Department of Defense
Fiscal Year (FY) 2015 Budget Estimates

March 2014

Army

Justification Book

Research, Development, Test & Evaluation, Army

RDT&E − Volume I, Budget Activity 3

RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY

APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, $6,593,898,000, to remain available for obligation until September 30, 2016.

The following Justification Books were prepared at a cost of $139,860.00: Aircraft (ACFT), Missile (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 - Tactical & Support Vehicles, Other Procurement Army (OPA) 2 - Communications &Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 6, and Budget Activity 7.

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Exhibit R-1 FY 2015 President's Budget
Total Obligational Authority
(Dollars in Thousands)

February 28, 2014

Appropriation	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
Research, Development, Test & Eval, Army	8,010,810	7,122,681	13,500	7,136,181	6,593,898
Total Research, Development, Test & Evaluation	8,010,810	7,122,681	13,500	7,136,181	6,593,898

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Summary Recap of Budget Activities	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
Basic Research	384,636	436,493		436,493	424,176
Applied Research	910,391	954,451		954,451	862,611
Advanced Technology Development	961,060	1,063,636		1,063,636	917,791
Advanced Component Development & Prototypes	421,655	408,552	6,500	415,052	323,156
System Development & Demonstration	2,785,237	2,052,576	7,000	2,059,576	1,719,374
RDT&E Management Support	1,241,684	1,163,091		1,163,091	1,000,430
Operational Systems Development	1,306,147	1,043,882		1,043,882	1,346,360
Total Research, Development, Test & Evaluation	8,010,810	7,122,681	13,500	7,136,181	6,593,898
Summary Recap of FYDP Programs					
Strategic Forces	142,508	83,406		83,406	54,076
General Purpose Forces	610,249	575,129		575,129	963,970
Intelligence and Communications	383,165	208,332		208,332	170,244
Research and Development	6,821,245	6,199,708	13,500	6,213,208	5,329,383
Central Supply and Maintenance	53,461	56,106		56,106	76,225
Administration and Associated Activities	182				
Total Research, Development, Test & Evaluation	8,010,810	7,122,681	13,500	7,136,181	6,593,898

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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
1	0601101A	In-House Laboratory Independent Research	01	18,836	21,792		21,792	13,464
2	0601102A	Defense Research Sciences	01	197,690	221,783		221,783	238,167
3	0601103A	University Research Initiatives	01	72,243	79,317		79,317	69,808
4	0601104A	University and Industry Research Centers	01	95,867	113,601		113,601	102,737
	Basic Research			384,636	436,493		436,493	424,176
5	0602105A	Materials Technology	02	54,578	55,569		55,569	28,006
6	0602120A	Sensors and Electronic Survivability	02	40,842	43,148		43,148	33,515
7	0602122A	TRACTOR HIP	02	20,638	36,273		36,273	16,358
8	0602211A	Aviation Technology	02	46,828	55,586		55,586	63,433
9	0602270A	Electronic Warfare Technology	02	13,838	17,575		17,575	18,502
10	0602303A	Missile Technology	02	43,277	59,500		59,500	46,194
11	0602307A	Advanced Weapons Technology	02	23,140	26,148		26,148	28,528
12	0602308A	Advanced Concepts and Simulation	02	21,075	24,051		24,051	27,435
13	0602601A	Combat Vehicle and Automotive Technology	02	62,267	64,555		64,555	72,883
14	0602618A	Ballistics Technology	02	55,113	75,263		75,263	85,597
15	0602622A	Chemical, Smoke and Equipment Defeating Technology	02	4,010	4,487		4,487	3,971
16	0602623A	Joint Service Small Arms Program	02	6,378	7,814		7,814	6,853
17	0602624A	Weapons and Munitions Technology	02	46,097	52,778		52,778	38,069
18	0602705A	Electronics and Electronic Devices	02	85,099	58,990		58,990	56,435
19	0602709A	Night Vision Technology	02	48,069	43,403		43,403	38,445
20	0602712A	Countermine Systems	02	28,875	30,563		30,563	25,939

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Line No	Program Element Number	Item	Act	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
21	0602716A	Human Factors Engineering Technology	02	18,161	21,328		21,328	23,783
22	0602720A	Environmental Quality Technology	02	18,259	20,304		20,304	15,659
23	0602782A	Command, Control, Communications Technology	02	26,200	34,191		34,191	33,817
24	0602783A	Computer and Software Technology	02	8,886	10,434		10,434	10,764
25	0602784A	Military Engineering Technology	02	71,553	70,027		70,027	63,311
26	0602785A	Manpower/Personnel/Training Technology	02	15,979	17,645		17,645	23,295
27	0602786A	Warfighter Technology	02	53,206	31,529		31,529	25,751
28	0602787A	Medical Technology	02	98,023	93,290		93,290	76,068
		Applied Research		910,391	954,451		954,451	862,611
29	0603001A	Warfighter Advanced Technology	03	36,975	66,025		66,025	65,139
30	0603002A	Medical Advanced Technology	03	99,924	100,999		100,999	67,291
31	0603003A	Aviation Advanced Technology	03	57,364	81,037		81,037	88,990
32	0603004A	Weapons and Munitions Advanced Technology	03	69,788	73,885		73,885	57,931
33	0603005A	Combat Vehicle and Automotive Advanced Technology	03	128,463	146,992		146,992	110,031
34	0603006A	Space Application Advanced Technology	03	3,702	5,862		5,862	6,883
35	0603007A	Manpower, Personnel and Training Advanced Technology	03	8,756	7,796		7,796	13,580
36	0603008A	Electronic Warfare Advanced Technology	03	45,254	45,394		45,394	44,871
37	0603009A	TRACTOR HIKE	03	6,792	9,161		9,161	7,492
38	0603015A	Next Generation Training & Simulation Systems	03	15,404	13,620		13,620	16,749
39	0603020A	TRACTOR ROSE	03	8,762	10,662		10,662	14,483
40	0603105A	Military HIV Research	03	20,920				

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Line No	Program Element Number	Item	Act	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
41	0603125A	Combating Terrorism - Technology Development	03	9,199	15,046		15,046	24,270
42	0603130A	TRACTOR NAIL	03	3,207	3,192		3,192	3,440
43	0603131A	TRACTOR EGGS	03	2,560	2,366		2,366	2,406
44	0603270A	Electronic Warfare Technology	03	19,561	25,335		25,335	26,057
45	0603313A	Missile and Rocket Advanced Technology	03	80,379	83,975		83,975	44,957
46	0603322A	TRACTOR CAGE	03	12,026	11,077		11,077	11,105
47	0603461A	High Performance Computing Modernization Program	03	202,969	220,565		220,565	181,609
48	0603606A	Landmine Warfare and Barrier Advanced Technology	03	24,448	22,794		22,794	13,074
49	0603607A	Joint Service Small Arms Program	03	5,478	5,027		5,027	7,321
50	0603710A	Night Vision Advanced Technology	03	33,328	44,387		44,387	44,138
51	0603728A	Environmental Quality Technology Demonstrations	03	12,398	11,739		11,739	9,197
52	0603734A	Military Engineering Advanced Technology	03	30,503	23,705		23,705	17,613
53	0603772A	Advanced Tactical Computer Science and Sensor Technology	03	22,900	32,995		32,995	39,164
		Advanced Technology Development		961,060	1,063,636		1,063,636	917,791
54	0603305A	Army Missle Defense Systems Integration	04	22,340	23,289		23,289	12,797
55	0603308A	Army Space Systems Integration	04	9,038	13,584		13,584	13,999
56	0603619A	Landmine Warfare and Barrier - Adv Dev	04	4,089				
57	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04	2,430				
58	0603639A	Tank and Medium Caliber Ammunition	04	27,114	30,596		30,596	29,334
59	0603653A	Advanced Tank Armament System (ATAS)	04	11,116	49,963		49,963	
60	0603747A	Soldier Support and Survivability	04	15,936	5,185	6,500	11,685	9,602

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61	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	7,960	6,890		6,890	8,953
62	0603774A	Night Vision Systems Advanced Development	04	9,556	9,061		9,061	3,052
63	0603779A	Environmental Quality Technology - Dem/Val	04	4,060	2,631		2,631	7,830
64	0603782A	Warfighter Information Network-Tactical - DEM/VAL	04	161,505	122,319		122,319	
65	0603790A	NATO Research and Development	04	4,393	3,872		3,872	2,954
66	0603801A	Aviation - Adv Dev	04	7,227	5,015		5,015	
67	0603804A	Logistics and Engineer Equipment - Adv Dev	04	13,028	11,549		11,549	13,386
68	0603805A	Combat Service Support Control System Evaluation and Analysis	04	4,499				
69	0603807A	Medical Systems - Adv Dev	04	22,514	15,594		15,594	23,659
70	0603827A	Soldier Systems - Advanced Development	04	30,793	14,152		14,152	6,830
71	0603850A	Integrated Broadcast Service	04	96	79		79	
72	0604100A	Analysis Of Alternatives	04					9,913
73	0604115A	Technology Maturation Initiatives	04	12,636	11,110		11,110	74,740
74	0604120A	Assured Positioning, Navigation and Timing (PNT)	04					9,930
75	0604131A	TRACTOR JUTE	04	54				
76	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04	25,710	79,190		79,190	96,177
77	0604785A	Integrated Base Defense (Budget Activity 4)	04	3,604	4,473		4,473	
78	0305205A	Endurance UAVs	04	21,957				
		Advanced Component Development & Prototypes		421,655	408,552	6,500	415,052	323,156
79	0604201A	Aircraft Avionics	05	60,472	76,547		76,547	37,246
80	0604220A	Armed, Deployable Helos	05	80,934	69,807		69,807	

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81	0604270A	Electronic Warfare Development	05	102,812	144,543		144,543	6,002
82	0604280A	Joint Tactical Radio	05		31,809		31,809	9,832
83	0604290A	Mid-tier Networking Vehicular Radio (MNVR)	05	2,556	23,328		23,328	9,730
84	0604321A	All Source Analysis System	05	5,601	4,837		4,837	5,532
85	0604328A	TRACTOR CAGE	05	11,297	23,829		23,829	19,929
86	0604601A	Infantry Support Weapons	05	83,224	85,054		85,054	27,884
87	0604604A	Medium Tactical Vehicles	05	2,908	2,139		2,139	210
88	0604611A	JAVELIN	05	4,540	5,000		5,000	4,166
89	0604622A	Family of Heavy Tactical Vehicles	05	17,975	21,310	7,000	28,310	12,913
90	0604633A	Air Traffic Control	05	10,140	514		514	16,764
91	0604641A	Tactical Unmanned Ground Vehicle (TUGV)	05	2,795				6,770
92	0604710A	Night Vision Systems - Eng Dev	05	29,352	43,382		43,382	65,333
93	0604713A	Combat Feeding, Clothing, and Equipment	05	1,901	1,938		1,938	1,335
94	0604715A	Non-System Training Devices - Eng Dev	05	40,470	18,971		18,971	8,945
95	0604716A	Terrain Information - Eng Dev	05	928				
96	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	42,876	18,284		18,284	15,906
97	0604742A	Constructive Simulation Systems Development	05	25,828	17,004		17,004	4,394
98	0604746A	Automatic Test Equipment Development	05	10,307	6,697		6,697	11,084
99	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	12,427	12,569		12,569	10,027
100	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	16,005	27,619		27,619	42,430
101	0604798A	Brigade Analysis, Integration and Evaluation	05	191,065	99,947		99,947	105,279

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102	0604802A	Weapons and Munitions - Eng Dev	05	12,999	15,712		15,712	15,006
103	0604804A	Logistics and Engineer Equipment - Eng Dev	05	45,135	41,682		41,682	24,581
104	0604805A	Command, Control, Communications Systems - Eng Dev	05	18,543	7,376		7,376	4,433
105	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	38,712	39,447		39,447	30,397
106	0604808A	Landmine Warfare/Barrier - Eng Dev	05	37,769	92,236		92,236	57,705
107	0604814A	Artillery Munitions - EMD	05	3,576	8,205		8,205	
108	0604818A	Army Tactical Command & Control Hardware & Software	05	50,279	22,945		22,945	29,683
109	0604820A	Radar Development	05	3,734	1,548		1,548	5,224
110	0604822A	General Fund Enterprise Business System (GFEBS)	05	24,742	226		226	
111	0604823A	Firefinder	05	18,303	20,210		20,210	37,492
112	0604827A	Soldier Systems - Warrior Dem/Val	05	28,358	18,467		18,467	6,157
113	0604854A	Artillery Systems - EMD	05	149,667	121,270		121,270	1,912
114	0604869A	Patriot/MEADS Combined Aggregate Program (CAP)	05	348,234				
115	0604870A	Nuclear Arms Control Monitoring Sensor Network	05	7,093				
116	0605013A	Information Technology Development	05	44,684	68,778		68,778	69,761
117	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	122,168	69,253		69,253	138,465
118	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05		28,285		28,285	92,353
119	0605030A	Joint Tactical Network Center (JTNC)	05		68,112		68,112	8,440
120	0605031A	Joint Tactical Network (JTN)	05					17,999
121	0605035A	Common Infrared Countermeasures (CIRCM)	05					145,409
122	0605350A	WIN-T Increment 3 - Full Networking	05					113,210

