to manage thermal strain and sleep loss in real-time. ***FY 2014 Plans:*** Will demonstrate the effectiveness of nutritional interventions for facilitating wound healing and supporting immune function; will demonstrate real-time physiological status monitoring systems for operational use in-theater; will enhance injury prediction algorithms for incorporation into wearable sensor systems; and will allow the prediction and prevention of physical injury and health outcomes.			
Title: Environmental Health and Protection - Physiological Awareness Tools and Warrior Sustainment in Extreme Environments ***Description:*** This effort supports and maturates non-invasive technologies, decision-aid tools, and models to enhance Warrior protection and sustainment across the operational spectrum. This effort supports Technology-Enabled Capability Demonstration 1.b, Force Protection--Soldier and Small Unit in FY2013-2014, and also supports Technology-Enabled Capability Demonstration 2.a, Overburdened Physical Burden in FY2013-2014. ***FY 2012 Accomplishments:*** Validated reference values for non-invasive hydration status markers and transitioned non-invasive hydration assessment sensors to the advanced development program. ***FY 2013 Plans:*** Refine novel hydration sensor technologies with a goal of achieving high (80-95%) diagnostic accuracy. This serves to reduce the incidence of electrolyte-related injury among Warfighters. ***FY 2014 Plans:*** Will determine the prototype noninvasive hydration sensor technologies that meet requirements for clinical precision and reliability. This technology will be used to determine Warrior hydration status and will inform appropriate clinical intervention and will reduce the incidence of heat injuries among Warriors.	1.480	1.726	1.043
Title: Injury Prevention and Reduction (Physical Performance Enhancement) ***Description:*** This effort supports and validates injury prediction tools for brain, spine, and thoracic injury from blast, blunt, and ballistic impact. This effort supports Technology-Enabled Capability Demonstration 1.b, Force Protection--Soldier and Small	3.453	4.392	5.217

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Unit in FY2013-2014, and also supports Technology-Enabled Capability Demonstration 2.a, Overburdened-Physical Burden in FY2013-2014. ***FY 2012 Accomplishments:*** Validated software that accounts for the effects of clothing and body armor on the body following blast; validated software to estimate lung, heart, and rib injury from blunt trauma caused by debris impact (secondary blast injury); and validated the effectiveness of selected elements of neurosensory performance assessment batteries. ***FY 2013 Plans:*** Validate the feasibility of using physiologically based injury models to interpret sensors and 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. ***FY 2014 Plans:*** Will upgrade the blast, blunt trauma, and inhalation performance decrement software to incorporate extreme environmental stressors and will mature musculoskeletal models for predicting physical performance injury and health outcomes for military-relevant tasks, accounting for individual variations, equipment, and environmental factors.			
Title: Psychological Health and Resilience ***Description:*** This effort supports and validates neurocognitive assessment and brain injury detection methods; and validates tools and preclinical methods to treat post-traumatic stress disorder in a military population. This effort supports Technology Enabled Capability Demonstration 7.d, Brain In Combat, in FY2013-2014. ***FY 2012 Accomplishments:*** Determined effectiveness of various treatment modalities (e.g., occupational therapy, counseling, etc.) and validated screening/ scoring guidelines for revisions to the Post-Deployment Health Assessment and the Post-Deployment Health Reassessment. ***FY 2013 Plans:*** 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; and design a strategic research approach to promote the longer-term physical and mental health of the Force. ***FY 2014 Plans:***	2.459	3.205	3.580

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will demonstrate the utility of magnetoencephalography, a cutting-edge imaging technique for the brain, to differentiate post-traumatic stress disorder from brain injury following a post-concussion event and the utility of circulating blood biomarkers for effective acute assessment of brain injury post-concussion symptoms and will demonstrate whether neurocognitive testing can accurately inform assessment of the brain injury following a post-concussion event. These efforts will lead to more effective assessment of Warriors and will facilitate improved strategies for appropriate care and will identify better treatment modalities for brain injury following a post-concussion event.			
Accomplishments/Planned Programs Subtotals	8.926	10.920	11.413

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	60.333	64.215	81.080	-	81.080	92.341	91.503	96.893	101.546	Continuing	Continuing
313: *Adv Rotarywing Veh Tech*	-	46.776	44.814	63.547	-	63.547	75.223	73.890	78.792	83.936	Continuing	Continuing
436: *Rotarywing MEP Integ*	-	5.408	9.492	9.257	-	9.257	6.867	7.841	9.623	8.979	Continuing	Continuing
447: *ACFT Demo Engines*	-	8.149	9.909	8.276	-	8.276	10.251	9.772	8.478	8.631	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY 14 resources increased for Future Vertical Lift

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, demonstrates and integrates 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; Joint Base Langley-Eustis, VA; and Moffett Field, CA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	62.095	64.215	69.519	-	69.519
Current President's Budget	60.333	64.215	81.080	-	81.080
Total Adjustments	-1.762	0.000	11.561	-	11.561
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.762	-			
• Adjustments to Budget Years	-	-	11.561	-	11.561

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
313: *Adv Rotarywing Veh Tech*	-	46.776	44.814	63.547	-	63.547	75.223	73.890	78.792	83.936	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project matures, demonstrates and integrates components, subsystems and systems for vertical lift and unmanned air systems 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, drive trains, robust airframe structures and integrated threat protection systems. A major effort in this project is the Joint Multi-Role (JMR) Technology Demonstrator in support of the Future Vertical Lift (FVL) family of 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 Development Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), Joint Base Langley-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 2012	FY 2013	FY 2014
Title: Rotorcraft Survivability	6.555	0.000	0.000
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 2012 Accomplishments:*** Conducted follow-on Hardware-In-The-Loop (HITL) demonstration of survivability software adapter utilizing Integrated Aircraft Survivability Equipment (I-ASE) system, developed by PM-ASE, and additional aircraft survivability systems; and finalized Super - Application Programming Interface (API) definition to allow existing legacy ASE devices and newly developed ASE devices to be added to the aircraft with little or no software changes to the aircraft - plug & play.			
Title: Integrated Aircraft and Crew Protection	5.142	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: This effort demonstrates combined rotorcraft platform durability and survivability improvements through a fully optimized, 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 2012 Accomplishments:*** Completed definition of integrated technology solution, including ballistic protection, vehicle crashworthiness, aircrew restraints and crash loads alleviation to enhance aircraft / occupant protection, improve durability, and reduce environmental vulnerability Defined and began technology maturation and an integrated demonstration approach for a combat tempered platform.			
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:*** 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 3-D 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; 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 conduct system engineering trades and validation of component integration. ***FY 2014 Plans:*** Will generate real-time threat lethality prediction algorithms and 3-D route planning optimization algorithms which include consideration of aircraft flight dynamics limits, and will demonstrate in the AMRDEC Aviation Integration System Facility; will demonstrate modular integrated survivability architecture using aircraft survivability equipment components, and incorporate Future Airborne Common Environment conforming software; and will initiate full scale fabrication of a combat tempered airframe sub-section designed to meet damage tolerance criteria.	0.000	9.178	11.452
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	17.230	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2012 Accomplishments:*** Completed assessment of reconfigurable rotors technology; designed a high performance, low vibration, low noise rotor and integrated control system; investigated advanced air vehicle concepts that address Army Aviation performance gaps; and initiated trade studies that support the evaluation of candidate next generation air vehicle designs that 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, and reduces flight control system weight. This work continues in FY13 under the Rotors & Vehicle Management Systems effort. ***FY 2012 Accomplishments:*** Finished simulation evaluation of candidate systems to determine final candidates for flight demonstration in FY15; and began detailed analysis and design of the best candidate Adaptive Vehicle Management System (AVMS) suites in preparation for flight demonstration of advanced technologies to improve legacy and future fleet handling qualities.	3.736	0.000	0.000
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 (AVMS) effort and the rotor design work of the Rotor Design and Capabilities effort. ***FY 2013 Plans:*** 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,	0.000	9.590	7.296

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will demonstrate scalable and portable vehicle management system techniques to more efficiently use available data to improve performance and reduce pilot workload using advanced flight controls, across a wide range of Army rotorcraft sized vehicles and missions (cargo, assault, scout, attack and recon); will demonstrate an integrated reconfigurable rotor, at full scale in a wind tunnel, and its capability to adapt during operation to maximize performance, reduce vibrations, and reduce acoustic signatures.			
Title: Platform Design & Structures Systems ***Description:*** Design, fabricate, evaluate and demonstrate advanced vertical lift aircraft system configurations that address Future Vertical Lift (FVL) medium class capability needs. 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 FVL medium class technology demonstrators. Prior to FY13, this effort was exhibited under the Rotor Design and Capabilities effort. ***FY 2013 Plans:*** Complete initial Operations Analysis and 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; and initiate preliminary design of multiple aircraft concepts. ***FY 2014 Plans:*** Will conduct preliminary design of multiple technology demonstrator aircraft, considering higher speed rotor/prop-rotor configurations, lightweight airframe structures, and low drag fuselages to support medium lift utility and attack/recon missions; design support testing will be conducted to establish performance expectations for vehicle subsystem concepts and enablers; will refine a model development specification; will initiate technology maturation plans for the selected vehicle concepts; and will conduct configuration and architecture concept evaluations with analyses and demonstrations performed to mature tools, processes and technologies required for mission systems development.	0.000	11.770	33.068
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.	3.877	5.000	6.204

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Completed detailed design and began 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:*** 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. ***FY 2014 Plans:*** Will complete designs of full-scale demonstrator transmissions and tail rotor drive shaft system; will fabricate full-scale demonstrator hardware for Kiowa and Blackhawk aircraft configurations; will assess and validate reliability and maintainability algorithms; and will assess progress towards meeting production and operational cost goals.			
Title: Maintainability & Sustainability Systems ***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 2012 Accomplishments:*** Demonstrated 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 developed data fusion techniques to improve sensor coverage and account for system-to-system influences. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will develop advanced prognostic algorithms for more chaotic, non-linear dynamic failure modes for engines, flight controls, rotor systems and drives; will develop the interfaces for health monitoring systems to communicate with Joint Common Architecture	6.477	6.976	2.027

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
standards; and will evaluate the integration of system health monitoring with electronic controls to enable adaptive control systems.			
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 develops standards and requirements for an aviation open systems, mission processing architecture that is scalable across joint rotorcraft missions. This effort implements these standards into a prototype processing system and demonstrates them through Software Integration Lab (SIL) testing. ***FY 2012 Accomplishments:*** Increased complexity of airspace/battlespace scenario and demonstrated effectiveness of real-time displays and collision avoidance technologies; and began development of a software developer toolkit and integrator toolkit to verify software compliance with defined JCA standards and requirements. ***FY 2013 Plans:*** 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).	3.759	2.300	0.000
Title: Crew Decision Aid System ***Description:*** Development of intelligent algorithms that aid decisions and actions in order to increase situation awareness, maximize use of on-board and off-board sensors, efficiently manage a team of manned and unmanned vehicles and their mission systems, and develop and execute effective and appropriate offensive and defensive responses. ***FY 2014 Plans:*** Will initiate development of intelligent search and screen functions to sort actionable priority data from onboard and offboard sources and will evaluate Joint Common Architecture-like protocols for algorithm integration.	0.000	0.000	3.500
Accomplishments/Planned Programs Subtotals	46.776	44.814	63.547

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
436: *Rotarywing MEP Integ*	-	5.408	9.492	9.257	-	9.257	6.867	7.841	9.623	8.979	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 aircraft 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 Development Directorate of the Aviation and Missile Research, Development and Engineering Center (AMRDEC), Joint Base Langley-Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Unmanned and Optionally Manned Systems	2.648	4.992	7.257
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. Develop, mature, apply, and integrate advanced decision aiding, autonomy, and human-machine interface technologies to enable the helicopter flight crew to make full use of the capabilities of an unmanned aerial system (UAS) without requiring continuous attention.			
FY 2012 Accomplishments: Migrated 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:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Complete fabrication of unattended delivery and landing system through incorporation of 3-D terrain analysis and mapping; mature and integrate multi-vehicle control technologies for cargo/resupply Unmanned Aerial System (UAS) operations; and prepare for flight demonstration. ***FY 2014 Plans:*** Will mature and integrate autonomous retrograde capability on rotary-wing cargo UAS; will conduct flight testing and system-level demonstration of all technologies integrated on the cargo unmanned aerial demonstrator system; will determine highest-value unmanned wingman functions for decision aiding and autonomy; and will select and begin algorithm implementation and integration approach.			
Title: Aircraft Weapon & Sensor Systems ***Description:*** Mature and integrate sensors, weapons, and networked technologies into manned and unmanned air systems for enhanced reconnaissance, attack, utility, and cargo missions. ***FY 2012 Accomplishments:*** Developed 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:*** 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. ***FY 2014 Plans:*** Will fabricate advanced fire control systems and demonstrate an integrated weapon system through flight test, including: sensors, proximity/point detonation airburst ammunition and sensor targeting algorithms, for use against ground and air targets.	2.760	4.500	2.000
Accomplishments/Planned Programs Subtotals	5.408	9.492	9.257

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
447: *ACFT Demo Engines*	-	8.149	9.909	8.276	-	8.276	10.251	9.772	8.478	8.631	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 vertical lift aircraft. 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 vertical lift 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 Development Directorate of the Aviation and Missile Research, Development, and Engineering Center (AMRDEC), at Joint Base Langley-Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Future Affordable Turbine Engine (FATE)	8.149	9.909	8.276

Description: Demonstrate an advanced, innovative 7000 horsepower 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 combustor subsystem, then the turbine subsystem, and finally the mechanical systems. Work in this project is coordinated with efforts in PE 0602211A, project 47A.

FY 2012 Accomplishments:

Completed preliminary design, and initiated 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 that included 2-D and 3-D mechanical and aero-thermal efforts to evaluate the merits of individual components.

FY 2013 Plans:

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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; and analyze completed component test results to support redesign efforts as required for future engine builds. ***FY 2014 Plans:*** Will complete all remaining component tests in support of first engine build; will use results from these initial component level tests to complete/refine hardware fabrication efforts as appropriate for the first engine build and redesigned component tests; will complete FATE engine hardware fabrication and initiate assembly/instrumentation for first engine test; and will identify design improvements for goal demonstration testing.			
Accomplishments/Planned Programs Subtotals	8.149	9.909	8.276

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	75.607	67.613	63.919	-	63.919	64.767	49.470	64.569	65.795	Continuing	Continuing
232: *Advanced Lethality & Survivability Demo*	-	53.446	50.578	46.668	-	46.668	46.396	33.387	42.674	43.914	Continuing	Continuing
L96: *High Energy Laser Technology Demo*	-	17.845	13.965	13.971	-	13.971	14.677	12.000	17.250	17.152	Continuing	Continuing
L97: *Smoke And Obscurants Advanced Technology*	-	4.316	3.070	3.280	-	3.280	3.694	4.083	4.645	4.729	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 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.

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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.

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	76.955	67.613	76.236	-	76.236
Current President's Budget	75.607	67.613	63.919	-	63.919
Total Adjustments	-1.348	0.000	-12.317	-	-12.317
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.635	-			
• SBIR/STTR Transfer	-1.983	-			
• Adjustments to Budget Years	-	-	-12.317	-	-12.317

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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
232: *Advanced Lethality & Survivability Demo*	-	53.446	50.578	46.668	-	46.668	46.396	33.387	42.674	43.914	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Ground Based Networked Munitions Technologies	2.951	0.000	1.388
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. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection Basing.			
FY 2012 Accomplishments: Integrated imagery and image processor, in a translucent protective container with Spider Munition Control Unit (MCU), for TRL 6 demonstration; incorporated the low collateral SD technology into a representative Scorpion System and concluded it with a final			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
TRL 6 test/demonstration; demonstrated the disposable radio repeater technology to maintain and regain signal from the Spider to the hand held device during the TRL 6 testing. ***FY 2014 Plans:*** Will mature autonomous Non-Lethal Alert technology for personnel detection/discrimination that was previously developed with improved communications and decreased size and weight to better support the base protection mission; will optimize non-lethal effects package for Autonomous Non-Lethal Alert to provide enhanced force protection.			
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:*** 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.	0.000	2.904	0.000
Title: Tunable Pyrotechnics ***Description:*** This effort demonstrates smoke and flare countermeasure for passive protection for ground and air combat platforms. ***FY 2012 Accomplishments:*** Validated performance of advanced countermeasure flares through captive seeker flight testing and demonstrated 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:*** 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.	2.897	2.993	0.000
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 2012 Accomplishments:***	9.701	8.493	3.019

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Integrated developed gun system with optimized ammunition to provide salvo firing capability; validate fire control software and integration into gun system; verified optimized warhead performance; assessed software and firmware improvements to track, divert and initiate the warhead of multiple targets simultaneously. ***FY 2013 Plans:*** Demonstrate the ability to track, command maneuver, and command detonate multiple in-flight projectiles against RAM targets and improve software based on flight results. ***FY 2014 Plans:*** Will demonstrate integrated system of radar, command guided interceptors, and auto cannon by a defeat of a statically placed threat munitions; will also demonstrate performance requirements.			
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 2012 Accomplishments:*** Integrated optimized flight projectile, fire from enclosure (from cover) propulsion and light weight composite launcher; optimized system against requirements; demonstrated integrated system capability; and validated system capability against target set.	4.694	0.000	0.000
Title: Advanced Lethality Demonstration ***Description:*** This effort matures and demonstrates novel penetrator designs (without using depleted uranium (DU)), as well as alternative lethal mechanisms to maintain or exceed tank main gun performance against multiple target types into the future. ***FY 2012 Accomplishments:*** Optimized and validated tactical size KE penetrator against actual range targets; provided lethality maps for modeling and simulation. ***FY 2013 Plans:*** Fabricate several full-up KE rounds with selected novel penetrator and demonstrate lethality performance meets modeling and simulation predictions and range objectives in an instrumented range; design based on results, refine design and prepare additional testing on range and simulated operational environment, i.e., fired from a tank. ***FY 2014 Plans:***	2.653	3.060	4.175