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Line No	Program Element Number	Item	Act	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
123	0605380A	AMF Joint Tactical Radio System (JTRS)	05		10,213		10,213	6,882
124	0605450A	Joint Air-to-Ground Missile (JAGM)	05	9,686	15,119		15,119	83,838
125	0605456A	PAC-3/MSE Missile	05	63,123	68,807		68,807	35,009
126	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	247,407	369,452		369,452	142,584
127	0605625A	Manned Ground Vehicle	05	570,121	100,147		100,147	49,160
128	0605626A	Aerial Common Sensor	05	108,566	10,377		10,377	17,748
129	0605766A	National Capabilities Integration (MIP)	05		21,132		21,132	15,212
130	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	59,205	84,185		84,185	45,718
131	0605830A	Aviation Ground Support Equipment	05					10,041
132	0210609A	Paladin Integrated Management (PIM)	05					83,300
133	0303032A	TROJAN - RH12	05	3,892	3,463		3,463	983
134	0304270A	Electronic Warfare Development	05	12,828	10,801		10,801	8,961
		System Development & Demonstration		2,785,237	2,052,576	7,000	2,059,576	1,719,374
135	0604256A	Threat Simulator Development	06	16,409	23,921		23,921	18,062
136	0604258A	Target Systems Development	06	12,583	13,481		13,481	10,040
137	0604759A	Major T&E Investment	06	45,057	46,647		46,647	60,317
138	0605103A	Rand Arroyo Center	06	18,892	18,909		18,909	20,612
139	0605301A	Army Kwajalein Atoll	06	162,089	193,555		193,555	176,041
140	0605326A	Concepts Experimentation Program	06	24,720	22,246		22,246	19,439
141	0605502A	Small Business Innovative Research	06	169,555				
142	0605601A	Army Test Ranges and Facilities	06	334,087	340,477		340,477	275,025

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143	0605602A	Army Technical Test Instrumentation and Targets	06	61,711	66,025		66,025	45,596
144	0605604A	Survivability/Lethality Analysis	06	40,865	43,256		43,256	33,295
145	0605606A	Aircraft Certification	06	5,258	6,022		6,022	4,700
146	0605702A	Meteorological Support to RDT&E Activities	06	6,668	7,345		7,345	6,413
147	0605706A	Materiel Systems Analysis	06	18,622	19,799		19,799	20,746
148	0605709A	Exploitation of Foreign Items	06	5,501	5,938		5,938	7,015
149	0605712A	Support of Operational Testing	06	64,458	55,475		55,475	49,221
150	0605716A	Army Evaluation Center	06	57,037	65,240		65,240	55,039
151	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	1,375	1,282		1,282	1,125
152	0605801A	Programwide Activities	06	75,662	81,993		81,993	64,169
153	0605803A	Technical Information Activities	06	48,995	33,835		33,835	32,319
154	0605805A	Munitions Standardization, Effectiveness and Safety	06	50,838	58,309		58,309	49,052
155	0605857A	Environmental Quality Technology Mgmt Support	06	4,276	5,191		5,191	2,612
156	0605898A	Management HQ - R&D	06	16,844	54,145		54,145	49,592
157	0909999A	Financing for Cancelled Account Adjustments	06	182				
		RDT&E Management Support		1,241,684	1,163,091		1,163,091	1,000,430
158	0603778A	MLRS Product Improvement Program	07	110,860	96,424		96,424	17,112
159	0607141A	Logistics Automation	07		3,715		3,715	3,654
160	0607664A	Biometric Enabling Capability (BEC)	07					1,332
161	0607865A	Patriot Product Improvement	07	44,581	35,034		35,034	152,991
162	0102419A	Aerostat Joint Project Office	07	142,508	83,406		83,406	54,076

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163	0203726A	Adv Field Artillery Tactical Data System	07	26,216	25,507		25,507	22,374
164	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07					24,371
165	0203735A	Combat Vehicle Improvement Programs	07	189,396	177,437		177,437	295,177
166	0203740A	Maneuver Control System	07	60,948	36,475		36,475	45,092
167	0203744A	Aircraft Modifications/Product Improvement Programs	07	193,404	239,696		239,696	264,887
168	0203752A	Aircraft Engine Component Improvement Program	07	804	315		315	381
169	0203758A	Digitization	07	34,225	6,183		6,183	10,912
170	0203801A	Missile/Air Defense Product Improvement Program	07	17,863	1,577		1,577	5,115
171	0203802A	Other Missile Product Improvement Programs	07		62,067		62,067	49,848
172	0203808A	TRACTOR CARD	07	58,174	18,768		18,768	22,691
173	0205402A	Integrated Base Defense - Operational System Dev	07					4,364
174	0205410A	Materials Handling Equipment	07					834
175	0205412A	Environmental Quality Technology - Operational System Dev	07					280
176	0205456A	Lower Tier Air and Missile Defense (AMD) System	07					78,758
177	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07					45,377
178	0208053A	Joint Tactical Ground System	07	29,187	7,104		7,104	10,209
179	0208058A	Joint High Speed Vessel (JHSV)	07	32				
180	0301359A	Special Army Program	07					
181	0303028A	Security and Intelligence Activities	07	6,778	7,596		7,596	12,525
182	0303140A	Information Systems Security Program	07	14,314	9,351		9,351	14,175
183	0303141A	Global Combat Support System	07	108,506	41,203		41,203	4,527

Department of the Army
FY 2015 President's Budget
Exhibit R-1 FY 2015 President's Budget
Total Obligational Authority
(Dollars in Thousands)

February 28, 2014

Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2013 (Base & OCO)	FY 2014 Base Enacted	FY 2014 OCO Enacted	FY 2014 Total Enacted	FY 2015 Base
184	0303142A	SATCOM Ground Environment (SPACE)	07	14,101	18,188		18,188	11,011
185	0303150A	WWMCCS/Global Command and Control System	07	13,208	14,208		14,208	2,151
186	0304348A	Advanced Geospatial Intelligence (AGI)	07					
187	0305204A	Tactical Unmanned Aerial Vehicles	07	28,466	33,515		33,515	22,870
188	0305208A	Distributed Common Ground/Surface Systems	07	38,673	27,607		27,607	20,155
189	0305219A	MQ-1C Gray Eagle UAS	07	68,694	10,895		10,895	46,472
190	0305232A	RQ-11 UAV	07	3,716	2,320		2,320	
191	0305233A	RQ-7 UAV	07	28,554	12,025		12,025	16,389
192	0307665A	Biometrics Enabled Intelligence	07	15,225	12,443		12,443	1,974
193	0310349A	Win-T Increment 2 - Initial Networking	07					3,249
194	0708045A	End Item Industrial Preparedness Activities	07	53,461	56,106		56,106	76,225
		Operational Systems Development		1,306,147	1,043,882		1,043,882	1,346,360
		Total Research, Development, Test & Eval, Army		8,010,810	7,122,681	13,500	7,136,181	6,593,898

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Program Element Table of Contents (by Budget Activity then Line Item Number)

Budget Activity 03: Advanced Technology Development (ATD)
Appropriation 2040: Research, Development, Test & Evaluation, Army

Budget Activity 03: Advanced Technology Development (ATD)
Appropriation 2040: Research, Development, Test & Evaluation, Army

Program Element Table of Contents (Alphabetically by Program Element Title)

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	36.975	66.025	65.139	-	65.139	52.083	42.072	42.347	44.063	-	-
242: *Airdrop Equipment*	-	3.141	3.766	3.209	-	3.209	2.714	3.693	3.802	3.884	-	-
543: *Ammunition Logistics*	-	2.066	2.503	2.819	-	2.819	2.755	2.300	2.341	2.357	-	-
C07: *Joint Service Combat Feeding Tech Demo*	-	2.174	3.735	3.012	-	3.012	2.165	2.090	2.097	2.114	-	-
J50: *Future Warrior Technology Integration*	-	26.659	38.194	48.393	-	48.393	37.636	29.712	30.649	32.228	-	-
J52: *WARFIGHTER ADVANCED TECHNOLOGY INITIATIVES (CA)*	-	-	10.000	-	-	-	-	-	-	-	-	-
VT5: *Expeditionary Mobile Base Camp Demonstration*	-	2.935	7.827	7.706	-	7.706	6.813	4.277	3.458	3.480	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to General Congressional Reductions (-60 thousand); SBIR/STTR transfers (-996 thousand) and Sequestration reductions (-1.328 million)

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 eyewear) (Project J50) and expeditionary base camps (Project VT5). 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 0622787A (Medical Technology), PE 0602716A (Human Factors Engineering Technology), PE 0622308A (Advanced Concepts and Simulation), PE 0633015A (Next Generation Training and Simulation Systems), PE 0602705A (Electronics and Electronic Devices), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army	Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603001A *I Warfighter Advanced Technology*

Automotive Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology), PEs 0602623A and 0603607A (Joint Service Small Arms Program), PE 0603710A (Night Vision Advanced Technology), PEs 0602784A (Military Engineering Technology) and 0603734A (Military Engineering Advanced Technology).

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

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

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	39.359	56.056	65.433	-	65.433
Current President's Budget	36.975	66.025	65.139	-	65.139
Total Adjustments	-2.384	9.969	-0.294	-	-0.294
• Congressional General Reductions	-0.060	-0.031			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.996	-			
• Adjustments to Budget Years	-	-	-0.294	-	-0.294
• Sequestration	-1.328	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*	Project (Number/Name) 242 / *Airdrop Equipment*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
242: *Airdrop Equipment*	-	3.141	3.766	3.209	-	3.209	2.714	3.693	3.802	3.884	-	-

The FY 2015 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 integrate 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), Product Manager (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 2013	FY 2014	FY 2015
Title: Airdrop/Aerial Delivery	3.141	3.766	3.209
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. This effort supports capability demonstrations for the Army Top Challenge of easing overburdened Soldiers in Small Units for tactical aerial resupply technologies.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** 242 / *Airdrop Equipment*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Demonstrated Helicopter Sling Load (HSL) hardware for unmanned payload hookup to increase safety for ground personnel; matured in-flight deconfliction and tracking sensors and software to prevent midair collisions of payloads; demonstrated mission planning software and tracking devices for rapid drop zone (DZ) assembly of troops and their equipment. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will mature and demonstrate in-flight Joint Precision Aerial Delivery System (JPADS) collision avoidance capability to reduce collision/catastrophic damage and loss of vital supplies; mature precision delivery and landing accuracy for lifecycle cost reduction efficiencies and lower retrograde; begin demonstration of next generation high altitude Parachutist Oxygen Breathing System technology to provide parachutists with sufficient oxygen at higher altitudes and with slower descent rates; optimize large scale helicopter auto hookup prototypes for multiple airdrops to increase personnel safety; demonstrate both half- and full-scale technologies for passively stabilizing the flight characteristics with helicopter sling load payloads; demonstrate low-cost and low-weight skidboard to reduce materials and save manufacturing and transportation costs; mature and demonstrate a tactical aerial resupply capability to resupply/unburden the small unit/squad.			
Accomplishments/Planned Programs Subtotals	3.141	3.766	3.209

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*	Project (Number/Name) 543 / *Ammunition Logistics*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
543: *Ammunition Logistics*	-	2.066	2.503	2.819	-	2.819	2.755	2.300	2.341	2.357	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Automated Material Handling Technology	2.066	0.391	2.418
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 2013 Accomplishments: Integrated inventory planning and control software into a robotics applique kit; demonstrated autonomous forklift operations in an ammunition igloo.			
FY 2014 Plans: Provide preliminary design architecture of an autonomous material handling applique kit for the 5000 lb capacity tactical forklift.			
FY 2015 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** 543 / *Ammunition Logistics*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will complete tactical navigation development and adapt robotic add-on kits to rough terrain environment to 5k forklift and demonstrate integrated system.			
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:*** Complete material market survey and initiate/evaluate prototype pallet and platform designs.	-	1.712	-
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:*** Complete preliminary system integration and engineering tests of automated base camp planning software that incorporates explosives safety. ***FY 2015 Plans:*** Will complete database and ammunition planning/management software module integration and validate module compatibility with base camp planning.	-	0.400	0.401
Accomplishments/Planned Programs Subtotals	2.066	2.503	2.819