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will build/procure hardware components, assemble cartridges, and conduct functional and armor tests leading to techonology demo. Will conduct technology demonstration (120 mm ballistic testing through all temperatures); will analyze test data: will provide test results to PM-MAS to determine if the Army needs to continue DU production.			
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 2012 Accomplishments:*** Demonstrated fuze reliability through static and ballistic testing; optimized warhead design based on feedback and used input to validate systems effectiveness modeling. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will perform TRL6 demonstration on complete system which will consist of two major tests - a static arena test on the warhead and a ballistic demonstration test; the static arena test will provide data on the effectiveness of the round which will then be used to validate that the system meets the lethality requirements; the ballistic demonstration test will show the performance of the system in a representative environment and show the improvement in reliability over traditional DPICM.	5.005	6.977	4.035
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 2012 Accomplishments:*** Built 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; matured remaining system dynamics models; utilized systems engineering to optimize components maturation efforts for maximum return on investments	10.719	12.408	11.051

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
and performance; demonstrated scalable lethality effects leveraging non-lethal munition technologies; conducted 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:*** 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 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. ***FY 2014 Plans:*** Will demonstrate and mature the turret control system in preparation for the integration of the weapon, ammunition handling system and fire control sensor enhancements within a Bradley fighting vehicle; demonstrate system level optimized performance capabilities of a 30mm weapon platform; optimize and down select the appropriate air bursting fuze technologies for the integration within the 50mm air bursting cartridge; continue to mature and improve the fire control target based user interface software as well as continue to develop and optimize the design of the 50mm Bushmaster III gun.			
Title: Advanced Remote/Robotic Armament System (ARAS) ***Description:*** This effort provides advanced remote armaments with scalable effects from non-lethal to lethal engagements. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection – Basing. Note: Prior to FY14, this effort was combined with Medium Caliber Weapon Systems above. ***FY 2014 Plans:*** Will mature and demonstrate ARAS software/electronics controls and validate/improve mechanical subsystems to ensure they meet all design specifications which will mitigate risks associated with obtaining an Army Test and Evaluation Command (ATEC) limited safety release which is essential for the capstone demonstration; also, in preparation of ATEC testing, generation of a Safety Assessment Report (SAR) and other pre-ATEC activities will be performed	0.000	0.000	1.006
Title: Advanced Power and Energy Management for Munitions	1.747	3.119	3.247

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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 Accomplishments:*** 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:*** 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. ***FY 2014 Plans:*** For multi-point initiation, will demonstrate a distributed four point initiation system in a future warhead application that is capable of achieving simultaneity between points and selectable control; for proximity sensor, will demonstrate improved range extraction and enhanced countermeasure protections through ballistic testing; for impact switch, will mature and demonstrate a microelectricalmechanical system (MEMS) based impact switch that has multi-level sensing capability against varying targets; for thin film thermal batteries, will mature and demonstrate a thin film heat source integrated into existing thin film battery; for super capacitor, will demonstrate robustness of design through environmental and ballistic testing.			
Title: Scale-up of Energetic Materials ***Description:*** This effort matures and demonstrates the performance and insensitivity of energetic materials in medium caliber (direct fire) and large cal (indirect fire) weapons. ***FY 2012 Accomplishments:*** Assessed propulsion system as well as explosive warhead performance improvements against most critical current and projected threat targets; fabricated and bench tested improved energetic materials in tactical quantities and configurations to evaluate performance improvements. ***FY 2013 Plans:***	2.800	2.948	1.819

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will scale-up and formulate newly synthesized ingredients for lethality and insensitive munition (IM) benefits; will optimize propellant formulations for various applications of interest for extended range; will prototype novel propulsion system concepts; will perform live fire and performance testing for nano pressed explosives; will conduct IM insult testing on XM1128 projectile; will perform IM testing on compatible IM detonation trains.			
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 Accomplishments:*** Conducted performance assessment of counter countermeasure technologies for application to prioritize weapon systems with the most critical need; conduct system trade studies; fabricated surrogates to evaluate improvements; and assessed technologies for application to Army unique needs for mitigation of unexploded ordnance. ***FY 2013 Plans:*** 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	0.000
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 Accomplishments:*** Matured and demonstrated enabling technologies, tactically relevant to the Kinetic Energy Active Protection System, and its subsystems to increase the battlefield lethality/survivability; demonstrated technologies for longer range artillery systems by optimizing alternative launch mechanisms for indirect fire extended range; demonstrated technologies for sensor-fused munitions for anti-armor and area defense capability; demonstrated technologies for improving precision that extended beyond existing ranges. ***FY 2013 Plans:***	8.934	3.439	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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.			
Title: Force Protection and Tactical Overmatch Armament Systems ***Description:*** This effort demonstrates improved ability to deliver decisive effects by providing hemispherical protection to semi-fixed and mobile sites against personnel, vehicle, and materiel targets to enable tactical overmatch to the Tactical Small Unit. ***FY 2014 Plans:*** Will integrate mature component technologies that have demonstrated effects against threat UAS, direct and indirect fired munitions providing hemispherical protection system of systems approach to accurately sense, warn, and respond to threats by delivering decisive effects timely and accurately.	0.000	0.000	1.534
Title: Remote Armament System Integration ***Description:*** This effort integrates and demonstrates weapon systems on a semi-autonomous and autonomous unmanned platforms while maintaining positive control of weapon system. ***FY 2014 Plans:*** Will integrate mature component technologies of a medium caliber weapon mounted on a 1+ ton unmanned vehicle controlled via secure distributed communications operating up to 5 km from command and control entity.	0.000	0.000	1.912
Title: Networked Effects Decision Suite ***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:*** 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. ***FY 2014 Plans:***	0.000	3.500	2.511

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will implement fire support execution matrix; will improve target prioritization; will improve 3D de-conflictions of fires application; will demonstrate target data/track management and effects planning; will demonstrate weapon placement coordination; will demonstrate effects planning component.			
Title: Precision Non-Line-of-Sight (NLOS) Munition for Light Forces ***Description:*** This effort will provide a precision technology capability for an 81mm mortar cartridge for light forces for base defense. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection Basing. ***FY 2014 Plans:*** Will improve and optimize down selected 81mm mortar GPS precision design candidate; will mature design and integrate into 81mm mortar round system taking into account warhead and propulsion system; will validate the 81mm precision mortar design integration.	0.000	0.000	1.006
Title: Solid State Active Denial Technology (SS-ADT) ***Description:*** This effort demonstrates non-lethal counter-personnel directed energy (DE) technology for crowd control up to 100 meters. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection Basing. ***FY 2014 Plans:*** Will improve the azimuth and elevation steering capability and develop a Fire Control Suite for Target Tracking; will perform demonstration of human target effects.	0.000	0.000	1.914
Title: Integrated Base Defense Hostile Protection System ***Description:*** This effort demonstrates technology to locate unmanned aircraft systems (UAS) in bearing via acoustic sensor arrays as well as the source of mortars and mortars and rocket propelled grenades (RPGs). In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection – Basing. ***FY 2014 Plans:*** Will demonstrate and optimize acoustic detection and tracking in bearing of UAS; will mature multi node system level fusion to improve performance, repackage components to reduce logistic burden and optimize power usage, for extended mission life and maintenance cycles; will support and participate in TECD 1a to demonstrate integrated capabilities.	0.000	0.000	1.510
Title: Extended Range/Guided 40mm Munition ***Description:*** This effort develops a 40mm guided, low cost, extended range projectile for use in the M320 launcher. Warfighter/ Command & Control will be able to see beyond line-of-sight targets while in flight. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection Basing.	0.000	0.000	2.013

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2014 Plans: Will mature and demonstrate optimized components for a guidance navigation and control system for extended range 40mm low velocity grenades; will perform improvements of extended range technologies to include airframe and Guidance, Navigation and Control and will conduct a demonstration; will optimize and demonstrate a mature warhead integrated into the projectile.			
Title: Automated Direct/Indirect Fire Mortar (ADIM) ***Description:*** This effort develops a line-of-sight/non-line-of-sight remotely operatable mortar system for use in base protection and mobile fire support. In FY 2014 this effort supports Technology Enabled Capability Demonstration 1.a, Force Protection Basing. ***FY 2014 Plans:*** Will improve and optimize the baseline, ground-up designed system; will demonstrate its capabilities in a controlled environment in order to validate expected increases in performance.	0.000	0.000	3.019
Title: Explosive Hazard Predetonation System ***Description:*** This effort demonstrates a system to neutralize improvised explosive devices (IEDs) leveraging emerging detection, geo-location, and classification technologies on a ground vehicle. It provides an integrated system approach to enhanced neutralization / predetonation that leverages data from sensor networks providing IED detection, geolocation and classification data. It transitions from the IED Neutralization Technology effort in PE 0602642A/Proj H19 in FY2014/15. ***FY 2014 Plans:*** Will demonstrate an improved IED neutralization capability that interoperates with standard communications networks and databases that provide historical and real time IED emplacement data; Will mature the neutralization system to utilize beam steering algorithms for convoy operations as well as integrate emerging waveforms to defeat a wider class of IEDs; will demonstrate reduce Size, Weight and Power (SWaP) requirements for legacy neutralization systems utilizing emplacement data and RF generation enhancements.	0.000	0.000	1.006
Title: Enhanced Sniper Technologies ***Description:*** This effort will investigate advanced projectile designs such as long rod technologies that will provide snipers with the capability for increased range effectiveness (up to 1500m, possibly greater), hit probability, and armor penetration for man-portable sniper systems. ***FY 2014 Plans:***	0.000	0.000	0.503

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will optimize the performance of the long rod sabot, notably the slip obturator and discard; will demonstrate accuracy improvements associated with design modifications to existing projectiles; will investigate the technological advances and viability of guided munitions in small caliber applications.			
Accomplishments/Planned Programs Subtotals	53.446	50.578	46.668

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
L96: *High Energy Laser Technology Demo*	-	17.845	13.965	13.971	-	13.971	14.677	12.000	17.250	17.152	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: High Energy Laser Technology Demonstrator (HEL TD) Beam Control System (BCS)	17.845	0.000	0.000
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 (HEL MD) planned program. HEL MD is the follow-on set of activities that utilize the mobile platform with			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
rugged BCS to continue integration and demonstration of other subsystems required for a HEL weapon, such as power, thermal management, and a rugged laser. ***FY 2012 Accomplishments:*** Conducted high power HEL demonstrations of target acquisition, tracking, aim point selection and lethality against rockets, mortar, and other selected targets. Pre-demonstration activities included BCS and 100 kW SSL hardware integration with check out activities. Planned for High Energy Laser Joint Technology Office (HEL JTO) provided Adaptive Optics (AO) technologies for integration into the BCS and prepared 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 HEL MD 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:*** Use the HEL technology selected under PE 0602307A, Project 042 to begin ruggedization of a 25-50kW class laser device for integration on the HEL MD 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. ***FY 2014 Plans:*** Will complete ruggedization efforts for available programmable pulsed power technology to provide prime power for the 50 kW laser device; begin ruggedization of available thermal management technology that can cool the 50 kW laser device; provide additional ruggedization of the 50 kW laser device to enable integration into the HEL MD platform; correct beam control system deficiencies discovered during the 10 kW demonstration.	0.000	7.499	11.571
Title: High Energy Laser Mobile Demonstrations (HEL MD) ***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 that includes the ruggedized BCS built under the HEL TD effort and other required subsystems to demonstrate weapon system performance. The goal is to demonstrate and evaluate performance of a complete mobile high power laser weapon in a relevant environment.	0.000	6.466	2.400

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2013 Plans: 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 HEL MD 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 HEL MD platform to support the next phase (25-50kW) of HEL mobile demonstrations. ***FY 2014 Plans:*** Will complete the 10 kW laser demonstration integrated with the HEL MD platform; finish assessment of 10 kW integrated subsystem performance against selected targets; demonstrate and assess the performance of the HEL JTO provided AO technologies with the 10kW laser device to determine increases to effective range of the laser; begin integration of power subsystem for future 50kW demonstration.			
Accomplishments/Planned Programs Subtotals	17.845	13.965	13.971

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
L97: *Smoke And Obscurants Advanced Technology*	-	4.316	3.070	3.280	-	3.280	3.694	4.083	4.645	4.729	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Obscurant Enabling Technologies	0.981	0.650	0.659
Description: This effort demonstrates the dissemination of new and advanced obscurants. ***FY 2012 Accomplishments:*** Optimized and demonstrated bispectral obscurant grenade; mature, fabricate and test grenade concepts for new low hazard visual obscurant/smoke. ***FY 2013 Plans:*** Optimize new low hazard visual obscurant grenade. ***FY 2014 Plans:*** Will conduct toxicology studies of optimized grenades; further characterize performance of low hazard visual obscurant grenade.			
Title: Forensic Analysis of Explosives	1.399	0.906	1.053

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Description: This effort demonstrates improved point and stand-off detection of explosives and home made explosive (HME) precursors. ***FY 2012 Accomplishments:*** Matured and evaluated 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:*** Optimize, mature and demonstrate a HME detection kit for the dismounted soldier. ***FY 2014 Plans:*** Will demonstrate unambiguous biometric identification detection of explosives in latent fingerprints; develop a prototype forensic imager that will generate digital fingerprints compatible with law enforcement databases and simultaneously determine the chemical composition of trace residue using Raman chemical imaging and fluorescence imaging.			
Title: Detection Mechanisms for Contaminants ***Description:*** This effort demonstrates improved point and standoff detection of a wide range of hazardous materials. ***FY 2012 Accomplishments:*** Matured innovative technologies based on multiple spectroscopic sensing techniques for the detection and identification of hazardous material; integrated 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:*** 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). ***FY 2014 Plans:*** Will optimize and mature unified ion mobility based sensing of explosives and chemical agents in the Joint Chemical Detector (JCD) system; demonstrate standoff detection of trace homemade explosives with laser based systems.	1.936	1.514	1.568
Accomplishments/Planned Programs Subtotals	4.316	3.070	3.280

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	142.833	104.359	97.043	-	97.043	104.204	92.861	104.145	105.582	Continuing	Continuing
221: *Combat Veh Survivablty*	-	42.666	53.322	49.513	-	49.513	48.617	43.864	48.076	48.504	Continuing	Continuing
441: *Combat Vehicle Mobilty*	-	41.559	36.028	31.595	-	31.595	34.450	33.138	38.068	38.753	Continuing	Continuing
497: *Combat Vehicle Electro*	-	8.700	6.620	7.353	-	7.353	9.850	6.911	7.564	7.700	Continuing	Continuing
515: *Robotic Ground Systems*	-	9.971	8.389	8.582	-	8.582	11.287	8.948	10.437	10.625	Continuing	Continuing
53D: *NAC Demonstration Initiatives (CA)*	-	39.937	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, microgrids 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.

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).

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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army	DATE: April 2013
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*

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	145.914	104.359	103.140	-	103.140
Current President's Budget	142.833	104.359	97.043	-	97.043
Total Adjustments	-3.081	0.000	-6.097	-	-6.097
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.508	-			
• SBIR/STTR Transfer	-2.573	-			
• Adjustments to Budget Years	-	-	-6.097	-	-6.097

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
221: *Combat Veh Survivablty*	-	42.666	53.322	49.513	-	49.513	48.617	43.864	48.076	48.504	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Active Protection Systems (APS) against Kinetic Energy (KE) and Long-Range Threats: ***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 2013 Plans:*** Support closeout of KE APS program including collection and archiving of documents and artifacts enabling knowledge preservation and transition feasibility.	0.000	0.400	0.000
Title: Tactical Wheeled Vehicle (TWV) Survivability: ***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.	12.430	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Applied the lessons learned from the systems engineering evaluation and survivability suite; began work on an optimized suite of survivability systems that focused on convoy protection; defined, fabricated, integrated and evaluated 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 2012 Accomplishments:*** Fabricated vision protection technologies at TRL 6; explored application of protection techniques to other Heavy Brigade platforms and performed laboratory assessments to address evolving threats. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** This effort will initiate vulnerability studies of electro-optical (day-camera) sensors against pulsed-laser energy threats to determine pixel, column and kill energy levels for the sensors; will refine the integration technique required to apply the laser protection technology to those sensors.	4.566	4.775	3.947
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 Accomplishments:***	8.323	0.970	1.004

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Fabricated and evaluated combat and tactical wheeled vehicle armor recipes and improved mine kit designs against objective threats while reducing armor weights; integrated armors on demonstrator vehicles and began performance evaluations; validated platform-level mine-blast response modeling and simulation tools to include crew/occupant response to support system level analysis. ***FY 2013 Plans:*** Evaluate various methods for reducing delamination and rock strike damage of transparent armor and demonstrates improved performance while maintaining armor visual transparency. ***FY 2014 Plans:*** This effort will mature and integrate advanced tactical and combat vehicle armor technologies by performing environmental, automotive and ballistic testing; will explore new integration techniques for armor systems; and will procure long-lead for future integrated armor attachment durability performance testing.			
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 2012 Accomplishments:*** Completed validation of track performance in an operational environment and transition design to PM Bradley Engineering Change Proposal (ECP) program.	2.975	0.000	0.000
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 2012 Accomplishments:*** Initial occupant protection suites analyzed for tradeoff studies, balancing protection against performance and payload; conducted an in-progress review to present analysis results and make recommendations for a program selection of demonstrator platform and occupant protection technologies; designed, built, and integrated the selected technologies onto the demonstrator vehicle and optimization of the ideal occupant cab.	9.047	0.000	0.000
Title: Underbody Blast Methodology:	5.325	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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 Accomplishments:*** Evaluated 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.			
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 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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 1.c: Force Protection - Occupant Centric Platform. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** This effort will integrate occupant protection technologies onto demonstrators using an approach that focuses on protecting the occupants by designing from the inside out; will refine processes for establishing occupant centric standards and guidelines; will conduct assessments using physical models and proofs of concepts of occupant protection capabilities to validate M&S and to reduce risks; and will design and integrate solutions to reduce injuries from secondary effects such as loose cargo becoming flying hazards in blast crash and rollover events.	0.000	14.271	8.132
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	0.000	14.827	12.207