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*	Project (Number/Name) C07 / *Joint Service Combat Feeding Tech Demo*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
C07: *Joint Service Combat Feeding Tech Demo*	-	2.174	3.735	3.012	-	3.012	2.165	2.090	2.097	2.114	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Joint Combat Feeding Equipment Technology	0.937	2.488	-
Description: Beginning in FY15, this effort will be renamed from Joint Combat Feeding Equipment Technology to Joint Combat Feeding Equipment and Food Protection Technology Demonstration. This effort will demonstrate technologies in support of DoD Veterinary Service Activity (VSA) to improve field detection and identification capabilities for presence of chemical and biological threats in foods and provide new techniques and sensors for food inspectors in support of field feeding operations. This effort demonstrates equipment and energy technologies to expand capability and reduce logistics footprint of field feeding systems.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** C07 / *Joint Service Combat Feeding Tech Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Conducted 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:*** 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: Joint Combat Feeding Equipment and Food Protection Technology Demonstration ***Description:*** Beginning in FY15, this effort is renamed from Joint Combat Feeding Equipment Technology to Joint Combat Feeding Equipment and Food Protection Technology Demonstration. This effort will demonstrate technologies in support of DoD Veterinary Service Activity (VSA) to improve field detection and identification capabilities for presence of chemical and biological threats in foods and provide new techniques and sensors for food inspectors in support of field feeding operations. This effort demonstrates equipment and energy technologies to expand capability and reduce logistics footprint of field feeding systems. ***FY 2015 Plans:*** Will demonstrate novel field sensor technologies to detect and identify toxic chemicals in food; evaluate and demonstrate commercial off the shelf technologies in support of DoD VSA mission; continue demonstration of novel technologies to improve fuel efficiency, increase operation in harsh environments and improve mean time between failure for field feeding equipment; demonstrate reduced reliance on field generators in field kitchens, decreasing fuel costs, resupply demands and reducing risk to logistics/resupply personnel.	-	-	1.747
Title: Ration Stabilization, Packaging, Nutrient Delivery and Food Safety Technology ***Description:*** Beginning in FY15, this effort will be renamed from Ration Stabilization, Packaging, Nutrient Delivery and Food Safety to Ration Stabilization and Nutrient Delivery Technology Demonstration. This effort matures and demonstrates novel nutritional biochemistry, food processing and packaging technologies to enhance nutrition and improve food stabilization and ration packaging to support Warfighter physical and cognitive performance on the battlefield. ***FY 2013 Accomplishments:*** Evaluated the effectiveness of using Super-Critical Carbon Dioxide to increase the long term storage shelf life of rations; evaluated 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:***	1.237	1.247	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** C07 / *Joint Service Combat Feeding Tech Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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.			
Title: Ration Stabilization and Nutrient Delivery Technology Demonstration ***Description:*** Beginning in FY15, this effort is renamed from Ration Stabilization, Packaging, Nutrient Delivery and Food Safety to Ration Stabilization and Nutrient Delivery Technology Demonstration. This effort matures and demonstrates novel nutritional biochemistry, food processing and packaging technologies to enhance nutrition and improve food stabilization and ration packaging to support Warfighter physical and cognitive performance on the battlefield. ***FY 2015 Plans:*** Will demonstrate increased bio-availability and stability of phytonutrients within ration components to improve Warfighter performance and recovery time; validate safety, acceptability, cost and shelf-life of rations processed in novel stabilization technologies for application to operational rations and extended shelf-life; demonstrate increased availability of nutrition components for Soldier post-mission physical recovery.	-	-	1.265
Accomplishments/Planned Programs Subtotals	2.174	3.735	3.012

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*	Project (Number/Name) J50 / *Future Warrior Technology Integration*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
J50: *Future Warrior Technology Integration*	-	26.659	38.194	48.393	-	48.393	37.636	29.712	30.649	32.228	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

This project matures, demonstrates, and integrates lightweight and 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 for the Small Unit. This project develops, matures, and maintains a Soldier Systems Engineering Architecture framework 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 quality of life by 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 0622787A (Medical Technology), PE 0602716A (Human Factors Engineering Technology), PE 0622308A (Advanced Concepts and Simulation), PE 0633015A (Next Generation Training and Simulation Systems), PE 0602705A (Electronics and Electronic Devices), PE 0603710A (Night Vision Advanced Technology), PE 0602624A (Weapons and Munitions Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology), and PE 0603008A (Electronic Warfare Advanced Technology).

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

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Soldier/Small Unit Integrated Protection	10.711	10.940	-
Description: 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 0602705A/Project H94. Demonstrated technologies transition to various PEO-Soldier Product Managers. This effort			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
supports Force Protection capability demonstrations for Soldiers and Small Units. Beginning in FY15, efforts for Soldier/Small Unit Integrated Protection will be captured within two paragraphs entitled "Soldier/Small Unit Ballistic and Blast Protection" and "Soldier/Small Unit Multi-threat Protection". ***FY 2013 Accomplishments:*** Demonstrated protective eyewear with improved ballistic impact, anti-fog and scratch resistance lenses; demonstrated upgradeable headgear protection with improved ballistic, eye, face, hearing protection, and a display that enhances the situational awareness in combat conditions (night, rain and obscurants); completed validation of a body armor assessment protocol integrating Soldier agility and physiology parameters; developed camouflage ensemble components for a lab-based assessment; built on ballistic and blast strategy developed in FY12 to exploit lighter weight materials, processing methods, and equipment configurations to reduce Soldier borne load; applied modeling and simulation tools to assess load mitigating technologies to reduce physical injuries and enhance small unit mobility and Soldier endurance. ***FY 2014 Plans:*** 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) and hygiene management; transition technologies, metrics, and tools matured in this effort to PEO Soldier Product Managers, to TRADOC for future requirements development and into the Soldier Systems Engineering Architecture.			
Title: Soldier/Small Unit Ballistic and Blast Protection	-	-	4.108
Description: Beginning in FY15, ballistic and blast efforts previously performed under Soldier/Small Unit Integrated Protection will be captured within this effort. Soldier/Small Unit Ballistic and Blast Protection utilizes a cross-disciplinary, human-centric approach to mature and demonstrate technologies which optimize tradeoffs in ballistic and blast protective component design. This effort focuses on maturing and demonstrating proven components which are integrated into experimental ensembles or prototypes that have potential to significantly increase protection for individual Soldiers and/or reduce physical load at equal or better capability. This work is fully coordinated with PE 0602786A/Project H98, PE 0602716A/Project H70 and PE 0602705A/ Project H94. Demonstrated technologies will transition to various PEO-Soldier Product Managers. This effort supports Force Protection capability demonstrations for Soldiers and Small Units. ***FY 2015 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will demonstrate combat eye protection technologies that provide 15% improved ballistic performance without degradation in optical quality and scratch resistance; provide weight versus threat-standoff trade space analysis to inform reduced weight small arms protective insert development; demonstrate relevant technologies and validated methods to enable assessment and verification of service life requirements for body armor components; develop knowledge products from successfully demonstrated protection technologies to allow for transition of test methodologies and human centric design parameters to inform current and future requirements, programs and framework of Soldier Systems Engineering Architecture.			
Title: Soldier/Small Unit Multi-threat Protection ***Description:*** Beginning in FY15, integrated multi-threat protection efforts (such as environmental protection, flame protection and camouflage) previously performed under Soldier/Small Unit Integrated Protection will be captured within this effort. Soldier/ Small Unit Multi-threat Protection focuses maturing and demonstrating multifunctional protective component materials, sub-systems, and hearing protection technologies that have potential to significantly increase protection of individual Soldiers. This work is fully coordinated with PE 0602786A/Project H98, PE 0602716A/Project H70 and PE 0602705A/Project H94. Demonstrated technologies transition to various PEO-Soldier Product Managers. This effort supports Force Protection capability demonstrations for Soldiers and Small Units. ***FY 2015 Plans:*** Will mature and demonstrate improved multifunctional protective textile technologies with enhanced durability, signature management performance, insect resistance and flame resistance; mature and integrate hearing protection technology that mitigates noise exposure while maintaining auditory situational awareness; demonstrate the viability of using environmental/ biological hazard and injury analyses, along with materials performance data and uniform design features, as a means of designing uniforms that provide capability sets tailored to specific geographical regions; develop knowledge products from successfully demonstrated technologies to allow for transition of test methodologies and human centric design parameters to inform current and future requirements, programs and framework of Soldier Systems Engineering Architecture.	-	-	9.134
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 0603005A/Project 497, PE 0603008A/TR1 and PE 0603004A/Project 232. In FY13-14 this effort supports capability demonstrations for the Army Top Challenge of easing overburdened Soldiers in Small Units. Beginning in FY15, efforts for integration of Soldier and Small Unit Operated Electronics will be captured within the effort titled Soldier and Small Unit Systems Integration and Demonstration.	6.908	4.949	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Matured information portrayal interfaces technology for full spectrum operations in cognitively burdened environments; matured 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; matured dismounted operations software algorithms enabling tactile relevant information transfer and explored technology solutions to refine the design sets for integrating nano unmanned air system into the Soldier network architecture. ***FY 2014 Plans:*** 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 optimized information portrayal integration from handheld un-manned air and ground sensors relayed to Soldier-borne electronic devices.			
Title: Soldier and Small Unit Systems Integration and Demonstration	-	-	11.461
Description: This effort integrates and demonstrates a breadth of Soldier and Small Unit capabilities across multiple mission sets and wide range of environmental conditions. Integrate and influence test venue architectures and analytic designs to improve demonstration and experimentation capabilities relevant for Soldier/Small Units. Integrate and demonstrate relevant mature technologies from Army Soldier S&T community. Conduct risk reduction demonstrations and produce validated analytical results for decision makers. Effort is coordinated with PE 0602786A/Project H98, PE 0603710A/Project K70, PE 0602624A/Project H18, PE 0603005A/Project 497, PE 0603008A/TR1 and PE 0603004A/Project 232. In FY13-14 this effort supports capability demonstrations for the Army Top Challenge of easing overburdened Soldiers in Small Units and force protection for Soldiers and Small Units. ***FY 2015 Plans:*** Will conduct integrated, operationally-relevant systems-level demonstrations with potential to increase protective equipment performance against a wide range of threats while decreasing weight; conduct system assessment and document system performance parameters for a dismounted route planning tool, which interfaces with three existing military mission planning platforms; mature and demonstrate tactically relevant performance of handheld unmanned sensor platform in simulated operational environments; demonstrate capabilities to offload Soldier's carried weight such as providing Soldier the ability to digitally request and track aerial resupply missions in real-time and combining various offloading technologies for Small Unit operations; participate in significant Army demonstrations, exercises, and wargames to demonstrate Soldier and Small Unit capabilities in below battalion level operations in order to inform future S&T efforts, close capability gaps, and inform S&T prioritization.			
Title: Soldier and Small Unit Power and Energy	3.296	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Description: This effort matures and demonstrates lightweight and 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 this effort supported the Army Top Challenge of easing overburdened Soldiers in Small Units. Beginning in FY14, efforts for power and energy demand management will be captured within the effort titled Soldier and Small Unit Load Management. ***FY 2013 Accomplishments:*** Integrated improved power source with one or more systems; integrated and evaluated wearable fuel cell hybrid power source enabling longer mission durations; matured higher efficiency wireless power transfer on the body to eliminate cables; refined higher power and energy dense multi-fuel engine based man-packable power source; analyzed energy efficiency improvements in power sinks to optimize battery size; matured power centric software.			
Title: Soldier Systems Engineering Architecture ***Description:*** This effort (previously titled System Integration Laboratory for Evaluation of Emerging Technological Capabilities) is renamed to Soldier Systems Engineering Architecture which will pursue a mature and maintainable architecture for a biological (human) platform architecture, validation of the variables that impact the Soldier and small units' readiness state, and matures a 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 and 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, 0633015A/Project S28, PE 0603710A/Project K70, PE 0622308A/Project C90, PE 0622787A/Project 869 and 0603004A/Project 232. In FY13-14 this effort supports capability demonstrations for the Army Top Challenges of easing overburdened Soldiers in Small Units and force protection for Soldiers and Small Units. ***FY 2013 Accomplishments:*** Matured select laboratory diagnostic tool suites required to measure and analyze mission effectiveness, power and mobility metrics that provide the necessary information to make trade-off decisions for Soldier and Small Unit capability sets and enabling technologies; explored the Soldier/Squad virtual simulation capability by identifying potential design and performance parameters for future integration such as physical and cognitive load, mission command networking and terrain data. ***FY 2014 Plans:*** Develop and mature a Soldier Systems Engineering Architecture with an established Soldier baseline platform; apply system integration tools to conduct lab and field assessments in relevant environments to demonstrate and validate integrated load	5.744	12.236	11.854

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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; build on FY13 body armor system integration laboratory assessment tools and assess emerging body armor systems for improved Soldier combat effectiveness and survivability relative to system sizing, weight and configuration; provide 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. ***FY 2015 Plans:*** Will lead the Army development and maturation of the Soldier Systems Engineering Architecture (SSEA) using the Systems Engineering Tools (SET) framework developed during FY14 for conducting assessments and decomposing identified needs into measures of performance and system requirements; identify required improvements to modeling and simulation capabilities to perform and support quantitative analyses and evaluations; develop the Soldier biological (human) platform architecture, and Soldier and squad level metrics gaps; enhance capabilities for virtual simulation for Soldier and small units; advance data collection tools to support the integration and measurement of the effects of Soldier-worn equipment in the SSEA; exercise the architecture as it is developed to test and refine its capabilities; provide knowledge products such as verified 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: Soldier and Small Unit Human Systems Performance ***Description:*** This effort (previously named Soldier and Small Unit Load Management is renamed to Soldier and Small Unit Human Systems Performance) matures and validates human performance metrics (i.e., physiological, psychophysical, biomechanical, etc.) which have potential to reduce or mitigate negative impacts of Soldier physical carried load and improve operationally relevant human performance. This work is fully coordinated with PE 060786A/Project H98, PE 0602716A/Project H70 and PE 0602705A/Project H94. In FY12-FY14 this effort supports capability demonstrations for the Army Top Challenge of easing overburdened Soldiers in Small Units. Technologies, metrics and tools developed in this effort will transition to PEO Product Managers and TRADOC and be integrated into the Soldier Systems Engineering Architecture and Systems Integration Laboratory environment. ***FY 2014 Plans:*** 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, 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 prediction capabilities into the mission planning process as a means to manage individual and squad carried loads in concert with	-	10.069	11.836

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** J50 / *Future Warrior Technology Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will validate individual Soldier mission relevant human performance metrics sensitive to equipment load and fatigue; optimize operationally relevant physical and cognitive measures to quantify the effect associated with physically and mentally demanding workloads; provide data and modeling approaches whose outputs make explicit trade-space between human functional capability and equipment configuration that supports informed technology development; field-validate laboratory data on changes in biomechanical and cognitive performance as a function of mission-contextual factors to determine the impact of Soldier borne load on mission performance; mature personal augmentation design for opportunities such as simple mechanical augmentation; transition mature knowledge products for human performance (e.g., thermal burden models, load-related metabolic energy cost, etc); validate operationally relevant human performance metrics under current clothing and individual equipment (CIE) configurations that can be used in future testing to demonstrate the impacts of the configuration on the individual's performance.			
Accomplishments/Planned Programs Subtotals	26.659	38.194	48.393

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*				Project (Number/Name) J52 / *WARFIGHTER ADVANCED TECHNOLOGY INITIATIVES (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
J52: *WARFIGHTER ADVANCED TECHNOLOGY INITIATIVES (CA)*	-	-	10.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Warfighter Advanced Technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Program Increase	-	10.000	-
Description: This is a Congressional Interest Item.			
FY 2014 Plans: This is a Congressional Interest Item.			
Accomplishments/Planned Programs Subtotals	-	10.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603001A / *Warfighter Advanced Technology*				Project (Number/Name) VT5 / *Expeditionary Mobile Base Camp Demonstration*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
VT5: *Expeditionary Mobile Base Camp Demonstration*	-	2.935	7.827	7.706	-	7.706	6.813	4.277	3.458	3.480	-	-

The FY 2015 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 Soldier readiness and 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 0602786A/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 2013	FY 2014	FY 2015
Title: Expeditionary Base Camp (EBC) Technology Demonstrations	2.935	7.827	7.706
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. This effort supports Basing Sustainment and Logistics capability demonstrations.			
FY 2013 Accomplishments: Applied FY12 system effectiveness measures and technical performance criteria to validate that the baseline architecture reduces basing manpower needs and operational energy efficiencies; used performance measures, interoperability criteria and power			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603001A / *Warfighter Advanced Technology*	**Project (Number/Name)** VT5 / *Expeditionary Mobile Base Camp Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
demand as attributes to begin development of a small unit base camp planning tool; matured passive protection, power, waste and water technology systems in compliance with the parameters defined in the baseline architecture. ***FY 2014 Plans:*** 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 and 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. ***FY 2015 Plans:*** Will begin demonstrations of integrated/matured technology and non material solutions for reducing small contingency base operation sustainment requirements thru more efficient management of energy and water consumption and solid/liquid waste production; demonstrate self-sustaining living module(s); integrate technology concept(s) and systems engineering models for handling and treatment of black waste, and demonstrate technical feasibility; mature, analyze and demonstrate water demand reduction technologies for developing a method to trade off net water savings with potential energy consumption increases; further improve photovoltaic power generating solar shade system technology for demonstration; optimize concepts, models, components and systems for sustainability/logistics demonstration.			
Accomplishments/Planned Programs Subtotals	2.935	7.827	7.706

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603002A *I MEDICAL ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	99.924	100.999	67.291	-	67.291	70.050	68.800	71.291	72.388	-	-
810: *Ind Base Id Vacc&Drug*	-	18.782	17.404	18.274	-	18.274	18.837	16.789	17.986	18.160	-	-
814: *NEUROFIBROMATOSIS*	-	13.915	15.000	-	-	-	-	-	-	-	-	-
840: *Combat Injury Mgmt*	-	32.615	31.527	29.334	-	29.334	30.783	31.398	32.460	33.020	-	-
945: *BREAST CANCER STAMP PROCEEDS*	-	0.602	-	-	-	-	-	-	-	-	-	-
97T: *NEUROTOXIN EXPOSURE TREATMENT*	-	15.979	16.000	-	-	-	-	-	-	-	-	-
FH4: *Force Health Protection - Adv Tech Dev*	-	1.488	1.661	1.692	-	1.692	1.276	1.340	1.788	1.880	-	-
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	7.076	8.000	-	-	-	-	-	-	-	-	-
MM3: *Warfighter Medical Protection & Performance*	-	9.467	11.407	17.991	-	17.991	19.154	19.273	19.057	19.328	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to Sequestration reductions (-7.603 million) and Congressional Add (39 million).
FY14 adjustments attributed to FFRDC reduction (-33 thousand) and Congressional Add (39 million).

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 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), 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army	Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603002A *I MEDICAL ADVANCED TECHNOLOGY*

Project MM3 supports the Medical and Survivability technology areas with laboratory validation studies and field demonstrations of biomedical products designed to counteract myriad environmental and physiological stressors, as well as materiel hazards encountered in training and operational environments to protect, sustain, and enhance Soldier performance. The key efforts are to demonstrate and transition technologies, as well as validate tools associated with Soldier survivability, injury assessment and prediction, assessments for post-concussive syndrome, and enhancing 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.

Work funded in this project PE is fully coordinated with efforts undertaken in PE 0602787A and the Defense Health Program.

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 Walter Reed Army Institute of Research (WRAIR), Silver Spring, MD; U.S. Army Medical Research Institute of Infectious Diseases, Ft Detrick, MD; U.S. Army Research Institute of Environ. Med. (USARIEM), Natick, MA; U.S. Army Institute of Surgical Research, Ft Sam Houston, TX; U.S. Army Aeromedical Research Laboratory (USAARL), Ft Rucker, AL; the Naval Medical Research Center (NMRC), Silver Spring, MD; U.S. Army Dental Trauma Research Detachment (USADTRD), Ft. Sam Houston, TX; and U.S. Army Center for Environ. Health Research and the Armed Forces Institute of Regenerative Medicine.

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	69.580	62.032	65.167	-	65.167
Current President's Budget	99.924	100.999	67.291	-	67.291
Total Adjustments	30.344	38.967	2.124	-	2.124
• Congressional General Reductions	-0.171	-0.033			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	39.000	39.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.602	-			
• SBIR/STTR Transfer	-1.484	-			
• Adjustments to Budget Years	-	-	2.124	-	2.124
• Other Adjustments	-7.603	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) 810 / *Ind Base Id Vacc&Drug*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
810: *Ind Base Id Vacc&Drug*	-	18.782	17.404	18.274	-	18.274	18.837	16.789	17.986	18.160	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

This project maturates and demonstrates U.S. Food and Drug Administration (FDA)-regulated medical countermeasures such as drugs, vaccines, and diagnostic (identification of the nature and cause of a particular disease) 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 (amount to be administered) 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 Environmental Protection Agency (EPA).

Research conducted in this project focuses on the following five areas:
(1) Drugs to Prevent/Treat Parasitic (organism 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 Department of Defense (DoD) naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

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

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

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 810 / *Ind Base Id Vacc&Drug*

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 Naval 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 2013	FY 2014	FY 2015
Title: Drugs to Prevent/Treat Parasitic Diseases	2.381	2.247	2.220
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 2013 Accomplishments:*** Evaluated effectiveness of new anti-parasitic drugs through testing in human populations exposed to malaria and leishmania infections. These drugs previously showed promising results in animal testing. ***FY 2014 Plans:*** Assess effectiveness of new and refined anti-parasitic drugs through testing in human populations exposed to malaria and leishmania infections world-wide. ***FY 2015 Plans:*** Will advance new generation drugs with improved therapeutic index through small animal model testing. Will perform clinical testing for safety and effectiveness of new selected candidate drugs and drug combinations. Will transition best therapeutic and preventive drug candidates to advanced development.			
Title: Vaccines for Prevention of Malaria	5.717	5.401	5.125
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 2013 Accomplishments:***			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 810 / *Ind Base Id Vacc&Drug*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Conducted clinical trials of multiple types of vaccines in human populations using laboratory-based human challenge model. Then, for promising candidates, optimized administration for testing in human populations naturally exposed to malaria. Transitioned successful vaccine candidate to Advanced Development for further testing. ***FY 2014 Plans:*** Conduct clinical trials of new formulations of vaccine candidates to assess safety and effectiveness in humans and assess vaccine performance for suitability for transition to Advanced Development. ***FY 2015 Plans:*** Will continue to conduct clinical trials of new formulations of vaccine candidates in human volunteers to assess their safety and effectiveness for transition into Advanced Development. Will down select lead P. falciparum (severe form of malaria) vaccine candidates for transition into Advanced Development.			
Title: Bacterial Disease Threats ***Description:*** This effort selects promising candidate vaccines against each of the three main bacterial causes of diarrheas (E. coli, Campylobacter, and Shigella (a significant threat during initial deployments)) for testing in human subjects. Data packages are prepared, as required for FDA approval, and testing is conducted in human subjects. ***FY 2013 Accomplishments:*** Conducted second human clinical trial for E. coli vaccines to determine the best candidate vaccine, route of administration, and dosage; conducted additional human clinical trials on best Shigella vaccine based on FY2012 human trial results; and evaluated results of Campylobacter clinical trial conducted in FY2012. ***FY 2014 Plans:*** Produce best vaccine candidates by using Good Manufacturing Practices developed by the FDA; conduct safety trials of additional promising vaccine candidates against three diarrheal pathogens (infectious agents) of interest (Shigella, Campylobacter, and E. coli) in human volunteers. ***FY 2015 Plans:*** Will conduct expanded safety and effectiveness clinical trials in human volunteers with two diarrheal pathogens (infectious agents), Shigella, and enterotoxigenic E. coli, vaccine candidates for assessment of their extended safety and effectiveness. Will transition best down-selected vaccine candidates to Advanced Development only if successful.	5.508	5.272	4.917
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-	3.263	2.752	4.887