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 1.c: Force Protection - Occupant Centric Platform. ***FY 2013 Plans:*** 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. 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. ***FY 2014 Plans:*** This effort will continue to develop and will demonstrate technologies to mitigate injuries due to underbody blast events, crashes and rollovers; will develop interior technologies to mitigate blast effects and develop vehicle exterior technologies such as energy absorbing materials in structural design, hull shaping and floor designs; will improve test and evaluation methods to validate existing M&S models; will design methodologies and assessments of blast mitigation products; will improve lab and instrumentation capabilities to assess components, sub-system and system level blast mitigation capabilities; and will create and maintain standards, guidelines and methodologies for specific blast mitigation technologies.			
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 agents, fire-resistant materials and hardware components. This effort is done in coordination with efforts in 0602601A, project C05. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 1.c: Force Protection - Occupant Centric Platform. ***FY 2013 Plans:*** 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	0.000	4.612	4.468

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** This effort will continue to demonstrate enhanced fire protection technologies for military platforms; evaluate and verify Common Automated Fire Extinguishing System (AFES) components to establish compliance to the AFES requirements; will integrate design of the Common Crew AFES into a vehicle platform to determine integration, test, safety, and fielding requirements for AFES on demonstrators designed for Occupant Centric military platforms; will validate M&S capabilities that were established for the OCP and improve modeling capabilities; and will enhance in-house laboratory capabilities to improved assessment and demonstration of vehicle fire protection technologies.			
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:*** 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. ***FY 2014 Plans:*** Will complete system analysis of Active Protection (AP) technologies and utilize the analysis to develop component specifications for active protection systems (APS); continue development of fuze board-compliant common APS command and control processor/fire control module to enable APS commonality across vehicle fleet; develop and provide bus protocols, common interface specifications and standards to industry for APS common architecture; conduct hardware in the loop analyses of AP components during development and integration of AP component technologies with the common processor; incorporate a laser decoy countermeasure (CM) capability into an existing infrared softkill CM; enhance capability of softkill jam lab and utilize to test	0.000	13.467	19.755

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
and mature softkill countermeasure; complete softkill countermeasure environmental and live fire assessments to mature the countermeasure to TRL 6.			
Accomplishments/Planned Programs Subtotals	42.666	53.322	49.513

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
441: *Combat Vehicle Mobilty*	-	41.559	36.028	31.595	-	31.595	34.450	33.138	38.068	38.753	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Hybrid Electric Component Development:	5.994	5.439	4.992
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, 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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 4a: Sustainability/Logistics-Basing.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Demonstrated 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; matured thermal systems to increase HVAC efficiency; and demonstrated electronics cooling technologies for increased performance. ***FY 2013 Plans:*** 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 are being 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 are validating high voltage architecture to support growing combat vehicle electric power requirements. ***FY 2014 Plans:*** This effort will integrate onboard vehicle power (OBVP) components onto the vehicles to demonstrate increased vehicle power generation capabilities; will evaluate performance of vehicle with OBVP against baseline vehicle performance; will evaluate reliability of hybrid vehicle components, including electric motors and controllers; and will demonstrate bidirectional vehicle to grid power flow and mobile microgrid capability.			
Title: Advanced Running Gear:	6.730	5.860	5.623
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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 1c: Force Protection - Occupant Centric Platform. ***FY 2012 Accomplishments:*** Evaluated reformulated track elastomer improvements through on-vehicle evaluation to determine effectiveness in increasing track system durability and survivability. Constructed and completed demonstration of material improvements to the T-161 track system with the goal to reduce the track system weight by over 1,000 lbs. Matured advanced suspension systems such as energy regenerative suspensions, for integration on-vehicle platforms. Established components necessary to increase vehicle stability in conjunction with on-board vehicle braking systems. ***FY 2013 Plans:***			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** This effort will fabricate, evaluate and qualify lightweight track technology improvements for the Bradley Fighting Vehicle in direct support of improving vehicle occupant survivability; will investigate, baseline and characterize low rolling resistant tire compounds for tactical military applications with the goal of increased fuel efficiency; will design, fabricate and laboratory test track width adjusting suspension systems to improve vehicle stability; and will asses flush backed track designs to establish baseline data on design improvements.			
Title: Power Management: ***Description:*** This effort demonstrates power management components to meet objective tactical and combat vehicle power requirements. ***FY 2012 Accomplishments:*** Validated and integrated advanced intelligent (learning and adaptive) control architecture to control multiple vehicular power sources and loads and validated the modeling and simulation toolset. Future work in power management being conducted under Program Element (PE) 0603005A / Project 497.	2.300	0.000	0.000
Title: Energy Storage Systems Development: ***Description:*** The goal of this work is to enable silent watch capability and improve survivability through energy storage components for electromagnetic armor. This is accomplished through the maturation and demonstration of advanced ground vehicle energy storage devices such as advanced chemistry batteries and ultra capacitors. This effort also leverages commercial industry battery development efforts to reduce battery volume and weight while improving their energy and power densities. Finally, 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. Coordinated work is also being conducted under Program Elements (PE) 0602601A , project H91. ***FY 2012 Accomplishments:***	3.054	3.569	2.879

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Improved battery energy density resulting in reduced battery size and weight thereby minimizing component footprint on vehicle platform for pulse power electromagnetic armor applications (module level Energy Density 75-85 Whr/kg and Power Density 1000W/kg). ***FY 2013 Plans:*** Demonstrate and integrate a battery monitoring and battery management system for accurate state of charge and state of health information. 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. ***FY 2014 Plans:*** This effort will mature and optimize an advanced battery system with improved energy and power density; will validate the battery system in a military footprint for reducing logistics burdens; will test the system to mil-specs; will integrate battery system onto a vehicle platform; will conduct performance characterization; and will validate and integrate second generation power brick battery into pulse power electromagnetic armor system.			
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, and 0602705A. ***FY 2012 Accomplishments:*** Began integration of power brick based electro-magnetic armor components for ground combat systems schedule, and 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.	3.679	2.235	0.000
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	3.531	4.374	3.533

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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 Accomplishments:*** : Integrated JP-8 reformer/fuel cell system into a relevant Abrams space claim; finalized JP-8 reformer/fuel cell system design; began testing engine based auxiliary power units in a relevant environment; integrated small engine technologies for use on small unmanned ground vehicles. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** This effort will demonstrate a small engine on an unmanned ground system; will select hardware for modular/scalable small engine into a high power APU (25kW); will initiate active noise control hardware on an engine-based APU; and will evaluate performance of various APU technologies for higher power applications.			
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 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 2012 Accomplishments:*** Advanced powertrain technologies by increasing thermal efficiency and reducing heat rejection of diesel engines; improved the development and integration of sensors and control algorithms for closed-loop control of diesel engines; validated advanced high efficiency transmissions; evaluated and matured control strategies for powertrain systems; adapted power generation components through powertrain analysis; improved and matured components to reduce engine cooling burden. ***FY 2013 Plans:***	9.037	10.256	9.384

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** This effort will perform advanced powertrain systems integration and validation testing to include energy efficiencies and performance capabilities by utilizing highly efficient transmissions and engines incorporating advanced algorithms and control strategies, low heat rejection and high power density systems; will evaluate waste heat recovery technologies at a system level in a laboratory environment for performance validation; will complete the power take off (PTO) system and fan control strategies for increased efficiency in engine cooling performance; and will develop an additional PTO system for a second combat vehicle platform.			
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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 4a: Sustainability/Logistics-Basing. ***FY 2012 Accomplishments:*** Completed field evaluation, military utility assessment and refurbishment of water from air demonstrators, fabricated hand held and in-line monitoring technology for water treatment process monitoring, developed wastewater treatment and recycle technology, developed 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:*** 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 Petroleum, Oils and Lubricants	7.234	4.295	5.184

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** This effort will conduct performance assessments of waste water treatment and recycling technologies; will demonstrate transition ready in-line water quality and process monitoring capability; will characterize selected alternative fuels and fuel additives to improve performance and diversify energy sources; will assess the suitability of candidate alternative fuels in military ground systems; will evaluate fuel efficient gear oils and hydraulic fluids; and will evaluate candidate Petroleum, Oil, Lubricants and coolants to meet new military technology requirements.			
Accomplishments/Planned Programs Subtotals	41.559	36.028	31.595

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
497: *Combat Vehicle Electro*	-	8.700	6.620	7.353	-	7.353	9.850	6.911	7.564	7.700	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Improved Mobility and Operations Performance through Autonomous Technologies:	2.930	0.000	0.000
Description: This effort matures indirect vision technologies to provide the Soldier with full hemispherical situational awareness in closed hatched vehicle operations.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Integrated advanced crew stations with state of the art Electro-Optic Indirect Vision (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; conducted 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 2012 Accomplishments:*** Integrated and evaluated the optimized track health monitoring system design performance including wear gauges, damage algorithms, and diagnostic/prognostics algorithms.	1.928	0.000	0.000
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 Accomplishments:*** Supported technical standards development or modification to existing standards for military ground vehicle electrical systems. Performed trade analyses of existing and future combat and tactical vehicle electrical systems and developed architectural design concepts for intra-vehicle data and video networks, general purpose computing resources, input/output devices, and associated software architectures. Also, supported technical standards development or modification to existing standards for low, medium, and high voltage power systems for military ground vehicles. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** This effort will implement the electrical data architecture using the FY13 evaluations and market studies of potential data management and computing equipment; will demonstrate computing technology that is smaller and uses less power while	3.842	4.220	4.344

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
performing more functions than currently available on military ground vehicles; and will merge the data architecture with the electrical power architecture to demonstrate a complete advanced vehicle electrical architecture.			
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, the Army's non-proprietary intra-vehicle data network), Institute of Electrical and Electronics Engineers (IEEE) 1588 and 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:*** 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. ***FY 2014 Plans:*** This effort will continue supporting and refining the VICTORY architecture effort; will expand the VICTORY SIL with new functionality to further optimize the performance of the VICTORY architecture; will continue providing architecture support to the VEA SIL in preparation for a TRL 5 next generation data and computing architecture demonstration; and will perform VICTORY architecture compliance testing.	0.000	2.400	3.009
Accomplishments/Planned Programs Subtotals	8.700	6.620	7.353

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
515: *Robotic Ground Systems*	-	9.971	8.389	8.582	-	8.582	11.287	8.948	10.437	10.625	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Safe Operations of Unmanned systems for Reconnaissance:	9.971	0.000	0.000
Description: This effort demonstrates perception, control and tactical behavior technologies to safely conduct unmanned urban operations.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Performed 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; collected and provided performance data that will be validated through M&S and live experimentation to support transition into future systems; Ensured interoperability and began integration of subsystems, assessed system design through modeling and simulation; Matured relevant technologies for systems integration, gained safety approval for testing, and matured robotic control station.			
Title: Unmanned Ground Systems Technology: ***Description:*** This project leverages perception, control and tactical behavior technologies created for the Safe Operations of Unmanned systems 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. In FY13 and FY14, this effort supports Technology Enabled Capability Demonstration 1c: Force Protection - Occupant Centric Platform and 2a: Overburdened-Physical Burden. ***FY 2013 Plans:*** 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; integrate 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. ***FY 2014 Plans:*** This effort will integrate advanced autonomous maneuver, active safety and Soldier load reduction hardware, software, algorithms, control interfaces, and sensor payloads onto demonstrator vehicles to provide substantiation of optionally manned/ unmanned vehicle missions and validate emerging safety methodology and tactics, techniques and procedures; will expand integration of scalable autonomy kits and control interfaces onto representative tactical wheeled vehicles to increase soldier safety, operational efficiency and effectiveness and culminate with technical demonstrations and robust data analysis in a relevant	0.000	8.389	8.582

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
operational environment; and will begin integration of interoperability standards compliant components and systems onto manned/ unmanned robotic platforms to increase re-use and reduce costs of current/future systems.			
Accomplishments/Planned Programs Subtotals	9.971	8.389	8.582

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
53D: *NAC Demonstration Initiatives (CA)*	-	39.937	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

These are Congressional Interest Items

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Alternative Energy Research ***Description:*** This is a Congressional Interest Item. ***FY 2012 Accomplishments:*** Alternative Energy Research	39.937	0.000	0.000
Accomplishments/Planned Programs Subtotals	39.937	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*					R-1 ITEM NOMENCLATURE PE 0603006A: *Space Application Advanced Technology*							
COST ($ in Millions)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	4.158	4.157	5.866	-	5.866	6.879	7.086	7.188	7.317	Continuing	Continuing
592: *SPACE APPLICATION TECH*	-	4.158	4.157	5.866	-	5.866	6.879	7.086	7.188	7.317	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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.

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	5.304	4.157	5.866	-	5.866
Current President's Budget	4.158	4.157	5.866	-	5.866
Total Adjustments	-1.146	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.000	-			
• SBIR/STTR Transfer	-0.146	-			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603006A: *Space Application Advanced Technology*	PROJECT 592: *SPACE APPLICATION TECH*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
592: *SPACE APPLICATION TECH*	-	4.158	4.157	5.866	-	5.866	6.879	7.086	7.188	7.317	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications, and Intelligence (C3I) 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 2012	FY 2013	FY 2014
Title: Payload Technology Development	4.158	4.157	5.866
Description: This effort matures technologies for smaller, Warfighter-responsive sensor and communication payloads for use in space environments.			
FY 2012 Accomplishments: Began 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; conducted systems engineering analysis and assessments of enhanced Electro-optical/Infrared (EO/IR) imaging satellite technologies and selected and matured technologies			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
APPROPRIATION/BUDGET ACTIVITY 2040: *Research, Development, Test & Evaluation, Army* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603006A: *Space Application Advanced Technology*	PROJECT 592: *SPACE APPLICATION TECH*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
to support constellation architectures; supported launch integration and operational demonstration of EO/IR imaging space sensor and data exfiltration small satellites. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will mature low cost launch vehicle capable of lifting small satellite class payloads into low earth orbit; mature and demonstrate on-orbit deployment and positioning system for small satellites; evaluate and demonstrate algorithms and software to enable tactical dissemination of space-based digital sensor data.			
Accomplishments/Planned Programs Subtotals	4.158	4.157	5.866

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	10.063	9.856	7.800	-	7.800	7.070	6.789	8.045	8.058	Continuing	Continuing
792: *Personnel Performance & Training*	-	10.063	9.856	7.800	-	7.800	7.070	6.789	8.045	8.058	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 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 Ft. Belvoir, VA.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	10.282	9.856	10.892	-	10.892
Current President's Budget	10.063	9.856	7.800	-	7.800
Total Adjustments	-0.219	0.000	-3.092	-	-3.092
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.219	-			
• Adjustments to Budget Years	-	-	-3.092	-	-3.092

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
792: *Personnel Performance & Training*	-	10.063	9.856	7.800	-	7.800	7.070	6.789	8.045	8.058	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Ft. Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Personnel Technology	3.263	2.125	1.452
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.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Evaluated capability of non-cognitive measures such as motivation, cooperation, and achievement to predict performance of enlisted personnel while in initial training environments; evaluated the capability of non-cognitive measures to augment existing measures to better predict an individual's potential; analyzed the use of non-cognitive measures to provide flexibility for selection methods that can accommodate changes in force size. ***FY 2013 Plans:*** Mature and assess improved non-cognitive measures for enlisted selection and classification; perform validation checks and update enlisted longitudinal databases. ***FY 2014 Plans:*** Will initiate validation of non-cognitive measures to better match enlisted Soldiers to jobs (involves large-scale data collection and analysis, job/task analysis, and predictive modeling) across multiple job types.			
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 2012 Accomplishments:*** Developed methods to more readily assess whether training can be adapted to account for individual differences and experience levels; developed strategies to tailor training based on Soldiers' learning progress for basic Soldier skills and for Advanced Individual Training; and analyzed the use of prototype training tools to refine training strategies in institutional and unit-based training environments. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will develop adaptive instructional model that captures task type, training domain, level of expertise, and training method to improve training efficiency for cognitive/decision-making tactical skills and tasks; will expand training approaches for operational units using live/virtual/constructive environments to train a broad range of military operations.	6.800	7.731	6.348
Accomplishments/Planned Programs Subtotals	10.063	9.856	7.800

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	67.673	50.661	40.416	-	40.416	35.523	35.161	35.874	36.373	Continuing	Continuing
TR1: *TAC C4 Technology Int*	-	35.603	30.939	29.088	-	29.088	23.964	23.480	23.766	24.212	Continuing	Continuing
TR2: *Secure Tactical Information Integration*	-	20.089	19.722	11.328	-	11.328	11.559	11.681	12.108	12.161	Continuing	Continuing
TR8: *C3 DEMONSTRATIONS (CA)*	-	11.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding realinged to higher priority efforts and to consolidate Mission Command efforts into 0603772A/101.

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) network modernization demonstrations to measure their potential battlefield effectiveness. Project TR2 researches information security devices, techniques and software to protect tactical wired and wireless networks against modern network attacks; and improves collaborative software, techniques and devices for information sharing between battlefield functional communities. Project TR8 funds congressional special interest items.

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), PE 0603001A (Warfighter Advanced Technology) and PE 0603772A (Advanced Tactical Computer Science and Sensor 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 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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	69.852	50.661	52.353	-	52.353
Current President's Budget	67.673	50.661	40.416	-	40.416
Total Adjustments	-2.179	0.000	-11.937	-	-11.937
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.639	-			
• SBIR/STTR Transfer	-1.540	-			
• Adjustments to Budget Years	-	-	-11.937	-	-11.937

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
TR1: *TAC C4 Technology Int*	-	35.603	30.939	29.088	-	29.088	23.964	23.480	23.766	24.212	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, Ground, Air and Soldier portfolios.