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 810 / *Ind Base Id Vacc&Drug*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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 2013 Accomplishments:*** Demonstrated 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; conducted further clinical testing of dengue vaccine candidates; further developed 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 prepared and conducted safety studies in human volunteers with new HIV vaccine candidates at multiple sites worldwide. ***FY 2014 Plans:*** Evaluate the alternative strategies to deliver vaccine candidates in human muscle and skin to develop a needle-free injection; 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 further evaluate human safety and effectiveness of best vaccine candidates against all dengue types present worldwide. ***FY 2015 Plans:*** Will complete clinical testing of selected hantavirus and dengue vaccine candidates for safety and initiate expanded clinical studies to test the efficacy of the candidate vaccine in human volunteers. Will initiate expanded clinical testing for efficacy studies with multivalent dengue vaccine in US adults with new vaccine lots. Will also initiate clinical studies for efficacy in dengue endemic countries with best down-selected candidates. Will refine the final vaccine formulation and delivery into human body. Will initiate the development of a human challenge model for all four dengue viruses. Under this model, volunteers vaccinated with a dengue vaccine candidate are deliberately "challenged" with attenuated dengue viruses to assess whether or not the candidate vaccine can prevent dengue infection.			
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 insects. ***FY 2013 Accomplishments:*** Completed 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; completed field evaluations on prototype rapid diagnostic kits developed for the detection of selected vector-borne pathogens (pathogens transmitted by insects, such as malaria, leishmania, and dengue virus); completed the development of an enteric assay to	1.913	1.732	1.125

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 810 / *Ind Base Id Vacc&Drug*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
transition the assay to Advanced Development; and completed field evaluations and FDA-required 510K clearance on the Dengue Rapid Diagnostic Device. ***FY 2014 Plans:*** 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; conduct field evaluation of the new alternate repellent products in overseas field locations; and evaluate the NGDS assays (tests) for use in diagnosing pathogens (infectious agents) in humans. ***FY 2015 Plans:*** Will develop Rapid Human Diagnostic Devices in collaboration with industry partners and transition to Advanced Development. Will test vector (organisms that transmit disease) surveillance devices in field. Will test new vector control technologies with field applications and select best tools for military operations.			
Accomplishments/Planned Programs Subtotals	18.782	17.404	18.274

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) 814 / *NEUROFIBROMATOSIS*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
814: *NEUROFIBROMATOSIS*	-	13.915	15.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Neurofibromatosis Research Program	13.915	15.000	-
Description: This congressionally directed project conducted research on Neurofibromatosis.			
FY 2013 Accomplishments: Neurofibromatosis Research Program			
FY 2014 Plans: Neurofibromatosis Research Program			
Accomplishments/Planned Programs Subtotals	13.915	15.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) 840 / *Combat Injury Mgmt*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
840: *Combat Injury Mgmt*	-	32.615	31.527	29.334	-	29.334	30.783	31.398	32.460	33.020	-	-

The FY 2015 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; the Walter Reed Army Institute of Research (WRAIR), Silver Spring, MD; and the Armed Forces Institute of Regenerative Medicine (AFIRM), Fort Detrick, MD.

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

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 840 / *Combat Injury Mgmt*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Damage Control Resuscitation	7.055	7.118	6.956
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 2013 Accomplishments:*** Continued coagulation (blood clotting) factor and platelet function studies of ways to stop bleeding and studied the use of compounds to reduce inflammation as a therapy for bleeding caused by trauma. ***FY 2014 Plans:*** 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; 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 validate an improved blood platelet storage technology for far-forward use. ***FY 2015 Plans:*** Will continue to evaluate medical products and techniques to control life threatening bleeding from areas of the body where tourniquets may not be effectively used, such as within the chest and abdomen, and from large soft tissue injuries and injuries to the armpit or groin. Will continue to evaluate drugs and biologics (medical products derived from living organisms) to reduce traumatic bleeding caused by inflammation. Will conduct preliminary studies to help determine optimal conditions for extension of platelet (a cell in blood that helps it clot) storage duration and maintenance of blood-clotting capability concurrently to support continued validation studies of novel blood platelet storage technologies for far-forward use.			
Title: Combat Trauma Therapies	5.449	5.173	4.347
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. ***FY 2013 Accomplishments:*** Conducted 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 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 840 / *Combat Injury Mgmt*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Transition biofilm diagnostics, drugs that disrupt biofilm (an aggregate of microorganisms in which cells adhere to each other on a surface) formation, and therapies to clinical evaluation and 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. ***FY 2015 Plans:*** Will perform analysis to support development of a predictive model to estimate dental casualties for Soldiers entering a theater of operations. Will continue research to improve repair of large volume muscle loss injuries using stem cell technologies, biological scaffolds (tissue engineered graft), and autologous muscle tissue therapies (use muscle from uninjured area of body to replace lost muscle).			
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. In FY2013 and FY2014, this effort supports Technology-Enabled Capability Demonstration 7.d, Brain in Combat. ***FY 2013 Accomplishments:*** Identified combination therapeutics for Advanced Development/clinical trials for TBI that substantially mitigated or reduced TBI-induced non-convulsive seizures and brain damage. ***FY 2014 Plans:*** Continue/finish clinical pivotal study to validate assay (test) to diagnose presence and severity of TBI at or near point of injury; continue clinical trial of candidate drug for treatment of TBI; and continue work to identify combination therapeutics that mitigate or reduce effects of TBI for Advanced Development and clinical trials. ***FY 2015 Plans:*** Will continue 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	3.046	3.398	3.660
Title: Combat Critical Care Engineering ***Description:*** This effort supports development of diagnostic and therapeutic medical devices, algorithms, software, and data-processing systems for resuscitation, stabilization, life support, and development of improved critical care nursing practices to improve care of severely injured or ill casualties during transport and in theater hospitals. ***FY 2013 Accomplishments:***	3.376	4.350	2.949

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 840 / *Combat Injury Mgmt*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Started 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 transitioned vital signs technology to Advanced Development for further test and evaluation, FDA licensure, and for fielding. ***FY 2014 Plans:*** Conduct in-human validation studies of advanced algorithms that measure tissue blood flow, metabolism, and oxygenation and evaluate ventilation strategies to improve neurologic (brain) status in casualties (those injured) with TBI. ***FY 2015 Plans:*** Will translate new arterial waveform (a graph obtained by monitoring the pressure in the arteries produced by the pumping of the heart) features to the development of algorithms for early identification of those patients at greatest risk for developing shock. Will continue research on ventilation strategies to improve brain status in casualties with traumatic brain injury. Will perform studies to identify means to improve critical care nursing practice in theater hospitals.			
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 2013 Accomplishments:*** Continued to develop drug delivery and diagnostic and tissue repair strategies, including stem cell therapies for traumatic eye injury; continued development and standardization of animal models to assess soft and hard tissue regeneration technologies; continued studies of burn, scarless wound, soft tissue, and bone repair strategies; continued development and testing of stem cell therapies and scaffolds (tissue-engineered grafts) in animal models; and continued 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:*** Evaluate the preclinical safety and effectiveness of promising drug delivery, diagnostic, tissue repair, and/or treatment strategies for traumatic eye injury; continue to conduct clinical research for rehabilitation strategies for traumatic eye injury; incrementally build upon past successes to develop novel drug delivery, diagnostic, reconstructive, and regenerative strategies; utilize and refine cell-based therapies (including stem cells) and tissue scaffolds (tissue-engineered grafts) to assess soft and hard tissue repair and regeneration safety and effectiveness; and also build upon promising approaches from FY2013 by continuing the	9.699	9.328	10.862

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 840 / *Combat Injury Mgmt*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will conduct preclinical studies on drug delivery, diagnostic, tissue repair, and/or treatment strategies for traumatic eye injury and evaluate the preclinical safety and efficacy of promising strategies to facilitate clinical transition. Will further develop novel drug delivery, diagnostic, reconstructive, and regenerative strategies including novel biological materials and cell-based therapies for clinical transition; utilize and refine cell-based therapies (including stem cells) and tissue scaffolds (tissue-engineered grafts) to restore soft and bone tissue form and function; perform preclinical safety and efficacy studies; build upon promising approaches from FY2014 by continuing the clinical evaluation of candidate strategies for burn, scarless wound healing, bone and soft tissue repair, and strategies to repair the tissues of the extremities (arms and legs), craniomaxillofacial (head, neck, face and jaw), genital, and abdominal body regions.			
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 Accomplishments:*** Funded 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:*** 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. ***FY 2015 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	3.990	2.160	0.560
Accomplishments/Planned Programs Subtotals	32.615	31.527	29.334

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** 840 / *Combat Injury Mgmt*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) 945 / *BREAST CANCER STAMP PROCEEDS*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
945: *BREAST CANCER STAMP PROCEEDS*	-	0.602	-	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Breast Cancer Stamp Proceeds	0.602	-	-
Description: This is a Congressional Interest Item.			
FY 2013 Accomplishments: Breast Cancer Stamp Proceeds			
Accomplishments/Planned Programs Subtotals	0.602	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) 97T / *NEUROTOXIN EXPOSURE TREATMENT*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
97T: *NEUROTOXIN EXPOSURE TREATMENT*	-	15.979	16.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Peer-Reviewed Neurotoxin Exposure Treatment Parkinsons Research Program	15.979	16.000	-
Description: This congressionally directed project conducts research for the Neurotoxin Exposure Treatment Parkinsons Research Program. ***FY 2013 Accomplishments:*** Neurotoxin Exposure Treatment Parkinsons Research Program ***FY 2014 Plans:*** Neurotoxin Exposure Treatment Parkinsons Research Program			
Accomplishments/Planned Programs Subtotals	15.979	16.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) FH4 / *Force Health Protection - Adv Tech Dev*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
FH4: *Force Health Protection - Adv Tech Dev*	-	1.488	1.661	1.692	-	1.692	1.276	1.340	1.788	1.880	-	-

The FY 2015 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Health Research	1.488	1.661	1.692
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 (chest) injury prediction models of blast exposure.			
FY 2013 Accomplishments: Matured 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 lead to a greater appreciation of post-traumatic stress disorder for the senior			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** FH4 / *Force Health Protection - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
military leadership and helped mitigate the physical and psychological effects of military service, protecting the Warfighter from potentially devastating consequences. ***FY 2014 Plans:*** Assess modifiable behaviors and emerging health concerns among Service members using survey data and other health outcome measures and assess validity of health screening instruments/surveys and other health measures. These data lead to a greater understanding of the impact of physical and mental health issues for Service members. This effort potentially provides screening and preventive strategies to decrease negative health consequences and inform DoD polices. ***FY 2015 Plans:*** Will assess modifiable behaviors and those resilience factors that protect Service Members from adverse mental or physical health outcomes. Will assess the economic burden of negative coping behaviors such as alcohol and tobacco use. This effort will provide screening factors to assess military Family well-being and resilience.			
Accomplishments/Planned Programs Subtotals	1.488	1.661	1.692

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*				Project (Number/Name) MM2 / *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
MM2: *MEDICAL ADVANCE TECHNOLOGY INITIATIVES (CA)*	-	7.076	8.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Military Burn Trauma Research Program	7.076	8.000	-
Description: This is a Congressional Interest Item.			
FY 2013 Accomplishments: Military Burn Trauma Research Program			
FY 2014 Plans: Military Burn Trauma Research Program			
Accomplishments/Planned Programs Subtotals	7.076	8.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	Project (Number/Name) MM3 / *Warfighter Medical Protection & Performance*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
MM3: *Warfighter Medical Protection & Performance*	-	9.467	11.407	17.991	-	17.991	19.154	19.273	19.057	19.328	-	-

The FY 2015 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Physiological (human physical and biochemical functions) Health and Environmental Protection (Sleep Research/ Environmental Monitoring)	1.555	1.573	1.698
Description: This effort supports and maturates laboratory products, nutritional interventions, and decision aids for the validation of physiological (human physical and biochemical functions) 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 capability demonstrations in the area of decreasing Soldier physical burden in FY2013-2014.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** MM3 / *Warfighter Medical Protection & Performance*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Evaluated real-time 'thermal strain monitoring and management' system in Brigade Modernization exercise or similar operationally relevant field environment and identified 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:*** Demonstrate the effectiveness of nutritional interventions for facilitating wound healing and supporting immune function; demonstrate real-time physiological status monitoring systems for operational use in-theater; enhance injury prediction algorithms for incorporation into wearable sensor systems; and allow the prediction and prevention of physical injury and health outcomes. ***FY 2015 Plans:*** Will perform field-studies to demonstrate the efficacy of nutritional interventions for optimizing Warrior recovery from physical and mental injury. Will validate algorithms and mathematical models capable of predicting cognitive status and monitoring recovery and healing from physical injury.			
Title: Environmental Health and Protection - Physiological (human physical and biochemical functions) 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 capability demonstrations in the area of decreasing Soldier physical burden in FY2013-2014. ***FY 2013 Accomplishments:*** Developed refined novel hydration sensor technologies with high (80-95%) diagnostic accuracy. This serves to reduce the incidence of electrolyte-related injury among Warfighters due to diarrheal disease incidence or exertion-based dehydration. ***FY 2014 Plans:*** Determine the prototype noninvasive hydration sensor technologies that meet requirements for clinical precision and reliability. This technology is used to determine Warrior hydration status and inform appropriate clinical intervention and will reduce the incidence of heat injuries among Warriors. ***FY 2015 Plans:*** Will conduct a feasibility study to determine saliva biomarker (physiological indicator of a specific biological state) panel that will distinguish levels of dehydration in exertional exercise in order to prevent heat injury. Will validate organ damage biomarkers to clinical measures in heat stroke patients. Will determine efficacy of drug treatments for heat injury and heat stroke recovery. Will provide strategies for localized heating to optimize hand and finger dexterity for specific military tasks. Will exploit nanomaterials (materials smaller than a one tenth of a micrometer in at least one dimension) for developing advanced focused heating	1.005	1.043	2.356