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, Development, and Engineering Command (RDECOM), Communications-Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Antenna Technologies	11.176	4.513	2.615
Description: This effort matures and demonstrates low cost, power efficient, communications and electronic warfare (EW) 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 Band for terrestrial communications on the same antennas. Work accomplished under PE 0602782A/project H92 compliments this effort.			
FY 2012 Accomplishments: Investigated and refined embedded armor antennas; fabricate internet protocol based antenna feed demonstrators; integrated antenna apertures and feed systems into vehicle armor; supported the Tank and Automotive Research Development and Engineering Center during ballistic assessments of embedded armor antennas; demonstrated integrated K/Ka/Q band low profile			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
electronically steered SATCOM antenna; integrated single package Ka/Q band integrated power amplifier (PA) into the K/Ka/Q band SATCOM antenna; refined Blue Force Tracker (BFT) SATCOM antenna network concepts and demonstrated medium scale performance. ***FY 2013 Plans:*** Fabricate and demonstrate multifunctional armor-embedded and conformal antennas that support both communications and counter improvised explosive device (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. ***FY 2014 Plans:*** Will demonstrate conformal antenna (including antenna feed system) integrated into Army ground platform; develop and fabricate EW antennas for nontactical vehicles; develop radio frequency (RF) multiplexers to enable multiple communications systems to use a single antenna simultaneously within the same frequency bands.			
Title: Applied Commercial Communications and Information Networking technologies ***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 2012 Accomplishments:*** Assessed emerging commercial wireless communications technologies for suitability in military wireless communications networks; adapted, matured and demonstrated commercial wireless network operations control and visualization solutions in Army tactical environments; assessed emerging 4G commercial cellular technologies (e.g., long term evolution) for future adaptation to military networks.	1.543	0.000	0.000
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 technology readiness level (TRL) of Army science and technology (S&T) and best of Industry efforts. ***FY 2012 Accomplishments:*** Assessed 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; assessed the FY12 programmed increments of Joint Tactical Radio System (JTRS) for mounted and dismounted Soldiers and platforms, unmanned ground	9.452	9.097	9.221

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
and aerial sensors, and intelligent munitions systems in support of the Army Brigade Combat Team Modernization Plan; assessed Warfighter Information Network-Tactical (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; assessed the TRL of Army science and technology (S&T) efforts maturing in the FY12 timeframe in a operationally relevant environment to facilitate technology transition. ***FY 2013 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; 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 research and development (R&D) of enabling Future Force capabilities and accelerate such capabilities to enhance and modernize the current force. ***FY 2014 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 hybrid/bridging architectures for Capability Sets 14/15 and conduct initial assessments of Capability Sets 16/17 architectures to support the associated programmed increments of WIN-T and Nett Warrior; provide a system of systems environment/venue to evaluate technical progress, assess the next generation of Army technologies and facilitate transition of S&T efforts; perform risk mitigation and TRL assessment of Army S&T programs and best of Industry efforts maturing in the FY14 timeframe for selection/ inclusion as systems under evaluation for future Army NIEs; and continue to support R&D of enabling Future Force capabilities and accelerate capabilities to enhance the current force such as Technology Enabled Capability Demonstrations.			
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. ***FY 2012 Accomplishments:***	3.105	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Applied network mining software to determine how a military software applications (Apps) store can be efficiently deployed on the network; coded and assessed advanced spectrum management software tools to facilitate network operations where various types of networks converge using multiple transmission media.			
Title: Wireless Mobile Networking	5.976	12.954	8.316
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. This effort matures and demonstrates software to improve performance of wireless tactical networks in austere and hostile RF spectrum environments by composing and coding algorithms and protocols that sense network and spectrum conditions, to automatically adapt network node behaviors to make more efficient use of available resources. Efforts target improving RF communications performance in complex terrain, enabling communications while simultaneously operating electronic protection devices. Additionally this effort defines a reference architecture for a modular, open systems approach for military communications devices. 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 2012 Accomplishments: Matured 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; matured digital transmitter and receiver interfaces and subsystem integration; matured and demonstrated all-digital receiver; demonstrated configurable baseband processor for increased SATCOM throughput and integrated with digital receiver for proof of concept; defined requirements and architecture for digital transmitter; demonstrated 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: 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 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.			
FY 2014 Plans: Will mature all-digital strategic SATCOM terminal components to increase SATCOM channel capacity and reduce vulnerability to interference; for Army tactical ground communications, adapt and mature directional radio networking protocols and routing			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
algorithms to improve spectral efficiency, network robustness and resistance to radio frequency (RF) interference; adapt and integrate spatial diversity signal processing to improve wireless communications performance in complex (e.g. urban, forested) terrain; design modular waveform components and mature algorithms that support simultaneous communications and blue force jamming; design radio reference architecture, specification and application program interfaces (API) to standardize radio modules and minimize life cycle cost of Army tactical communications devices; continue to investigate, adapt and develop techniques to allow use of commercial cellular and smart devices in Army communications bands and environments.			
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 Accomplishments:*** Demonstrated interoperability among disparate NetOps tools and technologies, leveraging existing GOTS/COTS tools being used in the field; took 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; consolidated and demonstrated 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:*** 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. ***FY 2014 Plans:*** Will develop and demonstrate software for automating the decision and implementation processes for configuring and re-configuring network components; develop a collaborative execution environment in an effort to provide a decision enhancing capability enabling unit signal officers to collaborate when managing tactical communication resources.	4.351	4.375	3.936
Title: Networking technologies for Wireless Personal Area Networks (WPAN)	0.000	0.000	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Description: This effort develops and matures wireless personal area network (WPAN) technology for the Soldier in a manor approved by the National Security Agency (NSA) for up to Secret data traffic. This effort is coordinated with PE 0603001A/Project J50. ***FY 2014 Plans:*** Will design and analyze networking architectures, frameworks and protocols to link devices into individual WPANs while allowing multiple WPANs to operate concurrently without interference; design and code a tactical standard waveform and protocols for up to Secret short range wireless communication between WPAN nodes that meet NSA security requirements; mature, integrate and demonstrate wireless hardware components for integration onto Soldier-borne equipment such as hand held computing platforms, radios, weapon sites, information displays and Soldier-borne sensors to develop a WPAN without impacting the SWAPC of these devices.			
Accomplishments/Planned Programs Subtotals	35.603	30.939	29.088

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
TR2: *Secure Tactical Information Integration*	-	20.089	19.722	11.328	-	11.328	11.559	11.681	12.108	12.161	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, Ground, Air and Soldier portfolios.

Note: In FY14 funding for Mission Command (MC) efforts previously conducted in in this Project has been moved to PE/Project 0603772/101 to consolidate MC efforts into a single PE/Project.

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, Development, and Engineering Command, Communications (RDECOM)-Electronics Research Development and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Collaborative Battle Management	6.815	6.563	0.000
Description: This effort matures and demonstrates MC software to improve sharing and understanding of data between the intelligence and operations communities. In FY14 funding for this effort has been moved to PE/Project 0603772/101 to consolidate Mission Command efforts into a single PE/Project.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Developed collaboration services to include browser-based components for visualization of strategic battle command data feeds and communications status; developed software environment permitting applications to execute on different operating systems (e.g., Windows, LINUX); completed multi-touch (MT)-based mission collaboration software including information link analysis tools and Tactical Ground Reporting System (TiGR)-compatible MT display; developed and matured general device-independent MT application framework; complete Geo terrain analytical tools and transition these efforts to PM Mission Command and PM Commercial Joint Mapping Toolkit. ***FY 2013 Plans:*** Code, assess and demonstrate collaboration and interoperability services such as the ability to interface Joint Battle Command Platform (JBC-P) vehicle variable message format chat with DISA-standard Extensible Messaging and Presence Protocol text chat in support of the Army Common Operating Environment; fabricate/code and assess multi-touch mission command (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 2012 Accomplishments:*** Improved the one-way position/location information data transfer and two-way digital data flow cross-domain software, integrated 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.	5.015	0.000	0.000
Title: Information Assurance ***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 complements this effort. ***FY 2012 Accomplishments:*** Integrated 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	8.259	13.159	11.328

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
ascertain exactly who or what is causing the cyber threat; integrated the IDS agents monitoring host platforms and the network into a common architecture; evaluated the IDS components in a lab environment to ascertain the maturity of the functionality of each component of the architecture; analyzed and assessed models of cyber attack behaviors to determine adversary objectives, attack vectors, and classes of attack to effect computer network defense (CND); coded and integrated 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:*** Demonstrate improved detection and automated response software and algorithms that reside on Army 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 Army 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. ***FY 2014 Plans:*** Will mature dynamic moving target defense internet protocol (IP) and port network hopping techniques; design and code software to dynamically modify operating systems and applications to increase an adversary's work factor to exploit Army networks; design and code moving target defense capability management software tools; demonstrate integration of IP and port hopping, with protection capabilities within the Army's CND common operating environment (COE); develop cyber attack prediction techniques to include associated consequences to help reason on adversarial intent and motivation to predict cyber related attacks on Army networks and associated consequences; utilize polymorphic and metamorphic transformation engines to develop new techniques to detect malware variants; design and code algorithms to assess software at the binary code level to detect malicious intent; demonstrate software assurance COE capability to seamlessly integrate Army software assurance tools with those developed by other DoD laboratories; design and code protection software tools for server components and design and code network security controls for the tactical cloud computing environment.			
Accomplishments/Planned Programs Subtotals	20.089	19.722	11.328

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
TR8: *C3 DEMONSTRATIONS (CA)*	-	11.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for C3 Demonstrations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Cyber Security/Information Assurance Research	11.981	0.000	0.000
Description: This is a Congressional Interest Item. This effort matures and demonstrates cyber security technologies that create new methods for proactively defending wireless networks against cyber attack using nontraditional methodologies. Work accomplished under PE 0602782A/project H92 and 0603008A TR2 compliments this effort. ***FY 2012 Accomplishments:*** Designed and demonstrated a software hardening tool for operating systems, servers and applications that enabled the rapid assessment and remediation of vulnerabilities that make them susceptible to computer network attack (CNA); developed a software framework that provides common services and communications between disparate computer network defense (CND) tools that provided near-real time cyber security situational awareness and reduced CND development time by removing CND component redundancy; designed and coded software toolkit that automates the DoD Information Assurance Certification and Accreditation Process (DIACAP) process; designed and coded key management interface (KMI) software for current (non KMI-aware) cryptographic devices to receive existing encrypted key material while leveraging the security capabilities provided by the new key management devices; enabled the secure use of low cost commercial smart devices on mobile tactical networks by designing and coding security software enabling them to comply with DoD cyber security requirements for use on mobile tactical networks; designed and coded an automated software quality assurance tool for validating source code against coding standards and performs rudimentary vulnerability analysis to provide greater confidence that software is clean of programmer error or malicious intent.			
Accomplishments/Planned Programs Subtotals	11.981	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

C. Other Program Funding Summary ($ in Millions)

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	8.142	9.126	9.166	-	9.166	9.033	9.166	9.321	9.488	Continuing	Continuing
B18: *DB18*	-	4.139	4.257	4.325	-	4.325	4.386	4.449	4.524	4.605	Continuing	Continuing
B31: *DB31*	-	4.003	4.869	4.841	-	4.841	4.647	4.717	4.797	4.883	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	8.142	9.126	9.166	-	9.166
Current President's Budget	8.142	9.126	9.166	-	9.166
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
B18: *DB18*	-	4.139	4.257	4.325	-	4.325	4.386	4.449	4.524	4.605	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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)

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
B31: *DB31*	-	4.003	4.869	4.841	-	4.841	4.647	4.717	4.797	4.883	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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)

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	14.970	17.257	13.627	-	13.627	13.316	13.853	16.552	16.637	Continuing	Continuing
S28: *Immersive Learning Environments*	-	3.053	2.799	2.572	-	2.572	2.704	3.144	3.278	3.124	Continuing	Continuing
S29: *Modeling & Simulation - Adv Tech Dev*	-	5.091	4.367	6.444	-	6.444	5.486	5.580	5.674	5.776	Continuing	Continuing
S31: *Modeling And Simulation Infrastructure Technology*	-	6.826	10.091	4.611	-	4.611	5.126	5.129	7.600	7.737	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	17.907	17.257	19.462	-	19.462
Current President's Budget	14.970	17.257	13.627	-	13.627
Total Adjustments	-2.937	0.000	-5.835	-	-5.835
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.389	-			
• SBIR/STTR Transfer	-0.548	-			
• Adjustments to Budget Years	-	-	-5.835	-	-5.835

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	-	3.053	2.799	2.572	-	2.572	2.704	3.144	3.278	3.124	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 to develop training prototypes for technology demonstrations with an emphasis on urban operations, asymmetric warfare, resilience and rehabilitation to support Warfighting units and Army Institutions (TRADOC and Medical). Resilience and rehabilitation research will focus on Post Traumatic Stress Disorder (PTSD). 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 capabilities.

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), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Immersive Techniques for Training Applications	3.053	2.799	2.572
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. In FY13 to FY15, this effort will support Technology Enabled Capability Demonstration 7b, Individual Training for Tactical Tasks.			
FY 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Developed virtual mission rehearsal trainers encompassing complex team, interpersonal actions as well as conflicts and is supported by interactive learning technologies; completed study that examines the measurement and impact of the sense of presence on learning in virtual environments. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will mature the tools and technologies required to create prototype simulations, games, and virtual environments focused on training commanders on the decision making, planning, and leadership for institutional and Warfighting units; will explore advanced display technologies to prototype new low cost immersive displays for virtual training environments.			
Accomplishments/Planned Programs Subtotals	3.053	2.799	2.572

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S29: *Modeling & Simulation - Adv Tech Dev*	-	5.091	4.367	6.444	-	6.444	5.486	5.580	5.674	5.776	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Embedded Techniques	4.301	4.367	6.444
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. In FY14, this effort will support Technology Enabled Capability Demonstration, 3b Surprise/Tactical Intelligence-Actionable Intelligence.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Continued 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. Continued 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:*** Integrate component level sensors for tracking Soldier movement, and augmented reality for dismounted Soldier immersive training environments; and commence planning for technology experiments, demonstrations and evaluations in FY14 of enhanced embedded training environments. Complete analysis and begin development of individual components for dismounted Soldier and embedded training technology that is not yet represented. The technology includes predictive technologies, artificial intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic environment and sensors for locomotion and gesturing. ***FY 2014 Plans:*** Will design embedded training components (e.g. predictive simulation) for current and future Command and Control systems for both mounted and dismounted. Will design components for advance sensor technology for locomotion and gesturing. Will advance and mature technology for developing Artificial Intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic training scenarios within a militarily dismounted infantry squad virtual game environment. Will advance and conduct experiementation with haptic feedback technology to enhance immersion in virtual and augmented reality environment.			
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 Accomplishments:*** Verified and Validated (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); quantified 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	0.000	0.000
Accomplishments/Planned Programs Subtotals	5.091	4.367	6.444

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
S31: *Modeling And Simulation Infrastructure Technology*	-	6.826	10.091	4.611	-	4.611	5.126	5.129	7.600	7.737	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

Not applicable for this item.

A. Mission Description and Budget Item Justification

Efforts in this project mature and demonstrate state-of-the-art and simulation systems. These efforts include a distributed Modeling and Simulation (M&S) environment that integrates a collection of multi-fidelity models and simulations and tools that map to an evolving architecture and M&S activities to support decisions throughout the acquisition life-cycle. This provides a unifying M&S architecture that synchronizes and integrates multi-resolution modeling applications such as Live, Virtual, and Constructive experimentation. This effort ultimately comprises a portfolio 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, and training that saves time and resources while increasing the effectiveness of acquisition and training activities.

Funding increase in FY13 reflects the use of Advanced Distributed Simulation Environments 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), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Advanced Distributed Simulation Environments (previously titled Modeling Architecture for Technology, Research and Experimentation, MATREX)	6.826	10.091	4.611
Description: Starting in FY14, this effort is renamed from Modeling Architecture for Technology, Research, and Experimentation (MATRIX) to Advanced Distributed Simulation Environments to more accurately reflect this effort's evolution of simulation			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
technologies. Matures and demonstrates modeling and simulation technologies and techniques that provide the means to design, integrate, and use of M&S in support of Training, and Army experimentation to assess and support system acquisition and military planning decision-making, System of Systems architecture, technology tradeoffs, etc. In FY13 to FY15, this effort will support Technology Enabled Capability Demonstration (TeCD) 7b, Individual Training for Tactical Tasks and TeCD 1a, Force Protection-Basing with training and mission rehearsal M&S. ***FY 2012 Accomplishments:*** Demonstrated simulation and systems engineering tools for distributed integration and M&S reuse focused on System of Systems; researched and demonstrated 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; demonstrated executable architectures for analysis, event management, and simulation initialization, on the RDECOM Virtual Testbed; researched and identified hardware and software technology solutions for current and future M&S challenges, concentrating on distributed execution of M&S. ***FY 2013 Plans:*** Mature the executable System of Systems 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. Exploit and refine next generation architecture(s) that demonstrate advances in computer science to support future training, experimentation, and acquisition decisions tools; demonstrate computer cloud technologies to increase the ability to better use and distribute M&S application services to users; 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. ***FY 2014 Plans:*** Will refine and mature System of Systems architecture for integration and use in Army and DoD simulation and training programs; mature a generalized interface for the systems engineering architecture and M&S tools for transition to DoD programs with existing M&S systems engineering capabilities; mature and refine Distributed Soldier Representation to provide a demonstration of Soldiers as a Service simulation experimentation that illustrates relevant use of Soldier human factors data to training; identify hardware and software solutions for current and future M&S challenges that decrease dependence on third party solutions; formalize M&S in a cloud environment supporting M&S as a service tool that supports training and mission rehearsal simulations across geographically distributed areas; integrate multi-processor environments; provide a tool to rapidly configure and run training simulations by maturing and translating simulations from complex scenario definitions and databases; and, mature and refine M&S tools targeted towards PEO STRI simulation gaps.			
Accomplishments/Planned Programs Subtotals	6.826	10.091	4.611

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	12.577	9.925	10.667	-	10.667	17.483	16.245	16.520	16.817	Continuing	Continuing
B84: *DB84*	-	2.692	2.455	2.500	-	2.500	2.540	2.583	2.627	2.674	Continuing	Continuing
DB1: *DDB1*	-	9.885	7.470	8.167	-	8.167	14.943	13.662	13.893	14.143	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	12.577	9.925	10.667	-	10.667
Current President's Budget	12.577	9.925	10.667	-	10.667
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
B84: *DB84*	-	2.692	2.455	2.500	-	2.500	2.540	2.583	2.627	2.674	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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).

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
DB1: *DDB1*	-	9.885	7.470	8.167	-	8.167	14.943	13.662	13.893	14.143	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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).

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	22.552	6.984	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
H29: *Med Protect Agnst Hiv*	-	6.577	6.984	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
T16: *MILITARY HIV INITIATIVES CA*	-	15.975	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 realigned to the Defense Health Program.

A. Mission Description and Budget Item Justification

This PE maturates and demonstrates advanced technology of candidate human immunodeficiency virus (HIV) vaccines, prepares and conducts human clinical studies to assess safety and effectiveness 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 FDA regulations. FDA requires thorough testing in animal models (preclinical testing) to ensure safety and effectiveness 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 (USAMRMC), 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 WRAIR, Silver Spring, MD, and its overseas laboratories, and NMRC, Silver Spring, MD, and its overseas laboratories. The Henry M. Jackson Foundation, located in Bethesda, MD, provides support for FDA testing and other research under cooperative agreement.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	22.760	6.984	7.111	-	7.111
Current President's Budget	22.552	6.984	0.000	-	0.000
Total Adjustments	-0.208	0.000	-7.111	-	-7.111
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.208	-			
• Adjustments to Budget Years	-	-	-7.111	-	-7.111

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
H29: *Med Protect Agnst Hiv*	-	6.577	6.984	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

Starting in FY 14, resources for this program were realigned from RDT&E,Army to Defense Health Program

A. Mission Description and Budget Item Justification

This project funds research to develop candidate HIV vaccines, to assess their safety and effectiveness in human subjects, and to 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 HIV 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 USAMRMC and 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), and 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 WRAIR, Silver Spring, MD, and its overseas laboratories. Significant work is conducted under a cooperative agreement with the Henry M. Jackson Foundation, Bethesda, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: HIV Program	6.577	6.984	0.000
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.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Performed tests under Good Laboratory Practice FDA guidelines to assess performance and ability of HIV vaccine candidates to provoke an immune response in human trials. Prepared and conducted safety studies in human volunteers with new vaccine candidates at multiple sites worldwide. ***FY 2013 Plans:*** Conduct initial safety studies in humans with candidate vaccines consisting of multiple subtypes in clinical trial sites in Asia and Africa and 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	6.577	6.984	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
T16: *MILITARY HIV INITIATIVES CA*	-	15.975	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

Congressional Interest Item projects for HIV Research.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: HIV Research	15.975	0.000	0.000
Description: This is a Congressional Interest Item.			
FY 2012 Accomplishments: Program Increase			
Accomplishments/Planned Programs Subtotals	15.975	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	21.939	9.716	15.054	-	15.054	10.136	10.222	10.394	10.581	Continuing	Continuing
DF5: *Agile Integration & Demonstration*	-	11.948	9.716	15.054	-	15.054	10.136	10.222	10.394	10.581	Continuing	Continuing
DW4: *Energy Technologies (Congressional Adds (CAs))*	-	9.991	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 increase for Technology Development Adaptive Red Teaming.

A. Mission Description and Budget Item Justification

This Program Element 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; rapidly deployable force protection technologies to enable troops at small, remote bases or integrated within local communities to detect, assess and defend against a range of enemy threats; and technology system red-teaming to stress and assess emerging systems earlier in the life-cycle, and provide a more holistic understanding of employment and performance risks in realistic environments and against potential threats.

This project supports the Command, Control, Communications and Intelligence (C3I), Ground and Innovation Enablers 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); the Army Engineer Research and Development Center; and the Space and Missile Defense Command (SMDC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	22.172	9.716	10.054	-	10.054
Current President's Budget	21.939	9.716	15.054	-	15.054
Total Adjustments	-0.233	0.000	5.000	-	5.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.233	-			
• Adjustments to Budget Years	-	-	5.000	-	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
DF5: *Agile Integration & Demonstration*	-	11.948	9.716	15.054	-	15.054	10.136	10.222	10.394	10.581	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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; rapidly deployable force protection technologies to enable troops at small, remote bases or integrated within local communities to detect, assess and defend against a range of enemy threats; and technology system red-teaming to stress and assess emerging systems earlier in the life-cycle, and provide a more holistic understanding of employment and performance risks in realistic environments and against potential threats.

This project supports the Command, Control, Communications and Intelligence (C3I), Ground and Innovation Enablers 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); the Army Engineer Research and Development Center; and the Space and Missile Defense Command (SMDC).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Hybrid Intelligent Power (HI Power)	4.632	4.859	4.997
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 2012 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Developed and demonstrated 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; developed and demonstrated advance control hardware and software; developed and assessed a standard secure communication protocol; continued development of a draft system specification. ***FY 2013 Plans:*** 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 (MOD) 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. ***FY 2014 Plans:*** Will continue to develop and demonstrate standards and protocols for tactical microgrids; develop a universal device controller able to monitor and manage power sources and loads; continue to advance technologies that enable the use of renewable power sources and energy storage systems for storing any excess grid power; demonstrate a grid power manager that can utilize all power assets on the battlefield to insure optimum power utilization based on mission requirements.			
Title: Rapidly Deployable Force Protection Technologies	7.316	4.857	5.057
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 2012 Accomplishments:*** Refined and updated criteria for deployable force protection technologies in order to meet capability gaps based on stakeholder input; matured and evolved promising technologies identified and assessed in prior year's effort; identified new and emerging force protection technologies that meet the rapidly deployable construct; selected and assessed candidate force protection technologies to support a system of systems design for force protection based on prioritized needs from stakeholders; included advanced assessments of technology improvements based on prior year's efforts; designed and conducted a series of demonstrations and experiments to assess performance of selected force protection technologies and to identify improvements in design, development and implementation including assessing systems vulnerabilities regarding the ability to conduct force protection effectively; and coordinated improvements with designers, developers, and stakeholders. ***FY 2013 Plans:*** 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			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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; 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; 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. ***FY 2014 Plans:*** Will analyze emerging threats that expeditionary units operating at remote bases or integrated with local communities may face in the future; select high-priority threats and develop a set of experiments using live, virtual, and mixed scenarios to stress deployable force protection developing technologies and identify vulnerabilities; incorporate Soldiers from a variety of military occupations and specialties as part of experiments and demonstrations; integrate assessments of technology-enabled capabilities for logistics basing and other force protection basing developments; expand the deployable force protection warfighter technology tradespace methodology and portfolio analysis; provide feedback for systems improvement and needed research areas.			
Title: Technology Development Adaptive Red Teaming ***Description:*** This effort seeks to challenge conventional approaches to technology and systems development and insertion, and increase the awareness of risks and opportunities earlier in the lifecycle in order to improve system design, development and employment. It builds on the concepts and methodology developed under the Deployable Force Protection Adaptive Red Teaming effort and applies them to other high-priority areas for the Army. It designs and conducts a series of live, virtual and mixed scenarios and demonstrations to evaluate the most promising technologies. It stresses and assesses developing technology systems for both individual and system-of-system performance across a representation of operational environments, realistic scenarios and emerging threats. Activities include: identifying, integrating and examining technology performance at live demonstration venues with experienced operators; emulating emerging threats and alternative futures to challenge assumptions regarding scenarios and system employment; and identifying and informing of potential vulnerabilities in systems and systems-of-systems, including but not limited to, training, logistics and adaptability. ***FY 2014 Plans:*** Will select developing technology systems for demonstration and evaluation; analyze emerging threats and select high-priority threats for use in technology experimentation; will develop a set of experiments to stress performance and identify potential vulnerabilities when employed; will incorporate Soldiers from a variety of Military Occupation Specialties to acquire user feedback; will apply and expand the warfighter technology tradespace methodology and analysis; and will provide feedback to inform technology development, systems integration, training, logistics and technology employment.	0.000	0.000	5.000
Accomplishments/Planned Programs Subtotals	11.948	9.716	15.054

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 DW4: *Energy Technologies (Congressional Adds (CAs))*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
DW4: *Energy Technologies (Congressional Adds (CAs))*	-	9.991	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This project contains Congressional add funding for Alternative Energy for Deployed Forces.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Alternative Energy for Deployed Forces	9.991	0.000	0.000
Description: This is a Congressional interest item. ***FY 2012 Accomplishments:*** Developed and demonstrated power architectures on the Soldier that incorporate modular design principles within the Soldier worn architecture; developed a 15-20 W soldier wearable power source system; developed thin, lightweight Soldier-worn Li-Ion batteries that will increase energy independence while decreasing the current power sustainment footprint and supporting domestic manufacturing capability; conducted independent demonstrations and evaluations of existing plasma gasification systems offered by several manufacturers.			
Accomplishments/Planned Programs Subtotals	9.991	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	4.271	3.487	3.194	-	3.194	3.440	2.398	2.357	2.399	Continuing	Continuing
DS8: *TRACTOR NAIL*	-	4.271	3.487	3.194	-	3.194	3.440	2.398	2.357	2.399	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	4.271	3.487	3.194	-	3.194
Current President's Budget	4.271	3.487	3.194	-	3.194
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	2.257	2.323	2.367	-	2.367	2.404	2.444	2.485	2.530	Continuing	Continuing
DS9: *TRACTOR EGGS*	-	2.257	2.323	2.367	-	2.367	2.404	2.444	2.485	2.530	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	2.257	2.323	2.367	-	2.367
Current President's Budget	2.257	2.323	2.367	-	2.367
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	23.046	21.683	25.348	-	25.348	22.188	21.319	21.632	22.058	Continuing	Continuing
K15: *Advanced Comm Ecm Demo*	-	11.737	9.799	9.951	-	9.951	9.797	9.477	9.645	9.828	Continuing	Continuing
K16: *Non-Commo Ecm Tech Dem*	-	11.309	11.884	15.397	-	15.397	12.391	11.842	11.987	12.230	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 increase for EW Countermeasure demonstrations.

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 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), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	23.640	21.683	22.598	-	22.598
Current President's Budget	23.046	21.683	25.348	-	25.348
Total Adjustments	-0.594	0.000	2.750	-	2.750
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.594	-			
• Adjustments to Budget Years	-	-	2.750	-	2.750

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
K15: *Advanced Comm Ecm Demo*	-	11.737	9.799	9.951	-	9.951	9.797	9.477	9.645	9.828	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, Soldier, Ground and Air portfolios.

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, Development, and Engineering Command (RDECOM), Communications - Electronics Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Offensive Operations	7.096	4.900	4.976
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 2012 Accomplishments: Continued fabrication and coding of integrated networked electronic warfare (EW) technologies and techniques to address current and emerging threat priorities; completed network load balancing and resource management techniques to aid in this integration; refined and integrated real-time, on-the-move (OTM) direction finding / geolocation technologies; demonstrated EW technologies			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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. 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:*** 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. ***FY 2014 Plans:*** Will code and demonstrate protocol exploitation software and techniques that allow users to remotely coordinate, plan, control and manage tactical EW and Cyber assets; develop techniques to exploit protocols of threat devices not conventionally viewed as Cyber to expand total situational awareness by providing access to and control of adversary electronic devices in an area of operations.			
Title: Stand-off Non-Cooperative Multi-Intelligence Technologies ***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. In FY13 and FY14 this effort supports Technology Enabled Capability Demonstration 3.b: Surprise/Tactical Intelligence-Actionable Intelligence. ***FY 2012 Accomplishments:*** Integrated and demonstrated software, algorithms and techniques that provided 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; demonstrated 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:*** 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	4.641	4.899	4.975

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will integrate MASINT/Multi-INT vehicle mounted detection capability with soldier and airborne sensors (electro- optic/infrared/ full motion video) to support higher fidelity standoff detection and targeting of threat emitters for small units; mature multi-platform cross cueing techniques and test multi-int detection and geolocation in a laboratory environment; mature algorithms to fuse multi source detection, geolocation and targeting data into a high fidelity common display and design and code a mechanism to ingest this data into DCGS-A for greater area situational awareness.			
Accomplishments/Planned Programs Subtotals	11.737	9.799	9.951

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
K16: *Non-Commo Ecm Tech Dem*	-	11.309	11.884	15.397	-	15.397	12.391	11.842	11.987	12.230	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, Ground, Air and Soldier portfolios.

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, Development, and Engineering Command (RDECOM), Communications-Electronic Research, Development, and Engineering Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Distributed Aperture Infrared Countermeasures (DAIRCM) Technologies	4.344	5.193	4.012
Description: This effort matures and demonstrates countermeasure technologies that provide platform protection and integrated cueing against electro-optically (EO), infra-red (IR) and radio frequency (RF) guided threats.			
FY 2012 Accomplishments: Conducted 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; demonstrated capability against a representative advanced infrared man-portable air defense system design; perform assessment on correlation algorithms and architecture.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will modify IR jam/receive deconfliction algorithms and interrogation techniques to develop cooperative countermeasures to protect multiple aircraft; integrate air threat detection and geo-location data with ground situational awareness to cooperatively defeat threats to both air and ground platforms; integrate miniature waveform generators, efficient high power amplifiers, and optical fiber signal distribution to add a low weight/power RF jammer to Army rotorcraft; mature and leverage EO, IR and RF jammers for an integrated aircraft survivability architecture for more efficient jamming and reduced observable signature of the aircraft.			
Title: Advanced Tactical Radio Frequency Countermeasures (ATRFCM) Technologies	4.565	4.191	4.762
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 2012 Accomplishments:*** Demonstrated a distributed, networked, multi-platform (air and ground) EW framework enabling the coordinated detection, geolocation, reporting, and engagement of multiple diverse threat waveforms; demonstrated automatic synchronization of EW framework with blue force communications to deconflict threats from friendly forces for improved survivability and situational awareness. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will modify and integrate previously matured techniques and develop new techniques, algorithms and waveforms for the detection, location and neutralization of RF threat devices; mature techniques to provide an integrated situational awareness			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
picture and countermeasures against identified threats; improve interoperability between detection and neutralization systems with other systems on the platform such as communications, networking and global positioning system/position navigation.			
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, 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. In FY13and FY14 this effort supports Technology Enabled Capability Demonstration 3.b: Surprise/Tactical Intelligence-Actionable Intelligence. ***FY 2012 Accomplishments:*** Leveraged light vehicle demonstration to complete final waveform modifications and selected Software Radio Waveform interrogation approach for coding onto Joint Tactical Radio System platform. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will complete component modifications to multifunction laser, site and weapon orientation module which are used to increase probability of positive friend, enemy, neutral non-combatant identification at increased ranges; conduct laboratory and limited field test to demonstrate modified wireless personal area network waveforms and Soldier radio waveforms, weapons orientation module and multifunction laser; document and assess user feedback and make appropriate component and integration modifications; mature non-cooperative target identification techniques.	2.400	2.500	3.123
Title: EW Counter Countermeasures ***Description:*** This effort matures and demonstrates hardware and software to counter emerging electronic warfare threats. Work being accomplished under PE 0602270A/project 906 compliments this effort. ***FY 2014 Plans:***	0.000	0.000	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will leverage technical assessments of a family of threat systems and conduct a full vulnerability assessment on these systems, generate potential mitigation strategies, determine associated CONOPs and employment scenarios; mature and optimize mitigation strategies that have the highest probability of success by demonstrating the feasibility of the proposed approached in the laboratory, leveraging threat system components, surrogates and modeling and simulation resources.			
Accomplishments/Planned Programs Subtotals	11.309	11.884	15.397

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	87.749	71.111	64.009	-	64.009	42.647	47.737	49.929	51.372	Continuing	Continuing
206: *Missile Simulation*	-	3.444	2.271	2.299	-	2.299	2.265	2.143	2.202	2.242	Continuing	Continuing
263: *Future Msl Tech Integr(FMTI)*	-	58.799	58.907	54.945	-	54.945	27.821	28.194	33.440	33.817	Continuing	Continuing
550: *COUNTER ACTIVE PROTECTION*	-	7.300	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
704: *Advanced Missile Demo*	-	8.527	4.879	6.765	-	6.765	12.561	17.400	14.287	15.313	Continuing	Continuing
G03: *Area Defense Advanced Technology*	-	9.679	5.054	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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; provide precision long-range fires; 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army	DATE: April 2013
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*

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

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	90.458	71.111	68.230	-	68.230
Current President's Budget	87.749	71.111	64.009	-	64.009
Total Adjustments	-2.709	0.000	-4.221	-	-4.221
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.709	-			
• Adjustments to Budget Years	-	-	-4.221	-	-4.221

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
206: *Missile Simulation*	-	3.444	2.271	2.299	-	2.299	2.265	2.143	2.202	2.242	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Missile Simulation	3.444	2.271	2.299
Description: This effort designs, matures, and demonstrates advanced simulation technologies and uses those technologies to support missile design, analysis, and evaluation including Hardware-in-the-Loop (HWIL) simulation, missile component and system simulations.			
FY 2012 Accomplishments: Continued simulation maturation to improve run-time performance of scene generators; improved HWIL multi-mode scene generation capabilities; increased standardization of HWIL interfaces to reduce integration time of different guidance systems; increased fidelity of real-time technical and programmatic modeling and simulation tools (visualization and fast-running models); and leveraged advancements in computer processing capabilities to improve fidelity and runtime of simulations.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will complete scene generation technology for improved fidelity and runtime of complex millimeter wave (MMW) scenes; improve fidelity of complex modeling and simulation through the leveraging of advancements in microprocessor speed and throughput; enhance endgame lethality modeling to evaluate the effectiveness of complex shaping of integrated blast fragmentation warheads; conduct component and system level analysis simulations.			
Accomplishments/Planned Programs Subtotals	3.444	2.271	2.299