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** MM3 / *Warfighter Medical Protection & Performance*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
approaches to prevent nonfreezing cold injury. Will evaluate the efficacy of new pharmaceuticals to prevent acute mountain sickness and improve work performance at high altitude.			
Title: Injury Prevention and Reduction (Physical Performance Enhancement) ***Description:*** This effort supports and validates injury prediction tools for brain, spine, and thoracic (chest) injury from blast, blunt, and ballistic impact. This effort supports Technology-Enabled Capability Demonstration 1.b, Force Protection--Soldier and Small Unit in FY2013-2014, and also supports capability demonstrations in the area of decreasing Soldier physical burden in FY2013-2014. ***FY 2013 Accomplishments:*** Validated 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:*** Upgrade the blast, blunt trauma, and inhalation performance decrement software to incorporate extreme environmental stressors and mature musculoskeletal models for predicting physical performance injury and health outcomes for military-relevant tasks, accounting for individual variations, equipment, and environmental factors. ***FY 2015 Plans:*** Will provide medical standards for protection against hearing and vestibular injuries and ensure compatibility with military operations and maintenance of Warfighter situational awareness. Will develop and validate improved sensory system injury countermeasures. Will develop and validate computational models to predict the effects of the primary blast wave on the face and eyes. Will develop field-forward, non-invasive tools that will aid medical staff decisions regarding treatment, prognosis, and return-to-duty following muscle and/or other tissue injury.	3.848	5.211	3.762
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 2013 Accomplishments:*** Developed guidance on pharmacological interventions to improve psychological and neurophysiological functioning post-concussion; conducted studies to develop and validate reliable metrics for identification, time course, and prospective neurocognitive/neurological effects of mild Traumatic Brain Injury (mTBI); convened working group panels to develop and execute	3.059	3.580	10.175

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603002A / *MEDICAL ADVANCED TECHNOLOGY*	**Project (Number/Name)** MM3 / *Warfighter Medical Protection & Performance*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
strategic findings from studies that support policy formation; and designed a strategic research approach to promote the longer-term physical and mental health of the Force. ***FY 2014 Plans:*** 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 demonstrate whether neurocognitive testing can accurately inform assessment of the brain injury following a post-concussion event. These efforts lead to more effective assessments of Warriors and facilitate improved strategies for appropriate care and identify better treatment modalities for brain injury following a post-concussion event. ***FY 2015 Plans:*** Will provide guidance on the utilization of sleep measures to aid in the diagnosis, prognosis, and monitoring of recovery from a post-concussion event. Will determine the utility of neurocognitive assessment tools in conjunction with physiological (human physical and biochemical functions) data from other sources, such as blood biomarkers, for assessment of post-concussive symptoms. Will validate algorithms that predict concussion injury and incorporate these into currently available blast-wave concussion sensor systems. Will evaluate the efficacy of bright light therapy for PTSD treatment. Will determine the gender-relevant signatures of PTSD and the changes in biomarker levels associated with PTSD onset during deployment.			
Accomplishments/Planned Programs Subtotals	9.467	11.407	17.991

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603003A *I AVIATION ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	57.364	81.037	88.990	-	88.990	90.394	94.966	101.461	101.421	-	-
313: *Adv Rotarywing Veh Tech*	-	40.008	63.513	72.732	-	72.732	73.612	81.545	88.528	89.349	-	-
436: *Rotarywing MEP Integ*	-	8.487	9.252	8.004	-	8.004	8.506	8.442	6.802	5.885	-	-
447: *ACFT Demo Engines*	-	8.869	8.272	8.254	-	8.254	8.276	4.979	6.131	6.187	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 reductions attributed to sequestration (-5,123 million), general Congressional reductions (-63 thousand), and SBIR/STTR transfers (-1,636 million)

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates manned and unmanned air vehicle 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 436 matures, integrates and demonstrates air launched weapons systems and 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) Technology 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 U.S. Army 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	64.215	81.080	92.341	-	92.341
Current President's Budget	57.364	81.037	88.990	-	88.990
Total Adjustments	-6.851	-0.043	-3.351	-	-3.351
• Congressional General Reductions	-0.092	-0.043			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.636	-			
• Adjustments to Budget Years	-	-	-3.351	-	-3.351
• Sequestration	-5.123	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	Project (Number/Name) 313 / *Adv Rotarywing Veh Tech*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
313: *Adv Rotarywing Veh Tech*	-	40.008	63.513	72.732	-	72.732	73.612	81.545	88.528	89.349	-	-

The FY 2015 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 and occupant survivability, reduced maintenance and sustainment costs, and greater performance through improved rotors, drives, vehicle management systems and platform design and 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 U.S. Army 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 2013	FY 2014	FY 2015
Title: Aircraft & Occupant Survivability Systems	7.637	11.418	9.118
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.			
FY 2013 Accomplishments: Matured concepts that most effectively and efficiently make the pilot aware of the current threat situation and offer the best survivability actions to dynamic threats; began design of a three dimensional (3-D) route optimization planner architecture that allows the aircraft to maneuver to its flight dynamic limits, coupled with real-time threat lethality predictions; began maturing preliminary component design of a combat tempered platform that exemplifies enhanced aircraft and crew/occupant protection, improved battlefield durability, and reduced environmental vulnerability; substantiated 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; conducted system engineering trades; and started validation of component integration.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 313 / *Adv Rotarywing Veh Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Generate real-time threat lethality prediction algorithms and 3-D route planning optimization algorithms which include consideration of aircraft flight dynamics limits, and demonstrate in the AMRDEC Aviation Integration System Facility; demonstrate modular integrated survivability architecture using aircraft survivability equipment components, and Future Airborne Common Environment conforming software; and begin full scale fabrication of a combat tempered airframe sub-section designed to meet damage tolerance criteria. ***FY 2015 Plans:*** Will integrate for flight demonstration purposes route planner software, common processing hardware, displays, and sensors onto a relevant aircraft platform; conduct system ground testing and a series of flight tests that will quantify the capability of the hardware/software to process data from threat sensors and display appropriate adjustments to the route plan; complete development and demonstration of a common software/hardware interface to rapidly integrate survivability technologies into aviation platforms; complete coordinated development of an airworthiness qualification process with a focus on qualifying and reusing software components; and demonstrate reduced operational durability and total survivability through full-scale tests of combat tempered airframe, zero-vibration helicopter, durable main rotor, integrated crash protection system, and adaptive flight control laws.			
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.) ***FY 2013 Accomplishments:*** Began testing to mitigate risk and address integration issues associated with integrating multiple active technologies into a rotor system; began maturing design of reconfigurable rotors with integrated active rotor components; demonstrated 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; matured a fault tolerant architecture that combines flight safety critical, mission critical and other non-safety critical subsystems into an integrated rotorcraft guidance and control system (Adaptive VMS); and matured system hardware and software components in preparation for fabrication and flight demonstration. ***FY 2014 Plans:*** 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	8.143	7.296	4.455

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 313 / *Adv Rotarywing Veh Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
missions (cargo, assault, scout, attack and recon); and 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. ***FY 2015 Plans:*** Will mature advanced Vehicle Management System (VMS) technologies and will demonstrate via flight test a system which more efficiently utilizes available vehicle data to improve system performance and reduce pilot workload across the range of Army rotorcraft applicable to both the legacy fleet and the Future Vertical Lift (FVL) fleet.			
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. ***FY 2013 Accomplishments:*** Completed initial Operations Analysis and used results to assign warfighter value to aircraft features and attributes; completed Configuration Trades & Analysis tasks, utilizing multiple contractors, that documented design trades, cost/weight sensitivity studies, and vehicle configuration recommendations; investigated space, weight & power requirements and provisions for aircraft mission equipment (avionics, weapons, sensors); developed a demonstrator performance specification; and began preliminary design of multiple aircraft concepts. ***FY 2014 Plans:*** 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; conduct design support testing to establish performance expectations for vehicle subsystem concepts and enablers; refine a model development specification; mature technology development plans for the selected vehicle concepts; and conduct configuration and architecture concept evaluations with analyses and demonstrations performed to mature tools, processes and technologies required for mission systems development. ***FY 2015 Plans:*** Will Complete detailed design of Joint Multi-Role technology demonstrator concepts; mature final design drawings; provide cost/ weight analyses; conduct critical system design review; begin component and subsystem fabrication and test; update analytical tools; conduct the Joint Common Architecture demonstration; refine the objective Mission Equipment Package (MEP) definition;	11.534	33.068	48.777

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 313 / *Adv Rotarywing Veh Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
define an Architecture Centric Virtual Integration process for avionics architecture development; and complete version 1 of the Joint Common Architecture standard.			
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. The drive system demonstrators for this effort will be applicable to current platforms and future Vertical Lift platforms. ***FY 2013 Accomplishments:*** Validated gear and bearing component hardware designs; evaluated modeling and design tools for accuracy to predict component stresses and material properties; tested advanced oils and additives for extending component durability; assessed reliability of new technologies for improved aircraft affordability; and tested advanced cooling technologies for reduced aircraft subsystem weight. ***FY 2014 Plans:*** Mature designs of full-scale demonstrator transmissions and tail rotor drive shaft system; fabricate full-scale demonstrator hardware for Kiowa Warrior and Blackhawk aircraft configurations; assess and validate reliability and maintainability algorithms; and assess progress towards meeting production and operational cost goals. ***FY 2015 Plans:*** Will complete final assembly of the full-scale drive system demonstrator hardware for Kiowa and Blackhawk configurations; will conduct full-scale testing to include endurance testing for reliability and over torque testing to validate material design parameters; and will evaluate loss of lubrication capabilities through testing.	4.899	6.204	6.986
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 2013 Accomplishments:*** Performed an aircraft level demonstration of the integrated set of technologies developed in FY11 and projected the operational benefits and support cost savings; demonstrated additional prognostic technologies for accessories and controls; began validation of prognostic algorithms for structural integrity, corrosion, electrical distribution system, and rotor components; prepared for flight	5.539	2.027	3.396

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 313 / *Adv Rotarywing Veh Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
test in FY14 of energy harvesting sensors used to monitor component health and extend component service times; and began validation of a sensor network system that improves health monitoring capabilities. ***FY 2014 Plans:*** Mature advanced prognostic algorithms for more chaotic, non-linear dynamic failure modes for engines, flight controls, rotor systems and drives; mature the interfaces for health monitoring systems to communicate with Joint Common Architecture standards; and evaluate the integration of system health monitoring with electronic controls to enable adaptive control systems. ***FY 2015 Plans:*** Will mature engine adaptive controls to optimize performance, component life and maintenance schedule based on engine health; mature planetary gear failure detection technology, multifunctional aircraft sensor technology to reduce number of sensors and system weight, and a drive system intermediate rating methodology; demonstrate technologies for assessment of the structural integrity of a primarily composite airframe; verify the integrity of composite repairs, and predict the remaining useful life; and demonstrate in-flight real-time, automated methods to sense rotor system track and balance and make adjustments.			
Title: Joint Common Architecture ***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 processing system and demonstrates them through Software Integration Lab (SIL) testing. In FY14 and 15, JCA related efforts for the Joint Multi-Role are moved to Platform Design and Structures Systems. ***FY 2013 Accomplishments:*** Published version 3 of the JCA standard that defines an open avionics systems architecture for future vertical lift aircraft and validated performance of the supporting JCA Ecosystem components (Software Developer's Tool Kit, Integrator's Tool Kit, Conformance Test Tool, Repository, and Simulation/Stimulation tools).	2.256	-	-
Title: Crew Decision Aid System ***Description:*** Demonstrate 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. This work continues in FY15 in Project 436 under the Unmanned / Optionally Manned Systems effort. ***FY 2014 Plans:***	-	3.500	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Demonstrate an intelligent search and screen function to sort actionable priority data from onboard and off-board sources and evaluate Joint Common Architecture-like protocols for algorithm integration.			
Accomplishments/Planned Programs Subtotals	40.008	63.513	72.732