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
263: *Future Msl Tech Integr(FMTI)*	-	58.799	58.907	54.945	-	54.945	27.821	28.194	33.440	33.817	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Technology for Guided Missiles and Interceptors	5.495	0.000	0.000
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 2012 Accomplishments: Continued efforts to design and demonstrate guidance, control, propulsion, and airframe technologies to enable a highly responsive interceptor to defeat incoming RAM threats; designed small radar frequency seeker technologies capable of guiding an			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
interceptor to incoming RAM threats; integrated these technologies with guided interceptor designs for flight demonstration; and updated 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 2012 Accomplishments:*** Completed design of composite missile propulsion casing and perform static performance evaluation; completed design of common ESAD in Javelin configuration; and designed uncooled state-of-the-art infrared seeker design in support of Javelin upgrades.	7.747	0.000	0.000
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. 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 that distinguishes soft targets (to include personnel), 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 Accomplishments:*** Integrated and demonstrated image stabilization and people tracking on a surrogate munition platform with captive flight imagery; completed the design, fabricated, and conducted dynamic evaluations of a small height of burst sensor package to provide warhead effects against soft targets; fabricated, integrated, and demonstrated a small warhead with improved effects against asymmetric threats; and characterized 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:*** 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	10.653	10.107	10.223

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will implement and flight test enhanced image stabilization and people tracking algorithms in, form-factored modular hardware architecture; complete packaged design, fabricate, and flight test final form-factored digital data link hardware.			
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 2012 Accomplishments:*** Completed fabrication of best technical approach for demonstration; and integrated the propulsion system in a controlled flight vehicle for demonstration of improved insensitive munition capabilities.	4.225	0.000	0.000
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), Unamnned Aerial Systems (UAS), and/or Cruise Missile threats in the required timeline to protect ground forces. This effort develops Technical Fire Control technology to complement the interceptor development performed in the Guided Interceptor Technology for Defense against RAM, UAS and/or Cruise Missile, Hit-to-Kill Interceptor Technology for Defense against RAM, UAS and/or Cruise Missile, and Counter RAM, UAS and/or Cruise Missile Tracking and Fire Control (PE 0603313 Project 704) efforts. These combined efforts will conduct multiple interceptor Hardware in the Loop (HWIL) and 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 and other Air and Missile Defense programs. ***FY 2012 Accomplishments:*** Completed fabrication of a technical fire control node for the interceptor flight demonstration; integrated technical fire control components with interceptor guidance section and tracking and fire control system components for pre-flight evaluation in HWIL; fully integrated technical fire control hardware and software with the tracking and fire control sensor to obtain incoming RAM threat state information; integrated technical fire control with interceptors to provide interceptor control for guided flight demonstrations; conducted a flight demonstration using the technical fire control nodes to control a counter RAM interceptor through live-fire pre	6.619	7.882	6.560

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
programmed flight maneuvers; and updated technical fire control design and system simulation based on HWIL evaluation and flight demonstration results. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will continue refinements and enhancements of Technical Fire Control nodes for the Counter RAM, UAS and/or Cruise Missile interceptors based on analysis of flight test performance; integrate updated Technical Fire Control node test articles with interceptor guidance sections and fire control systems in HWIL set-ups; conduct virtual and flight tests against single RAM, UAS and/or Cruise Missile targets using Technical Fire Control nodes to control each.			
Title: Guided Interceptor Concept Technology for defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missile ***Description:*** This effort demonstrates a Guided missile-based Interceptor concept with a high explosive warhead initially focused to defeat RAM, UAS, and Cruise Missile 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. The complementary effort, Technical Fire Control Technology, provides the interceptor with a firing solution and launch command, and Counter RAM, UAS and/or Cruise Missile Tracking and Fire Control, in PE 0603313A Project 704, tracks the RAM, UAS, and Cruise Missile threat. This effort will support the design, fabrication, integration, Hardware-in-the-Loop (HWIL) tests, and flight demonstration of multiple guided interceptors beginning in FY 2014. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11 and other Air and Missile Defense programs. ***FY 2012 Accomplishments:*** Updated Guided Interceptor and launch system designs based on HWIL evaluation; redesigned and tested components in preparation to integrate components and fabricate interceptors and a launch system for flight demonstration against single RAM threat; conducted pre-flight HWIL evaluation of each Guided Interceptor to ensure successful flight demonstration; simulated the target intercept engagement sequence in preparation to integrate the interceptor and launch system with the technical fire control node and tracking and fire control system; flight conducted pre-flight simulations of integrated interceptors, launch system,	11.598	20.810	17.525

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
technical fire control node, and tracking and fire control system capability to defeat single RAM threats in flight within the required timeline; updated designs and system simulation based on component demonstration results. ***FY 2013 Plans:*** 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 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. ***FY 2014 Plans:*** Will fabricate, integrate, and test the alternative components for Guided interceptors; perform Hardware-In-The-Loop tests and pre-flight predictions to prepare for flight tests and reduce risk; conduct interceptor flight-test demonstrations against single RAM, UAS and/or Cruise Missile targets, ; analyze test results and correlate to predicted and HWIL performance; update the Battle Element system; and refine the system simulation based on performance demonstrated through preflight predictions and flight tests. Will complete preliminary designs of affordable propulsion and advanced seeker technologies to extend CUAS/CCM interceptor effective range, enabling the defeat of both current and emerging threats.			
Title: Hit-to-Kill Interceptor Concept Technology for Defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missile ***Description:*** This effort demonstrates a compact, very light weight, radar and alternative 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, UAS and/or Cruise Missile Tracking and Fire Control, PE 0603313A Project 704, provides tracking of the threat for intercept. This effort will support the design, fabrication, integration, Hardware-in-the-Loop (HWIL) tests, and flight demonstration of multiple hit-to-kill interceptors. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11. ***FY 2012 Accomplishments:*** Updated the Hit-to-Kill interceptor and launch system designs based on HWIL evaluation; integrated components and fabricated interceptors and launch system for flight demonstration; conducted pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; integrated the interceptor and launch system with the Technical Fire Control node and Tracking and Fire Control system; flight demonstrated the ability of the integrated interceptors, launch system, Technical Fire	12.462	20.108	16.884

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Control node, and Tracking and Fire Control system in a pre-programmed flight within the required timeline; updated designs and system simulation based on flight demonstration results. ***FY 2013 Plans:*** 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 multiple 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. ***FY 2014 Plans:*** Will continue flight tests of the miniature Hit-To-Kill interceptor; continue Hardware-In-The-Loop tests and pre-flight predictions to prepare for additional guided flight tests and to reduce risk; conduct additional interceptor flight-test demonstrations against single and multiple RAM, UAS, and/or Cruise Missile targets; analyze test results and correlate to predicted and HWIL performance; update the Battle Element system; and refine the system simulation based on performance demonstrated through preflight predictions and flight tests.			
Title: Low-cost Extended Range Air Defense ***Description:*** This effort focuses on developing key enabling technologies for a lower-cost interceptor system for a low- to medium-altitude, medium- to long-range capability. Resulting technologies will enable interceptor integration into a net-enabled Air and Missile Defense Task Force and protection of assets within a 150km diameter Area of Operations. Technologies will be designed for the defeat of tactical UAS and Cruise Missile threats with secondary capability against Large Caliber Rockets (LCR), Short Range Ballistic Missiles (SRBM), and Tactical Air-to-Surface Missiles (TASMS) at extended range and to be interoperable with existing Integrated Air and Missile Defense (IAMD) Force. ***FY 2014 Plans:*** Will complete systems and operational analysis of medium- to long-range missile-based interceptor given anticipated area of operations and anticipated force structure. Begin detailed design of integrated missile system.	0.000	0.000	2.553
Title: Javelin Command Launch Unit (CLU) with External Far Target Locator (FTL) ***Description:*** This effort focuses on the designs, fabrication, and demonstration of technology for a highly accurate, externally-mounted Javelin FTL that integrates with the CLU and provides a means to significantly lighten the load of the Javelin close-combat missile system. The system-technology construct comprises an externally mounted FTL connected to the Javelin Command Launcher Units. This construct will reduce the weight and volume of the FTL capability for close-combat weaponry carried by the individual Soldiers while increasing lethality, survivability, and situational awareness for Small Unit operations. This	0.000	0.000	1.200

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
effort transitions, integrates, and demonstrates technology from PE 0602303A, Project 214, 'Smaller, Lighter, Cheaper Tactical Missile Technologies'. ***FY 2014 Plans:*** Will complete FTL-sensor lightweight-composite housing design, the initial design and fabrication of miniaturized electronics, development and integration of first-build software for the Javelin CLU.			
Accomplishments/Planned Programs Subtotals	58.799	58.907	54.945

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 550: *COUNTER ACTIVE PROTECTION*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
550: *COUNTER ACTIVE PROTECTION*	-	7.300	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Kinetic Energy Active Protection System (KEAPS) Guided Interceptor	7.300	0.000	0.000
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 2012 Accomplishments: Continued 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			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 550: *COUNTER ACTIVE PROTECTION*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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	7.300	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 704: *Advanced Missile Demo*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
704: *Advanced Missile Demo*	-	8.527	4.879	6.765	-	6.765	12.561	17.400	14.287	15.313	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Counter Rockets, Artillery, Mortars (RAM), UAS, and/or Cruise Missile Tracking and Fire Control	8.527	4.879	6.765
Description: This effort matures and demonstrates system technology to provide 360 degree, near hemispherical coverage for tracking and intercept of RAM, UAS, and/or Cruise Missile threats. This effort determines the trajectory and location of the incoming RAM, UAS, and/or Cruise Missile 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 and Unmanned Aerial Systems, and Cruise Missiles efforts in PE 0603313A Project 263. These efforts will be evaluated through Hardware-in-the-Loop (HWIL) tests and multiple interceptor flights. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC), which began the Material Solution Analysis Phase in 4QFY11, and other Air and Missile Defense programs.			
FY 2012 Accomplishments: Updated tracking and fire control system hardware and software designs; integrated through simulation tracking and fire control systems with technical fire control nodes to provide RAM threat state information to support live-fire guided flight demonstrations			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 704: *Advanced Missile Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
of interceptors to shoot down a single RAM threat; conducted simulated 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 updated the system simulation based on component demonstration results. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will use final test bed and/or existing counter RAM, UAS, and Cruise Missile tracking and fire control systems for interceptor flight tests against RAM, UAS, and Cruise Missile targets, and verify tracking and fire control simulations based on results of Hardware-In-the-Loop and flight tests.			
Accomplishments/Planned Programs Subtotals	8.527	4.879	6.765

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 G03: *Area Defense Advanced Technology*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
G03: *Area Defense Advanced Technology*	-	9.679	5.054	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Deployable Force Protection Missile Technology	9.679	5.054	0.000
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 2012 Accomplishments: Integrated missile component technologies into missile systems; integrated missile system with the fire control systems; demonstrated missile and fire control systems individually and evaluated performance of the combined systems.			
FY 2013 Plans: 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	9.679	5.054	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 G03: *Area Defense Advanced Technology*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	10.299	10.902	11.083	-	11.083	11.099	11.271	11.381	11.586	Continuing	Continuing
B92: *DB92*	-	10.299	10.902	11.083	-	11.083	11.099	11.271	11.381	11.586	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	10.299	10.902	11.083	-	11.083
Current President's Budget	10.299	10.902	11.083	-	11.083
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	176.533	180.582	180.662	-	180.662	181.609	182.473	183.914	187.224	Continuing	Continuing
DS7: *High Performance Computing Modernization Program*	-	132.977	180.582	180.662	-	180.662	181.609	182.473	183.914	187.224	Continuing	Continuing
DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*	-	43.556	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

The High Performance Computing Modernization Program (HPCMP) transferred from the Office of the Secretary of Defense (RDT&E,DW) to the Department of the Army (RDT&E,A) in FY 12.

During the Continuing Resolution in Fiscal Year (FY) 2012 the HPCMP received $44.3 million and authority from the Office of the Secretary of Defense (OSD) for initial operations during the CRA period as the HPCMP was considered a new start for the Army even though it was a transferred program. When the FY 2012 budget was approved/appopriated, the $44.3M was returned by the Army (RDT&E,A) to RDT&E,DW. The actual FY 2012 appropriated Army program was $228.15 million including the paid back funding.

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 2012 the HPCMP provided approximately 1.47 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 13 supercomputers (including systems for classified processing) located in the 5 DSRCs across the country providing a total of approximately 180,000 processors and 1.7 quadrillion floating point operations per second (1.7 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 38 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.

B. Program Change Summary ($ in Millions)	FY 2012	FY 2013	FY 2014 Base	FY 2014 OCO	FY 2014 Total
Previous President's Budget	227.790	180.582	180.662	-	180.662
Current President's Budget	176.533	180.582	180.662	-	180.662
Total Adjustments	-51.257	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-44.300	-			
• SBIR/STTR Transfer	-6.957	-			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
DS7: *High Performance Computing Modernization Program*	-	132.977	180.582	180.662	-	180.662	181.609	182.473	183.914	187.224	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 1.7 quadrillion floating point operations per second (1.7 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 Innovation Enablers (formerly named 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Department of Defense (DoD) Supercomputing Resource Centers (DSRCs)	73.612	92.494	91.426
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 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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 Accomplishments:*** Supported five DoD Supercomputing Resource Centers (DSRCs) and awarded two to five competitive Dedicated HPC project investments (DHPIs). This effort was formerly under PE 0603755D8Z- HPCMP. ***FY 2013 Plans:*** 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 is supported by an expected increase in storage capability to over 60 petabytes (60,000,000,000,000 bytes). This expansion in computational capacity is 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. ***FY 2014 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); provide approximately 4.4 billion processor hours to users; increase in storage capability to over 78 petabytes (78,000,000,000,000 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 Accomplishments:*** Provided network services to link all elements of the program and operation of security systems and enhancements. Continued collaborative work with the federal networking community and standards associations continued to assure that the Defense	22.432	31.265	29.894

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Research and Engineering Network (DREN) remained compatible with future technology change. This effort was formerly under PE 0603755D8Z- HPCMP. ***FY 2013 Plans:*** 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 Science and Technology (S&T) and Test and Evaluation (T&E) communities with new capabilities in excess of 3 Gbps network bandwidth provided on the highest bandwidth links. Lead and partner in efforts within the federal networking community to ensure that DoD users remain ready to take advantage of anticipated technology change. ***FY 2014 Plans:*** Will provide an advanced network platform (DREN) and mature new high performance communications and data security technologies; enable advanced computational simulations and data analysis for users in both the Science & Technology and Test & Evaluation communities with new capabilities of up to10 Gbps network bandwidth provided on the highest bandwidth links; lead and partner 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 Accomplishments:*** Computational Research and Engineering Acquisition Tools and Environments (CREATE): continued development of supercomputer-based engineering design and test tools to improve the acquisition process for major weapons systems across the DoD; continued development efforts in software programs continued to mature as other projects are completed, and others begun with a greater emphasis on engineering applications. Software Institutes: continued to develop shared scalable applications to exploit scalable HPC assets. Academic Outreach Program: continued support to encourage and support computational science in universities across the United States. Programming Environments and Training (PETTT): continued 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 was adjusted as the program is re-focused. This effort was formerly under PE 0603755D8Z-HPCMP. ***FY 2013 Plans:***	36.933	56.823	59.342

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Computational Research for Engineering and Science (CRES): 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: 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 are selected competitively based on then-current DoD needs. Programming Environments and Training (PETTT): 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. ***FY 2014 Plans:*** Computational Research and Engineering Acquisition Tools and Environments (CREATE)/ Computational Research for Engineering and Science (CRES): Will provide focused resources to accelerate Science and Technology (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 projects focused on transition of newly-developed technologies out of the university environment into the DoD RDT&E community.			
Accomplishments/Planned Programs Subtotals	132.977	180.582	180.662

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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 DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*	

COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*	-	43.556	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

A. Mission Description and Budget Item Justification

This is a Congressional increase to the High Performance Computing Modernization Program.

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 1.7 quadrillion floating point operations per second (1.7 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 Innovation Enablers (formerly named 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Congressional Increase	43.556	0.000	0.000
Description: Congressional increase for the High Performance Computing Modernization Program.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
FY 2012 Accomplishments: 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	43.556	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	30.687	27.204	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing
608: *Countermine & Bar Dev*	-	25.818	24.684	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing
683: *Area Denial Sensors*	-	4.869	2.520	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 decrease to support 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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	31.491	27.204	28.738	-	28.738
Current President's Budget	30.687	27.204	22.806	-	22.806
Total Adjustments	-0.804	0.000	-5.932	-	-5.932
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.804	-			
• Adjustments to Budget Years	-	-	-5.932	-	-5.932

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
608: *Countermine & Bar Dev*	-	25.818	24.684	22.806	-	22.806	24.018	22.042	24.509	24.460	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence 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 2012	FY 2013	FY 2014
Title: Threat Detection and Neutralization for Route Clearance:	8.218	0.000	0.000
Description: This effort demonstrates capabilities to detect and neutralize surface and shallow buried threats on primary and secondary roads from tactical standoff ranges. ***FY 2012 Accomplishments:*** Conducted trade studies to establish system level options for neutralization of individual explosive devices and for mine fields; validated emerging high energy laser techniques to neutralize individual explosive hazards; substantiated evolving burst laser techniques to neutralize threats detected by primary sensors.			
Title: Explosive Hazard Detection for Manned and Unmanned Aerial Systems:	8.160	8.210	6.402
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			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Made Explosives (HME). In FY13-14, this effort supports the Technology Enabled Capability Demonstration 3.b: Surprise/Tactical Intelligence Actionable Intelligence. ***FY 2012 Accomplishments:*** Integrated shortwave infrared (SWIR) into initial payload and integrated the payload on a manned aircraft; completed baseline aided target recognition (AiTR) integration and conducted initial flight testing in a relevant environment to baseline payload and AiTR detection performance; optimized payload from test data, performed final verification testing, specified and initiated build of a 3-band longwave infrared (LWIR) demonstrator; performed system design trade studies; conducted concept evaluation exercise with representative sensors. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will demonstrate the performance of the specialized sensor integrated on the PUMA SUAV in a relevant environment; validate and test the compatibility of the multi-spectral sensor developed for the Shadow Tactical Unmanned Aerial Vehicle (TUAV) with the communications architecture of the airframe and ground station.			
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 2012 Accomplishments:*** Performed SWaP analysis and system tradeoff studies for potential sensor payloads for the Pointer Upgraded Mission Ability Unmanned Aerial Vehicle (PUMA UAV) and evaluated complimentary sensors for a ground-based platform; designed a 3-band imaging sensor compatible with a forward motion compensation pointer; evaluated aided target recognition approaches for compatibility with selected sensors; conducted concept evaluation exercises of representative air and ground-based sensors using mission scenarios in a relative environment.	9.440	0.000	0.000
Title: Ground Vehicle Explosive Hazard Detection ***Description:*** This project improves detection of buried low metal/low contrast explosive threats, such as Improvised Explosive Devices (IEDs), and antitank landmines and increases Rates of Advance (RoA). Improving the signal to noise ratio and acquisition rates reduces susceptibility to electromagnetic interference and improves the interoperability with electronic countermeasures,	0.000	13.474	13.385

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
while continuing to improve detection and reduce false alarms. Currently, Ground Penetrating Radar (GPR) capabilities for detection of explosive threats in an electronic warfare environment are limited by radar receiver technology and detection latency. 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:*** 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. 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. ***FY 2014 Plans:*** Will integrate and demonstrate performance of initial full size four-panel digital GPR array with greater detection; integrate and demonstrate performance of ground vehicle based, forward looking electro-optical/infrared sensor; mature sensor fusion algorithms and cueing techniques to enable handoff of potential in-road threats detected in front of the vehicle to the on-board digital GPR for confirmation of threat locations to enable increased rates of advance during route clearance operations.			
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:*** 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. Integrate novel hand held GPR and wideband metal detectors into demonstrators for data collections and explosive hazard detection algorithm improvements. ***FY 2014 Plans:***	0.000	3.000	3.019

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Will collect data in relevant environments using an improved digital night vision goggle with a new counter IED mode demonstrator and optimize target detection algorithms; demonstrate performance low/no-metal hand held buried explosive hazard detector against realistic IED and mine targets (including both metallic, non-metallic and command wire threat components) by integrating metal detector and ground penetrating radar technologies into a single system.			
Accomplishments/Planned Programs Subtotals	25.818	24.684	22.806

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
683: *Area Denial Sensors*	-	4.869	2.520	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence 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 2012	FY 2013	FY 2014
Title: Area Denial Sensors	4.869	2.520	0.000
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 2012 Accomplishments: Continued the maturation and demonstration of the personnel detection system in an operationally relevant environment; validated 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 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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	4.869	2.520	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.473	6.095	5.030	-	5.030	7.317	5.137	5.873	5.823	Continuing	Continuing
627: *JT SVC SA PROG (JSSAP)*	-	7.473	6.095	5.030	-	5.030	7.317	5.137	5.873	5.823	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding realigned to higher priority efforts.

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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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*		
B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	7.674	6.095	6.235	-	6.235
Current President's Budget	7.473	6.095	5.030	-	5.030
Total Adjustments	-0.201	0.000	-1.205	-	-1.205
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.201	-			
• Adjustments to Budget Years	-	-	-1.205	-	-1.205

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
627: *JT SVC SA PROG (JSSAP)*	-	7.473	6.095	5.030	-	5.030	7.317	5.137	5.873	5.823	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 2012	FY 2013	FY 2014
Title: Small Arms Weapons and Fire Control Integration	3.640	2.519	2.305
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 Accomplishments: Matured dynamic target tracking and range finding, as well as adaptive polymer zoom lens technologies; demonstrated power distribution/sourcing technologies in an integrated weapon and fire control prototype; matured and demonstrated integrated thermal management small arms weapon technologies such as graphite foam and heat pipes.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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; use results to assist in selection of best systems. ***FY 2014 Plans:*** Will complete integration of the daytime electro-optic fire control demonstrator with target tracking algorithms and range determination component technologies for machine gun mounted optics; demonstrate capability to track multiple targets and increase probability of hit by 100% out to a range of 1200 meters.			
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 Accomplishments:*** Demonstrated advanced lethality concepts, including course correction, as well as enhanced fragmentation/directionality technologies; integrated and demonstrated recoil mitigation technologies. ***FY 2013 Plans:*** 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 grenades for demonstration; assess performance improvement results to assist in selection of best systems; transition fuze design improvements to PM-MAS. ***FY 2014 Plans:*** Will minimize dispersion and drag variation of the mk433 40mm grenade through exterior design modifications in order to maximize the range of the projectile; integrate the smaller fuze and sensor components into the improved projectile body; demonstrate improved warhead and ballistic performance; transition grenade design improvements to PM-MAS. Initiate weapon effectiveness study to understand target and advanced projectile interactions for overwhelming lethal effects.	3.833	3.576	2.725
Accomplishments/Planned Programs Subtotals	7.473	6.095	5.030

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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)*

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	41.283	37.217	36.407	-	36.407	42.338	39.761	41.069	41.588	Continuing	Continuing
K70: *Night Vision Adv Tech*	-	25.067	21.760	20.401	-	20.401	25.508	22.577	23.581	23.951	Continuing	Continuing
K86: *Night Vision, Abn Sys*	-	16.216	15.457	16.006	-	16.006	16.830	17.184	17.488	17.637	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 for 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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	42.348	37.217	39.257	-	39.257
Current President's Budget	41.283	37.217	36.407	-	36.407
Total Adjustments	-1.065	0.000	-2.850	-	-2.850
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.065	-			
• Adjustments to Budget Years	-	-	-2.850	-	-2.850

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
K70: *Night Vision Adv Tech*	-	25.067	21.760	20.401	-	20.401	25.508	22.577	23.581	23.951	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, Ground, Air and Soldier Portfolios.

The cited work is consistent with the Assistant Secretary of Defense for 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 2012	FY 2013	FY 2014
Title: Weapon Sight Technology	7.520	3.000	6.102
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. In FY12-14 this effort supports TECD 3.a: Surprise/Tactical Intelligence Mission Command and 2.a: Overburdened Physical Burden.			
FY 2012 Accomplishments: Completed Counter Surveillance System (CSS) brassboard integration; demonstrated and conducted user evaluation then transitioned CSS technology to Program Manager-Soldier Sensors and Lasers (PM-SSL) and PM-Stryker; completed weapon sight brassboard integration; demonstrated and conducted user evaluations of the weapon sight technology then transitioned the technology to PM-SSL.			
FY 2013 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
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. ***FY 2014 Plans:*** Will integrate and evaluate an integrated sensor fusion kit (combines situational awareness and target handoff) and existing fielded equipment and improve algorithms to reduce false alarms for an affordable UV/virtual pointer and hand-held targeting technology; leverage and integrate latest generation of high performance focal plane arrays (FPAs), displays, advanced optics, direction finding and wireless data component technologies for lighter weight, lower power, clip-on weapon sight with improved range performance.			
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 2012 Accomplishments:*** Demonstrated 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); completed 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; developed signal processing algorithms for pixel level sensor fusion and information fusion. ***FY 2013 Plans:*** 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.	8.719	2.637	0.000
Title: Tactical Ground Persistent Surveillance and Targeting ***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. In FY14 this effort supports TECD 1.a: Force Protection - Basing. ***FY 2012 Accomplishments:***	3.888	5.916	6.108

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Initiated development of higher performance, lower cost advanced sensor technology and incorporated 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:*** Mature large format high definition infrared (IR) focal plane arrays (FPAs) 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. ***FY 2014 Plans:*** Will increase sensor resolution with large format FPAs and improve active illumination coverage to demonstrate long range, rapid and positive target recognition; improve gimbal performance through a combination of mechanical and electrical techniques to provide stabilized imagery for the sensor surveillance suite; demonstrate improved Moving Target Indicator (MTI) software capable of human and small unmanned aerial vehicle (SUAV) target recognition with improved system performance by leveraging laser range finder, cross-cueing with radars and advanced real-time signal processing of IR imagery.			
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-D imaging sensor techniques, and precise far target location technology to increase target detection range, extended target and reduce target acquisition timelines. ***FY 2012 Accomplishments:*** Matured a 3-D sensor suite with precise target acquisition technology (target identification and location); demonstrated and validated 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:*** 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. ***FY 2014 Plans:***	4.940	10.207	8.191

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will integrate Next Generation, high definition component technologies to rapidly detect and identify (ID) threats while on-the-move for vehicle sights; demonstrate flash detection capability coupled with acoustics for cueing and bullet tracking; develop hardware and software for detection and negation of sniper optics.			
Accomplishments/Planned Programs Subtotals	25.067	21.760	20.401

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
K86: *Night Vision, Abn Sys*	-	16.216	15.457	16.006	-	16.006	16.830	17.184	17.488	17.637	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Army vertical lift aircraft 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, Communications and Intelligence portfolios.

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, Development and Engineering Command (RDECOM)/Communications-Electronics Research, Development, and Engineering Center (CERDEC) /Night Vision and Electronic Sensors Directorate (NVESD), Fort Belvoir, VA. Work in this project is fully coordinated with efforts in PE 0603003A (Aviation Advanced Technology).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Airborne Unmanned Persistent Imaging	10.416	6.464	4.730
Description: This effort demonstrates day and night persistent surveillance imaging and enhanced reconnaissance, surveillance and target acquisition (RSTA) capabilities from a single payload on the Grey Eagle Unmanned Aerial System (UAS). Technology developed will be applied to smaller/lighter UASs as miniaturized large format sensors mature. In FY14 this effort supports TECD 3.b: Actionable Intelligence.			
FY 2012 Accomplishments: Integrated enhanced capabilities (high definition sensors and dual color infrared (midwave/longwave (MW/LW)) into a high definition demonstrator; completed intelligent data compression subsystem to provide persistent wide-area activity monitoring,			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
personnel/vehicle tracking, and enhanced RSTA capabilities to include high resolution target search; completed and demonstrated the 3rd generation focal plane array turret to provide the optimal infrared imaging band for prevailing battlefield conditions. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will complete system flight testing; mature Step-Stare capability, demonstrating local-area persistent surveillance for small unit situational awareness; demonstrate automated target cueing, vehicle and dismount tracking, image mosaicing and mapping, and provide imagery and target report products to the small unit network as part of the TEC-D; demonstrate HD dual band 720 pixel format MWIR and LWIR imagery to determine best band for battlefield conditions and improved performance in adverse weather.			
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 Accomplishments:*** Matured the capabilities of waveguide display optics technology; expanded field-of-view and resolution through innovative optical designs, materials and advanced display technologies; began to integrate and demonstrate the system (conduct laboratory and engineering flight tests). ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will complete fabrication of wide field of view system demonstrators; conduct laboratory performance characterization of complete HMD system and aero-medical human factors conformance; finalize platform integration activities; conduct ground and flight test demonstrations and user evaluation.	5.800	8.993	6.919
Title: Multifunction Imagers for Rotary Wing	0.000	0.000	4.357

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Description: This effort matures and demonstrates an economical sensor capability by developing multifunction sensor modules for increased performance of pilotage capability in a degraded visual environment at lower total life cycle cost than separate sensor systems. ***FY 2014 Plans:*** Will develop a dual-speed 60/1000 Hz readout integrated circuit that enables a single infrared (IR) sensor to provide simultaneous day/night imagery for applications such as pilotage; integrate the dual-purpose IR sensor into a multifunction sensor module with other low-light night vision technology to provide a multi-spectral capability; conduct trade studies to optimize sensor placement for multiple applications performance over the entire flight envelope, including degraded visual environments.			
Accomplishments/Planned Programs Subtotals	16.216	15.457	16.006

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	15.247	13.626	11.745	-	11.745	12.537	12.147	12.212	12.446	Continuing	Continuing
002: *Environmental Compliance Technology*	-	4.597	2.314	1.923	-	1.923	2.407	1.901	1.864	1.897	Continuing	Continuing
025: *Pollution Prevention Technology*	-	3.599	3.720	3.022	-	3.022	3.450	3.606	3.668	3.734	Continuing	Continuing
03E: *Environmental Restoration Technology*	-	7.051	7.592	6.800	-	6.800	6.680	6.640	6.680	6.815	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding realigned to higher priority area.

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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	15.934	13.626	13.299	-	13.299
Current President's Budget	15.247	13.626	11.745	-	11.745
Total Adjustments	-0.687	0.000	-1.554	-	-1.554
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.383	-			
• SBIR/STTR Transfer	-0.304	-			
• Adjustments to Budget Years	-	-	-1.554	-	-1.554

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
002: *Environmental Compliance Technology*	-	4.597	2.314	1.923	-	1.923	2.407	1.901	1.864	1.897	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Innovation Enablers (formerly 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 2012	FY 2013	FY 2014
Title: Sustainable Ranges and Lands	4.597	2.314	1.923
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. In FY13-14 this effort supports Technology Enabled Capability Demonstration (TECD) 4a Sustainability/Logistics Basing.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Matured and demonstrated a cell-based, field portable sensor design for real time analysis to detect and quantify or evaluate toxicity of water; matured 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:*** 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. ***FY 2014 Plans:*** Will evaluate emerging biofiltration technologies applicable to gray water treatment at contingency bases based on technology performance, efficiency, and robustness; develop full scale design specifications for a robust gray water pretreatment component technology based on biofiltration evaluation; develop detailed technology test plan in coordination with Army Test and Evaluation Command, US Army Public Health Command, and US Army Tank Automotive Research, Development and Engineering Center; mature a dynamic simulation model which integrates the complex adaptive system algorithms representing the dynamic operating systems of a contingency base that transitions Virtual Forward Operating Base (VFOB) research from PE 0602720 to TECD 4a Sustainability/Logistics Basing.			
Accomplishments/Planned Programs Subtotals	4.597	2.314	1.923

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
025: *Pollution Prevention Technology*	-	3.599	3.720	3.022	-	3.022	3.450	3.606	3.668	3.734	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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. Technology thrusts also include demonstration of technologies for reductions of waste streams at base camps and toxic metal reductions from surface finishing processes.

Work in this project supports the Army S&T Innovation Enablers (formerly 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 Army Research Laboratory, Aberdeen Proving Ground, MD, the Armaments Research, Development, and Engineering Center, Picatinny Arsenal, NJ, the Aviation and Missile Research, Development, and Engineering Center, Redstone Arsenal, AL , the Natick Soldier Research, Development and Engineering Center, Natick, MA (NSRDEC), and the Tank Automotive Research, Development and Engineering Center (TARDEC), Warren, MI in conjunction with the Army Public Health Command, Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Pollution Prevention Technology	3.599	3.720	3.022
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.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Rocket and Missile Propellants: finalized design of flight-scale hardware and prepare to conduct flight performance evaluation; Conventional Ammunition: refined and optimized compositions in a relevant end item; Pyrotechnics: integrated flare, delay and signal formulations into system prototypes. ***FY 2013 Plans:*** Rocket and Missile Propellants: qualify and test lead-free propellant in 2.75-inch Hydra rocket system; Conventional Ammunition: initiate insensitive munitions testing on environmentally benign formulation in relevant end item; Pyrotechnics: integrate high nitrogen materials into pyrotechnic signal prototypes. ***FY 2014 Plans:*** Conventional Ammunition: will conduct large-scale performance and insensitive munitions testing on environmentally benign formulation in relevant end item; Pyrotechnics: will integrate chromate-free delay composition into relevant end item; Toxic Metal Reduction: will demonstrate alternatives to chromic acid anodizing for common aircraft substrates; Zero Footprint Camp: will select and mature high-payoff approaches for reducing fresh water demand and wastewater generation in contingency bases.			
Accomplishments/Planned Programs Subtotals	3.599	3.720	3.022

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
03E: *Environmental Restoration Technology*	-	7.051	7.592	6.800	-	6.800	6.680	6.640	6.680	6.815	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 Innovation Enablers (formerly 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 2012	FY 2013	FY 2014
Title: Sustainable Ordnance Mitigation and Management (Previously titled - Unexploded Ordnance (UXO))	2.196	1.406	1.500

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Description: This effort matures and demonstrates an active range ordnance impact assessment and positioning system in relevant environments and provides technologies for automated unexploded ordnance (UXO) removal. This effort also develops real time detection and discrimination methodologies for unique and emerging UXO. ***FY 2012 Accomplishments:*** Matured and demonstrated the active range ordnance impact assessment and positioning system in a relevant environment; continued development of real time detection and discrimination methodologies for unique and emerging UXO. ***FY 2013 Plans:*** Mature emergent technology in smart sensors and real time assessment of UXO discrimination for enhanced range maintenance, sustainability and construction support. ***FY 2014 Plans:*** Will mature a networked semi- to-fully-autonomous mobile platform with the operational capability to mitigate hazardous UXOs on military ranges.			
Title: Hazard Assessment for Military Materials (Previously titled - 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 militarily relevant compounds and allow for improved predictive risk assessment and provide environmental life cycle assessment capability. ***FY 2012 Accomplishments:*** Provided 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; matured and demonstrated tools for rapid, standardized, and quantitative measurement of effects and toxicity from current MCs using toxicogenomics and computational biology. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:***	2.192	1.306	0.863

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will mature and demonstrate a toolkit with optimized sensor technologies for rapid and reliable data collection providing real time analysis for contamination within an operational environment.			
Title: Technologies for Sustainable and Green Operations and Acquisition (Previously titled - Green Remediation Technologies) ***Description:*** This effort investigates and matures technologies to control contaminant transport in environmental media on Army lands and mission spaces as well as assesses and demonstrates novel detection, remediation and mitigation capabilities for existing and emerging contaminants. ***FY 2012 Accomplishments:*** Assessed and matured bioreactor technologies for control of contaminant transport in soil on training ranges; assessed and demonstrate novel detection capabilities for depleted Uranium on Army lands. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will mature technologies that will provide an integrated approach to contamination management in range and installation design; complete development of methods for the cost effective and environmentally protective management and/or removal of small (size of the granular media or smaller) metallic Depleted Uranium and residues from affected soils and sands; initiate development of a virtual model for wastewater treatment of munitions production water and investigate new technologies for improved water quality of surface water and wetlands impacted by development and use of new munitions.	2.663	2.941	2.287
Title: Risk Prediction and Decision Technologies (Previously titled - Risk Prediction and Mitigation Technologies) ***Description:*** This effort develops and demonstrates capabilities to anticipate and adapt to multiple environmental related stressors to Army lands and mission space and provides capability to incorporate science-based environmental life-cycle into acquisition decision. ***FY 2013 Plans:*** Mature a decision framework and screening assessment tool to evaluate multi-stressor climatic change impacts to vulnerable Army installations based on mission critical criterion. ***FY 2014 Plans:***	0.000	1.939	2.150

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will complete and apply climate models under site level simulation frameworks to validate web-based visualization tools that provide a framework for assessing multi-stressor impacts due to predictive climatic changes; demonstrate appropriate protocols for generating/parameterizing environmental risk data and parameterization for modifying existing life-cycle analysis of munitions constituents.			
Accomplishments/Planned Programs Subtotals	7.051	7.592	6.800

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	40.496	28.458	23.717	-	23.717	20.874	19.451	20.169	19.559	Continuing	Continuing
T08: *COMBAT ENG SYSTEMS*	-	40.496	28.458	23.717	-	23.717	20.874	19.451	20.169	19.559	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY12 reprogramming increase for MAPCAT.