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	Project (Number/Name) 436 / *Rotarywing MEP Integ*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
436: *Rotarywing MEP Integ*	-	8.487	9.252	8.004	-	8.004	8.506	8.442	6.802	5.885	-	-

The FY 2015 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, 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 U.S. Army Aviation and Missile Research, Development and Engineering Center (AMRDEC), Joint Base Langley-Eustis, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Unmanned and Optionally Manned Systems	4.816	7.257	8.004
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. Efforts include 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 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 436 / *Rotarywing MEP Integ*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Completed fabrication of an unattended delivery and landing system through incorporation of three dimensional (3-D) terrain analysis and mapping; matured and integrated multi-vehicle control technologies for cargo/resupply UAS operations; and prepared for flight demonstration. ***FY 2014 Plans:*** Mature and integrate autonomous retrograde capability on rotary-wing cargo UAS; conduct flight testing and system-level demonstration of all technologies integrated on the cargo unmanned aerial demonstrator system; determine highest-value unmanned wingman functions for decision aiding and autonomy; and select and begin algorithm implementation and integration approach. ***FY 2015 Plans:*** Will complete implementation of aiding and autonomy algorithms into simulation; test and evaluate task and mission effectiveness of interface devices and concepts, and aiding and autonomy algorithms; optimize approach for full integration of selected devices, concepts, and algorithms; and demonstrate a hierarchical structure of nested crew aiding and autonomy functions and evaluate the structure and functionality set for application across multiple Army aircraft, both current and future, and for suitability as the aiding/autonomy domain of the Joint Common Architecture (JCA).			
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 2013 Accomplishments:*** Performed detailed design of the lightweight, integrated weapon system concept developed in FY12 to defeat threat aircraft systems (manned and unmanned) and soft ground targets; matured designs for target tracking algorithms to enable airborne engagement of maneuvering targets; began evaluation of performance of airburst ammunition fuzing concepts. ***FY 2014 Plans:*** Mature 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. This effort terminates at the end of FY14.	3.671	1.995	-
Accomplishments/Planned Programs Subtotals	8.487	9.252	8.004

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 436 / *Rotarywing MEP Integ*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*				Project (Number/Name) 447 / *ACFT Demo Engines*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
447: *ACFT Demo Engines*	-	8.869	8.272	8.254	-	8.254	8.276	4.979	6.131	6.187	-	-

The FY 2015 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 U.S. Army Aviation and Missile Research, Development, and Engineering Center (AMRDEC), at Joint Base Langley-Eustis, VA.

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 2013	FY 2014	FY 2015
Title: Future Affordable Turbine Engine (FATE)	8.869	8.272	8.254
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 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603003A / *AVIATION ADVANCED TECHNOLOGY*	**Project (Number/Name)** 447 / *ACFT Demo Engines*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Completed detailed system design activities and initiated 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; began validation of the design's aerodynamic performance and mechanical integrity, prior to the first integrated, full-engine test; and began analysis of completed component test results to support redesign efforts as required for future engine builds. ***FY 2014 Plans:*** Complete all remaining component tests in support of first engine build; 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; complete FATE engine hardware fabrication and initiate assembly/instrumentation for first engine test; and identify design improvements for goal demonstration testing. ***FY 2015 Plans:*** Will complete assembly/instrumentation for first engine test; this initial, full engine, system level test will validate the mechanical integrity of the advanced FATE architecture and provide data for an initial integrated performance assessment; begin redesigned component tests in support of final goal engine build; and use results from first engine test to establish optimized component flow areas and variable geometry schedules.			
Accomplishments/Planned Programs Subtotals	8.869	8.272	8.254

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	69.788	73.885	57.931	-	57.931	65.886	72.808	69.494	65.711	-	-
232: *Advanced Lethality & Survivability Demo*	-	47.111	46.644	39.823	-	39.823	48.903	49.987	46.708	42.596	-	-
43A: *ADV WEAPONRY TECH DEMO*	-	7.487	10.000	-	-	-	-	-	-	-	-	-
L96: *High Energy Laser Technology Demo*	-	12.460	13.963	14.381	-	14.381	12.611	17.849	17.742	18.053	-	-
L97: *Smoke And Obscurants Advanced Technology*	-	2.730	3.278	3.727	-	3.727	4.372	4.972	5.044	5.062	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to Congressional Add funding (10.0 million); Congressional general reductions (-122 thousand); SBIR/STTR transfers (-1.560 million); and Sequestration reductions (-6.143 million)
FY14 adjustments attributed to FFRDC reductions (-34 thousand) and Congressional Add funding (10.0 million)
FY15 funding realigned to support higher Army priorities.

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 L97 demonstrates 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army	Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603004A *I Weapons and Munitions Advanced Technology*

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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	67.613	63.919	64.767	-	64.767
Current President's Budget	69.788	73.885	57.931	-	57.931
Total Adjustments	2.175	9.966	-6.836	-	-6.836
• Congressional General Reductions	-0.122	-0.034			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	10.000	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.560	-			
• Adjustments to Budget Years	-	-	-6.836	-	-6.836
• Sequestration	-6.143	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*	Project (Number/Name) 232 / *Advanced Lethality & Survivability Demo*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
232: *Advanced Lethality & Survivability Demo*	-	47.111	46.644	39.823	-	39.823	48.903	49.987	46.708	42.596	-	-

The FY 2015 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.

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 2013	FY 2014	FY 2015
Title: Ground Based Networked Munitions Technologies	-	1.388	0.992
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 2014 Plans:*** 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; optimize non-lethal effects package for Autonomous Non-Lethal Alert to provide enhanced force protection. ***FY 2015 Plans:*** Will integrate and demonstrate technologies for multi-purpose networked munitions.			
Title: Operationally Adaptable Effects	2.790	-	-
Description: This effort utilizes the technologies demonstrated in Scalable Effect Weapons and Munitions System 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.			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Designed and fabricated variable yield unitary warhead that used reactive materials, preformed fragmenting composite casing and dual purpose energetics to demonstrate improved scalable lethal and non-lethal effects.			
Title: Tunable Pyrotechnics ***Description:*** This effort demonstrates smoke and flare countermeasure for passive protection for ground and air combat platforms. ***FY 2013 Accomplishments:*** Demonstrated and validated performance of ultraviolet, laser beam rider, and imaging seeker counter measures; subsequently validated performance using flares through flight testing; compared results to modeling and simulation studies and used derived information to advance computer modeling and simulation capabilities.	2.864	-	-
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 2013 Accomplishments:*** Demonstrated the ability to track, command-maneuver, and command-detonate multiple in-flight projectiles against RAM targets and improved software based on flight results. ***FY 2014 Plans:*** Demonstrate integrated system of radar, command guided interceptors, and auto cannon by a defeat of a statically placed threat munitions; demonstrate performance requirements. ***FY 2015 Plans:*** Will optimize and demonstrate an integrated Counter Unmanned Aerial Systems (C-UAS) capability, comprised of; algorithms, fire control and command guided interceptor munitions.	8.493	3.019	3.113
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 2013 Accomplishments:***	2.327	4.170	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Fabricated several full-up KE rounds with selected novel penetrator and demonstrated that lethality performance met modeling and simulation predictions and range objectives in an instrumented range; designed concept based on results, refined design and prepared additional testing on range and simulated operational environment, i.e., fired from a 120mm tank gun. ***FY 2014 Plans:*** Build/procure hardware components, assemble cartridges, and conduct functional and armor tests leading to techonology demo; conduct technology demonstration (120 mm ballistic testing through all temperatures); analyze test data: 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 2013 Accomplishments:*** Completed warhead insensitive munition tests, producibility studies and final static arena tests validating system lethality; conducted instrumented ballistic firings and dispersion verification tests of finalized dispense/stabilizer designs; built optimized fuze technology demonstrator and conducted evaluation testing; finalized submunition baseline, built demonstrator and conducted final 155mm integrated ballistic demonstration validating demonstrator. ***FY 2014 Plans:*** 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 provides 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 shows the performance of the system in a representative environment and shows the improvement in reliability over traditional DPICM. ***FY 2015 Plans:*** Will mature the design and demonstrate performance against the expanded target set that now includes tracked and light wheeled tactical vehicles; will exploit emerging breakthroughs in warhead technologies that enable defeat of the expanded target sets at a reduced cost (e.g. number of rounds fired to service a target).	6.729	4.035	3.000
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,	11.586	11.051	10.000

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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 2013 Accomplishments:*** Matured and demonstrated air burst munition and armament to validate accuracy; conducted analysis to model accuracy performance and optimize air burst munition; matured air burst munition; optimized performance of onboard fuze and fuze setter for programmable airburst munition; provided interface control documents for weapon, ammunition handling system and air burst munition; optimized fire control software for scenario based touch screen user interface; matured fire control system with downrange wind sensor, dynamic meteorological, environmental, temperature (MET) sensor and improved laser ranging; continued with the maturation phase of remote weapon station to reach a higher level of ruggedness and reliability; optimized the control system; improved the operator control interface; conducted extended system level cycling tests; matured weapon and ammo handling/turret cycling tests to determine system reliability and effectiveness; demonstrated remote weapon station capabilities using both lethal and non lethal ammunition. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Primary focus will be to optimize technologies from Weapon, Fire Control and Turret functional areas together in preparation of demonstrating a system level platform integration with an advanced medium caliber weapon system within a Bradley Fighting Vehicle (BFV) variant. In support of this effort, will finalize and optimize a prototype turret and drive system to support the XM813 30mm weapon system; will optimize and mature the advanced sensors (down range wind sensor, dynamic metrology sensor and improved laser range finder) and the scenario based fire control system supporting the XM813 30mm weapon system, 30mm armor piercing (AP) munition and the Mk310 30mm programmable air bursting munitions (PABM); will perform the integration of these technologies within the BFV and will demonstrate improved accuracy and lethality performance at a system level. Additionally, will finalize 50mm fuze improvements and will perform a fuze shoot off and demonstration to down select and optimize the burst point accuracy of the 50mm PABM munition.			
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.	-	1.006	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Note: Prior to FY14, this effort was combined with Medium Caliber Weapon Systems above. ***FY 2014 Plans:*** 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, perform generation of a Safety Assessment Report (SAR) and other pre-ATEC activities.			
Title: Advanced Power and Energy Management for Munitions ***Description:*** This effort demonstrates the technology options available to provide the next generation of gun fired smart munitions, with advanced fuzing and power components for improved performance. ***FY 2013 Accomplishments:*** Investigated fabricate technologies for gravity sensor, and performed small scale environmental testing; for proximity sensor, designed necessary components and integrated into preliminary sensor, and conducted performance tests in lab environment; for multi-point initiation, created breadboard multi-point system based on artillery application, testing control circuitry and simultaneity; fabricated demonstration millimeters thin lithium- ion batteries and demonstrated environmental robustness; matured supercapacitor for munition application and fabricated for bench and environmental evaluation. ***FY 2014 Plans:*** For multi-point initiation, 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, demonstrate improved range extraction and enhanced countermeasure protections through ballistic testing; for impact switch, mature and demonstrate a micro electrical mechanical system (MEMS) based impact switch that has multi-level sensing capability against varying targets; for thin film thermal batteries, mature and demonstrate a thin film heat source integrated into existing thin film battery; for super capacitor, demonstrate robustness of design through environmental and ballistic testing. ***FY 2015 Plans:*** Will optimize next generation proximity sensor (NGPS) sub-system to meet improved performance requirements; will demonstrate and validate NGPS design in an artillery platform to achieve a TRL 6.	3.033	3.247	0.600
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 2013 Accomplishments:***	2.182	1.819	2.927