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 2014 Army					DATE: April 2013
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 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	36.458	28.458	24.198	-	24.198
Current President's Budget	40.496	28.458	23.717	-	23.717
Total Adjustments	4.038	0.000	-0.481	-	-0.481
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	5.000	-			
• SBIR/STTR Transfer	-0.962	-			
• Adjustments to Budget Years	-	-	-0.481	-	-0.481

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
T08: *COMBAT ENG SYSTEMS*	-	40.496	28.458	23.717	-	23.717	20.874	19.451	20.169	19.559	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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 and Command, Control, Communications and Intelligence (C3I) 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.

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Title: Defeat of Emerging Adaptive Threats	3.415	0.000	0.000
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 2012 Accomplishments:*** Demonstrated and validated performance of novel layered protective systems under live-fire tests in realistic environments; matured components, fabricated prototypes, optimized implementation, and established initial fielding of protective systems to defeat large-caliber rockets, vehicle-borne improvised explosive devices (IED), human-borne IEDs, and shoulder-fired rockets.			
Title: Geo-Enabled Mission Command Enterprise (Previously titled - Advanced Geospatial Tools and Architectures)	4.147	3.782	4.141
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. In FY14 this effort supports Technology Enabled Capability Demonstrations 3a, Surprise/Tactical Intelligence Mission Command, and 3b, Surprise/Tactical Intelligence Actionable Intelligence. ***FY 2012 Accomplishments:*** Developed multi-platform, cross community applications and software services supporting the integration and synchronization of Intelligence (Intel), Operations (Ops) and Geospatial (Geo) functions; transitioned several Tactical Spatial Objects (TSOs) and web-services to the Combined Joint Mapping ToolKit (CJMTK); transitioned several TSOs to Distributed Common Ground System - Army; completed the interoperability and documentation of an integrated set of services that will support an improved, joint collaborative planning processes to work seamlessly regardless of physical location and automatedcompletion of digital operations orders. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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 2012	FY 2013	FY 2014
Will mature and demonstrate software tools for mission command systems to include digital operation order generation and collaborative Course of Action planning; demonstrate use and application of map-based narratives for military applications on the Secure Internet Protocol Router Network and Joint Worldwide Intelligence Communications System with advanced spatial and temporal visualization and collaboration engines. Will demonstrate geospatially enabled persistent surveillance and analytic capabilities based on mission, threat, terrain and weather to provide synchronization of unattended ground sensors and small unit unattended aerial systems for increased situational awareness of threats at small outposts, convoy operations and key urban locations.			
Title: Deployable Force Protection Technology Integration Demonstrations and Red Teaming	27.184	20.716	16.096
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 2012 Accomplishments: Identified critical force protection gaps and down selected most promising technology enabled solutions to advance active and passive protection, detection and assessment; improved designs to reduce key factors such as size and/or weight, power and energy, manpower, and support requirements and to enhance performance of systems; integrated capabilities based on stakeholder priorities; continued 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: 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			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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 2014 Plans:*** Will complete development of first-generation, low-logistic reinforcement technologies for indigenous structures typical of conditions in operating environments; demonstrate lightweight vehicle ramming protection kits for base perimeter protection; will complete development of integrated sensor architecture including web and tactical services, with data exchange standards, protocols, and compliance tools for interoperability; demonstrate integrated pre-shot sniper detection and non-line-of-site threat detection capabilities with improved designs for deployed forces; demonstrate light-weight threat assessment tools for predictive capabilities; conduct full-scale demonstrations and user assessments and conduct red and blue team missions in asymmetric and 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 (TARDEC). In FY13-14 this effort supports Technology Enabled Capability Demonstration 1c, Occupant Centric Platform. ***FY 2012 Accomplishments:*** Demonstrated for Tank and Automotive Research, Development and Engineering Center (TARDEC) the numerical modeling capability of ground vehicle protective schemes against surface and buried threats. ***FY 2013 Plans:*** Demonstrate advanced numerical methods for coupling occupant response to shock resulting from improvised explosive device (IED) detonations. ***FY 2014 Plans:*** Will demonstrate a comprehensive model of vehicle response to mines/IEDs during Army Occupant Protection Suite Concept Demonstration. This model represents the next generation of Lagrangian Meshfree methods for airblast/fragmenting buried weapons of various sizes in different soils at a large range of burial depths. This model will provide the Army with accurate predictions of the effect of IEDs on vehicles.	0.750	0.694	0.724
Title: Austere Entry and Maneuver Support Demonstrations (Previously titled - Rapid Operational Access and Maneuver Support)	0.000	3.266	0.256

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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. In FY14 this effort supports Technology Enabled Capability Demonstration 2a, Overburdened Physical Burden. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will demonstrate a high performance computing computational testbed that allows for evaluation of sensor and platform tradeoff studies of potential off-loading platforms as well as soldiers in the 9-man squad.			
Title: Integrated Base Protection ***Description:*** This effort demonstrates integrated protective technologies to plan and expediently construct Combat Outposts (COPs) and Patrol Bases (PBs). In FY14 this effort supports Technology Enabled Capability Demonstrations 1a, Force Protection - Basing. ***FY 2014 Plans:*** Will demonstrate the first version of decision support tools for planning of overall basing architecture that integrates and optimizes force protection architectures and basing functions; incorporate user feedback into second version of modeling software; demonstrate, using troops in the field, an initial perimeter barrier for perimeter security of a COP/PB constructed of advanced, reusable materials; evaluate troop constructability, protection, and retrograde value to optimize life-cycle cost and effectiveness of systems.	0.000	0.000	2.500
Title: Map-based Adaptive Planning Course of Action Tool (MAPCAT) ***Description:*** Map-based Adaptive Planning Course of Action Tool (MAPCAT) is a joint, web-enabled, collaborative, map-based, Course of Action (COA) analysis tool to assist the Combatant Commands and their Service components/supporting commands to conduct Adaptive Planning (AP). This effort will technically and operationally assess MAPCAT functionality, Common Operating Environment compliance, and usability by Combatant Command and Service Component Command Planners. ***FY 2012 Accomplishments:*** Initiated MAPCAT prototype assessment efforts to quantify real-time geospatial data for real-time update to interactive map displays, and other transportation feasibility and planning tools for continuous monitoring and effective response to dynamic	5.000	0.000	0.000

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
situations; conducted preparation for assessment of planning and feasibility analyses capabilties that assure rapid and efficient resource allocation methods are incorporated into custom-made plans to include transportation, logistics, personnel and deployment planning.			
Accomplishments/Planned Programs Subtotals	40.496	28.458	23.717

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army											DATE: April 2013	
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)	**All Prior Years**	**FY 2012**	**FY 2013#**	**FY 2014 Base**	**FY 2014 OCO ##**	**FY 2014 Total**	**FY 2015**	**FY 2016**	**FY 2017**	**FY 2018**	**Cost To Complete**	**Total Cost**
Total Program Element	-	29.937	25.226	33.012	-	33.012	40.046	37.050	36.852	36.471	Continuing	Continuing
101: *Tactical Command and Control*	-	15.037	11.590	22.353	-	22.353	20.614	16.366	16.361	16.111	Continuing	Continuing
243: *Sensors And Signals Processing*	-	14.900	13.636	10.659	-	10.659	19.432	20.684	20.491	20.360	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

Note

FY14 funding increase to support mission command capability demonstrations.

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 (MC) 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 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), Aberdeen Proving Ground, MD.

Exhibit R-2, RDT&E Budget Item Justification: PB 2014 Army					DATE: April 2013
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B. Program Change Summary ($ in Millions)	**FY 2012**	**FY 2013**	**FY 2014 Base**	**FY 2014 OCO**	**FY 2014 Total**
Previous President's Budget	30.552	25.226	27.413	-	27.413
Current President's Budget	29.937	25.226	33.012	-	33.012
Total Adjustments	-0.615	0.000	5.599	-	5.599
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.615	-			
• Adjustments to Budget Years	-	-	5.599	-	5.599

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
101: *Tactical Command and Control*	-	15.037	11.590	22.353	-	22.353	20.614	16.366	16.361	16.111	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence portfolio.

Note: In FY14 Mission Command (MC) funding from PE/Project 0603008A/TR2 has been moved into this PE/Project to consolidate MC efforts into a single PE/Project.

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, Development, and Engineering Command, Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Title: Integrated Mission Command (MC)	8.691	8.155	11.104
Description: This effort matures and demonstrates technologies that allow forces to effectively collect, analyze, transfer, and display information in a net-centric battlefield environment across multiple computing environment (CEs). In order to manage acquisition costs and reduce duplicative efforts the Army has introduced the notion of the Common Operating Environment (COE) composed of several distinct CEs such as the Mobile (hand held devices) and the Mounted (vehicle based devices) CEs. Technology areas in this effort are designed to support all applicable CEs and include intelligent software agents, server virtualization, knowledge management, and automated query technologies. Work accomplished under PE 0602782A/project 779 compliments this effort. In FY 13 and FY14 this effort supports Technology Enabled Capability Demonstration 3.a: Surprise/ Tactical Intelligence-Mission Command.			

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Validated proof-of-concept for mission context data aggregation and alert algorithm for more effective use of available information; further created and demonstrated methods to assess information sharing, decision making and collaboration in network-enabled operations to better understand how to align these technologies with Warfighter needs; demonstrated 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; demonstrated technologies permitting the Warfighter to customize and/or extend decision-enabling software in response to unique and evolving mission needs; wrote algorithms to monitor text-based chat conversations, evaluated content meaning, and suggested information from other related chat sessions that may be applicable. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will architect, design, fabricate, code and integrate a platoon level MC demonstration suite to provide actionable intelligence and timely information sharing over the Army's low bandwidth small unit tactical edge network; code and integrate additional decision support and collaboration tools, including knowledge management and the necessary database connections and deliver information pertinent to a small unit's mission to increase situational awareness/understanding and decrease tactical surprise; demonstrate this suite's capability to allow Soldiers to access and use all relevant information available on the network most effectively, accounting for the Soldier's cognitive abilities and contextual framework for ease of use and ensure relevance of the delivered information to the unit's mission; analyze social networks and identify in near real-time team strengths, weaknesses, and vulnerabilities and highlight collaboration opportunities which could be leveraged more effectively to foster the efficient use of combat power.			
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.	3.400	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2014 Army		DATE: April 2013
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
FY 2012 Accomplishments: Coded user interface enhancements to facilitate manned/unmanned interaction, improved ability to monitor multiple unmanned assets, and improved visualization of vehicle status, task progression, and incoming sensor data; continued to evolve mission planning, execution and monitoring software services supporting collaborative UAS/UGV teaming; continued to enhance software algorithms for UAS/UGV perception and control technologies that potentially facilitate increased autonomy and mission complexity; continued 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. In FY13 and FY14 this effort supports Technology Enabled Capability Demonstration 3.a: Surprise/ Tactical Intelligence-Mission Command. ***FY 2012 Accomplishments:*** Completed 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:*** 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 radio frequency-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. ***FY 2014 Plans:*** Will enhance and demonstrate navigation sensors such as pedometry, human motion classification, and visual odometry fused with radio frequency and smart phone approaches to enhance pos/nav and improve positional situation awareness; integrate navigation sensor and network algorithms into personal Android based smart phones or tablets and demonstrate situational awareness in a representative platoon size Soldier network; mature, integrate and demonstrate interfaces, software and protocols and that will allow handheld electronics to integrate with emerging M Code capable secure GPS chips.	2.946	3.435	4.490
Title: Collaborative Battle Management (moved from PE/project 0603008A/TR2)	0.000	0.000	6.759

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
Description: This effort matures and demonstrates mission command (MC) software to improve sharing and understanding of data between the intelligence and operations communities. In FY14 this effort supports Technology Enabled Capability Demonstration 3.a: Surprise/Tactical Intelligence-Mission Command. (Funding for this effort has been moved here in FY14 from PE/project 0603008A/TR2 to consolidate 6.3 Mission Command Work into this PE/Project). ***FY 2014 Plans:*** Will design, code, fabricate and demonstrate an enhanced mission command capability with collaborative software tools that allows for faster and more accurate target identification and handoff, real time alerts, natural information collection, Soldier-composable leader tools, and support for operations across diverse human and geographic terrains to enable tactical overmatch for the small units by acting before the adversary can respond; develop these capabilities to operate in a platoon level low bandwidth tactical network using planned Army infrastructure.			
Accomplishments/Planned Programs Subtotals	15.037	11.590	22.353

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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 2014 Army			DATE: April 2013
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COST ($ in Millions)	All Prior Years	FY 2012	FY 2013#	FY 2014 Base	FY 2014 OCO ##	FY 2014 Total	FY 2015	FY 2016	FY 2017	FY 2018	Cost To Complete	Total Cost
243: *Sensors And Signals Processing*	-	14.900	13.636	10.659	-	10.659	19.432	20.684	20.491	20.360	Continuing	Continuing

FY 2013 Program is from the FY 2013 President's Budget, submitted February 2012

The FY 2014 OCO Request will be submitted at a later date

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, Communications and Intelligence, 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 2012	FY 2013	FY 2014
Title: Measurement and Signature Intelligence Technologies (MASINT) for clandestine tagging, tracking and locating (TTL)	2.265	2.870	0.000
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 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 2012 Accomplishments:			

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
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:*** 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 2012 Accomplishments:*** Completed brassboard weapon-locating radar system hardware; conducted component and system level engineering and performance assessment against rocket, artillery and mortar targets fired at non-traditional trajectories; integrated 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.	4.235	0.000	0.000
Title: Collaborative ISR Sensors ***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. In FY 14 this effort supports Technology Enabled Capability Demonstration 1.a: Force Protection-Basing. ***FY 2013 Plans:*** 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 (lightweight counter-mortal radar (LCMR)) to improve the accuracy of target recognition, identification and classification; code software and firmware to correlate data from	0.000	4.701	5.095

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2012	FY 2013	FY 2014
existing short range (LCMR) and long range (Enhanced Firefinder Radar (EQ-36)) radar systems to more accurately validate and verify threats at increased ranges and combine targeting information into a single display. ***FY 2014 Plans:*** Will demonstrate improved target recognition, identification and classification for Counter-Target Acquisition (CTA) and air Defense Surveillance radars (LCMR and EQ-36); demonstrate increased detection, identification and classification range and accuracy gained from correlating short (LCMR) and long range (EQ-36) radar systems; develop a method to allow ground sensors to cue airborne radars to events on the ground and allow them to track the scene in that area (i.e. cueing a ground moving target indicator radar to follow insurgents away from a rocket launch point after CTA radar has discovered the rocket's point of origin).			
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 2012 Accomplishments:*** Fabricated networking radar-EO/IR sensor pairs using ad-hoc methods; analyzed and assessed network bandwidth and security requirements for downlink from UAS; further matured antenna design and processing techniques to support multi-sensor capability and cross-cue to narrower fields of view and auto-tracker; modified sensor payload to reduce size, weight and power; hardened antenna and electronics design for field environment; designed and coded application for radar command, control, and data display on handheld device (PDA, smart-phone, or similar).	3.400	0.000	0.000
Title: Advanced All Source Fusion ***Description:*** This effort develops software technologies for intelligence/mission command (Intel/MC) 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. In FY 14 this effort supports Technology Enabled Capability Demonstration 3.b: Surprise/Tactical Intelligence-Actionable Intelligence. ***FY 2012 Accomplishments:*** Analyzed, assessed and designed 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); coded entity extractors, relational reasoning engines, and visualization products; integrated human assisted extraction,	5.000	6.065	5.564

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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 2012	FY 2013	FY 2014
interactive correlation and data mining techniques to enable the data fusion process and assist intel analysts with activity and relationship discovery; integrated these technologies into DCGS-A Systems Integration Laboratory and architecture; integrated biometric data matching and fusion algorithms for use in non-cooperative intelligence collection environment. ***FY 2013 Plans:*** 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. ***FY 2014 Plans:*** Will continue to assess the utility of automated exploitation and fusion analysis tools for tactical edge users in a network constrained environment; mature data transformation services to provide intelligence data as situational awareness (SA) reports for a small unit; employ correlation and pattern analysis algorithms to provide actionable and timely intelligence that is relevant to small units based on their geographic area, mission type and objective; integrate automated exploitation and fusion analysis tools, intelligence/SA transformation services, threat prediction software, and enterprise data feeds into a proactive data service framework that supports timely situation understanding for a small unit; will conduct networked laboratory experiments to validate this framework and gather user feedback.			
Accomplishments/Planned Programs Subtotals	14.900	13.636	10.659

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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.