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Investigated insensitive materials of interest for augmenting lethality; scaled up and formulated nano energetics for increased performance; scaled up organic compounds based explosives to augment energy and lethality outcomes. ***FY 2014 Plans:*** Scale-up and formulate newly synthesized ingredients for lethality and insensitive munition (IM) benefits; optimize propellant formulations for various applications of interest for extended range; prototype novel propulsion system concepts; perform live fire and performance testing for nano pressed explosives; conduct IM insult testing on XM1128 projectile; perform IM testing on compatible IM detonation trains. ***FY 2015 Plans:*** Will perform appropriate test series on mature propellant and explosive formulations to facilitate certification at the Energetic Material Qualification Board (EMQB) level and enable transition of new materials to munitions qualification programs.			
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 2013 Accomplishments:*** Matured and demonstrated CCM technologies that optimized performance against threats, e.g. novel anti-armor weapon systems to defeat Active Protection Systems protected platforms; matured technology to reduce mounted soldier vulnerability by decreasing time on target.	0.707	-	-
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 2013 Accomplishments:*** Matured existing weapon platform and fire control software for integration and demonstration on a robotic platform; matured and demonstrated enabling integrated technologies tactically relevant to increasing battlefield lethality/survivability; continued to demonstrate technologies for improving precision that extends beyond existing ranges.	3.300	-	-
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.	-	1.534	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2014 Plans: 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.			
Title: Active Protection Armament Technologies ***Description:*** This effort supports the Army's Active Protection System (APS) program to mature and demonstrate APS technologies to reduce vehicle weight while reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection, and active countermeasures to achieve increased protection against current and emerging threats. This effort is done in coordination with efforts in PE 0602601A, PE 0602618A, PE 0603004A, PE 0603005A, PE 0603270A, and PE 0603313A. ***FY 2015 Plans:*** Will mature and integrate hard kill related technologies such as fire control, target detection device and hard kill countermeasures into the Army's APS common architecture.	-	-	3.125
Title: Remote Armament System Integration ***Description:*** This effort integrates and demonstrates weapon systems on a semi-autonomous and autonomous unmanned platform while maintaining positive control of weapon system. ***FY 2014 Plans:*** 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.	-	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 Accomplishments:*** Improved weapon target pairing (WTP) enhancement for non-lethal effects; improved fire support of unmanned aerial vehicle/ unmanned ground vehicle tactical behavior along with the remote weapon station collaborative effort; validated de-conflction of target data received; demonstrated improvements to validate the enhanced sensor-to-shooter WTP capabilities for lethal and non-lethal effects; validated the networked fire control perfomance utilizing existing hardware and software. ***FY 2014 Plans:***	3.100	2.511	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Implement fire support execution matrix; improve target prioritization; improve 3D de-conflictions of fires application; demonstrate target data/track management and effects planning; demonstrate weapon placement coordination; 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:*** Improve and optimize down selected 81mm mortar GPS precision design candidate; mature design and integrate into 81mm mortar round system taking into account warhead and propulsion system; validate the 81mm precision mortar design integration. ***FY 2015 Plans:*** Will mature components, build hardware and verify 81mm precision design live system test: will verify GPS and fuze setter technology and designs with tests.	-	1.006	1.507
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:*** Improve the azimuth and elevation steering capability and develop a Fire Control Suite for Target Tracking; perform demonstration of human target effects.	-	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:*** Demonstrate and optimize acoustic detection and tracking in bearing of UAS; 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; support and participate in TECD 1a to demonstrate integrated capabilities.	-	1.510	-
Title: Extended Range/Guided 40mm Munition	-	2.013	3.016

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2014 Plans:*** Mature and demonstrate optimized components for guidance navigation and control system for extended range 40mm low velocity grenades; perform improvements of extended range technologies to include airframe and Guidance, Navigation and Control and conduct a demonstration; optimize and demonstrate a mature warhead integrated into the projectile. ***FY 2015 Plans:*** Will mature, integrate and demonstrate previously demonstrated component technologies in an extended range guided 40mm projectile to 600 meters (threshold)/ 1000 meters (objective); will demonstrate improved probability of hit at an increased range; will provide a low cost integrated guidance navigation and control system with optimized airframe, canards, tail fin, and propulsion system; will optimize fuze and warhead design and functionality to enhance lethality capabilities;. will demonstrate target acquisition, increased range and guide to hit projectile, at targets at ranges between 600 to 1000 meters.			
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:*** Improve and optimize the baseline, ground-up designed system; demonstrate its capabilities in a controlled environment in order to validate expected increases in performance. ***FY 2015 Plans:*** Will adapt the system to be compatible with 81mm precision mortar cartridge; will prepare for an integrated demonstration.	-	3.000	2.000
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:***	-	1.006	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Demonstrate an improved IED neutralization capability that interoperates with standard communications networks and databases that provide historical and real time IED emplacement data; 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; demonstrate reduce Size, Weight and Power (SWaP) requirements for legacy neutralization systems utilizing emplacement data and RF generation enhancements.			
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:*** Optimize the performance of the long rod sabot, notably the slip obturator and discard; demonstrate accuracy improvements associated with design modifications to existing projectiles; investigate the technological advances and viability of guided munitions in small caliber applications. ***FY 2015 Plans:*** Will validate the technology matured through this program by demonstrating improved sniper cartridges in common calibers that increase a sniper's probability of hit in non-ideal/combat relevant conditions at extended ranges.	-	0.503	1.507
Title: Long Range Gun Technology ***Description:*** This effort matures and demonstrates extended range artillery weapon system and projectile technologies that increase the range by 25% without an increase in platform weight. ***FY 2015 Plans:*** Will mature component technologies associated with longer range artillery capabilities and it will include weapon system components like cannon tube, breech and mount.	-	-	2.036
Title: Soldier Fired Advanced Effect Air Burst Munition ***Description:*** This effort will provide improved lethality of air bursting munitions that focus on emerging requirements from the User as shown in the Soldier Lethality Roadmap (e.g., 25mm High Explosive Air Bursting Improvements). ***FY 2015 Plans:*** Will mature technologies for neutralization of targets in defilade; will mature and demonstrate advanced explosives/fragmentation warheads to increase lethal zone.	-	-	1.800
Title: Affordable Precision Technologies	-	-	2.000

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** 232 / *Advanced Lethality & Survivability Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Description: This effort will integrate complementing navigation sensors, actuators and subsystems in order to demonstrate precision delivery capability on an indirect fire munition system in a GPS denied environment. ***FY 2015 Plans:*** Will integrate and optimize critical guidance subsystems; will demonstrate airframe and actuator performance through flight testing in order to verify the maneuverability.			
Title: Guided Enhanced Fragmentation Mortar Munition ***Description:*** This effort will develop and demonstrate a 120mm precision guided mortar with improved capabilities with respect to the currently fielded 120mm precision guided mortar. ***FY 2015 Plans:*** Will build and test fully integrated systems to verify designs and demonstrate functionality at nominal and environmental extreme conditions.	-	-	2.200
Accomplishments/Planned Programs Subtotals	47.111	46.644	39.823

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*				Project (Number/Name) 43A / *ADV WEAPONRY TECH DEMO*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
43A: *ADV WEAPONRY TECH DEMO*	-	7.487	10.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Advanced Weaponry Technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Program Increase	7.487	10.000	-
Description: This is a Congressional Interest Item ***FY 2013 Accomplishments:*** Matured and demonstrated lethal and non-lethal weapons and munitions with potential to increase force application and force protection capabilities across the spectrum of operations. ***FY 2014 Plans:*** Mature and demonstrate lethal and non-lethal weapons and munitions with potential to increase force application and force protection capabilities across the spectrum of operations.			
Accomplishments/Planned Programs Subtotals	7.487	10.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*				Project (Number/Name) L96 / *High Energy Laser Technology Demo*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
L96: *High Energy Laser Technology Demo*	-	12.460	13.963	14.381	-	14.381	12.611	17.849	17.742	18.053	-	-

The FY 2015 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).

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 US Army Space and Missile Defense Command/Army Forces Strategic Command, Technical Center, Huntsville, AL.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Laser System Ruggedization	6.886	11.563	5.679
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, command and control and thermal management subsystems required for the laser device operation.			
FY 2013 Accomplishments: Used 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; validated 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;			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** L96 / *High Energy Laser Technology Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
began ruggedization efforts for available programmable pulsed power technology to provide prime power for the 25-50 kW laser device; and ruggedized available thermal management technology that can cool the 25-50 kW laser device. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will continue additional ruggedization of a 50kW class laser device for integration on the HEL MD platform; continue ruggedization of thermal management technology that can cool the 50 kW laser device; and initiate power generation function ruggedization for recharging the power storage modules.			
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. ***FY 2013 Accomplishments:*** Capitalized on the availability of COTS 10 kW class lasers and reduced 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; demonstrated the HEL JTO provided AO technologies with the 10kW device to assess increases to effective range; and began the integration of ruggedized components on the HEL MD platform to support the next phase (25-50kW) of HEL mobile demonstrations. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will begin subsystem demonstration and performance validation for the ruggedized thermal management technology that cools the 50 kW laser device; begin subsystem demonstration and performance validation for the ruggedized battle management	5.574	2.400	8.702

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** L96 / *High Energy Laser Technology Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
function that provides controls for the 50kW laser and other subsystems; and begin planning for the integrated 50kW class demonstration, to include objective definition, demonstration reference missions, and long-lead purchases.			
Accomplishments/Planned Programs Subtotals	12.460	13.963	14.381

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603004A / *Weapons and Munitions Advanced Technology*	Project (Number/Name) L97 / *Smoke And Obscurants Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
L97: *Smoke And Obscurants Advanced Technology*	-	2.730	3.278	3.727	-	3.727	4.372	4.972	5.044	5.062	-	-

The FY 2015 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.

Work in this PE is related to, and fully coordinated with, PE 0602622A (Chemical, Smoke and Equipment Defeating Technology) and PE 0603606A, project 608 (Countermine & Barrier Development).

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 2013	FY 2014	FY 2015
Title: Obscurant Enabling Technologies	0.627	0.659	0.697
Description: This effort demonstrates the dissemination of new and advanced obscurants.			
FY 2013 Accomplishments: Optimized new low hazard visual obscurant grenade.			
FY 2014 Plans: Conduct toxicology studies of optimized grenades; further characterize performance of low hazard visual obscurant grenade.			
FY 2015 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** L97 / *Smoke And Obscurants Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will conduct initial dissemination studies on artillery/mortar delivered low hazard visual obscurant. Will demonstrate low hazard visual smoke grenade.			
Title: Forensic Analysis of Explosives ***Description:*** This effort demonstrates improved point and stand-off detection of explosives and home made explosive (HME) precursors. ***FY 2013 Accomplishments:*** Optimized and matured a HME detection kit for the dismounted soldier. ***FY 2014 Plans:*** Integrate and demonstrate Colorimetric Reconnaissance Explosive Sensor System (CRESS) HME detection kit for dismounted Soldiers; fabricate the Chemical Fingerprint Identification System (CFIS) device for unambiguous biometric identification detection of explosives in latent fingerprints; develop a prototype forensic optical 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. ***FY 2015 Plans:*** Will integrate and demonstrate Chemical Fingerprint Identification System (CFIS) device for unambiguous biometric identification of an individual linking explosive residue identified and found in latent fingerprints using Raman Chemical Imaging.	0.787	1.053	1.378
Title: Detection Mechanisms for Contaminants ***Description:*** This effort demonstrates improved point and standoff detection of a wide range of hazardous materials. ***FY 2013 Accomplishments:*** Optimized and demonstrated recommended spectroscopic approaches for standoff, proximity and point detection of explosives, homemade explosives, and/or homemade explosive precursors; and demonstrated integrated sensing of chemical agents and explosives in a common Ion Mobility Spectroscopy system (IMS) Joint Chemical Detector (JCD). ***FY 2014 Plans:*** 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. ***FY 2015 Plans:***	1.316	1.566	1.652

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603004A / *Weapons and Munitions Advanced Technology*	**Project (Number/Name)** L97 / *Smoke And Obscurants Advanced Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will demonstrate unambiguous detection of explosives and chemical agents in a unified and integrated system based on ion mobility spectrometry.			
Accomplishments/Planned Programs Subtotals	2.730	3.278	3.727

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	128.463	146.992	110.031	-	110.031	114.799	121.938	128.785	125.310	-	-
221: *Combat Veh Survivablty*	-	47.948	49.487	53.765	-	53.765	55.882	62.959	67.874	63.305	-	-
441: *Combat Vehicle Mobilty*	-	32.291	31.578	42.050	-	42.050	44.599	44.876	43.583	44.095	-	-
497: *Combat Vehicle Electro*	-	5.907	7.349	7.146	-	7.146	6.709	7.166	7.200	7.250	-	-
515: *Robotic Ground Systems*	-	7.466	8.578	7.070	-	7.070	7.609	6.937	10.128	10.660	-	-
533: *Ground Vehicle Demonstrations*	-	-	25.000	-	-	-	-	-	-	-	-	-
53D: *NAC Demonstration Initiatives (CA)*	-	34.851	25.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to Congressional Add funding (37.0 million); Congressional General Reductions (-223 thousands); SBIR/STTR transfers (-2.238 million); and Sequestration reductions (-10.435 million)
FY14 adjustments attributed to Congressional Add funding (50.0 million) and FFRDC reduction (-51 thousand)

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, 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, water and fuel logistics, 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 (Electronics and Electronic Devices), 0603004A (Weapons and Munitions Advanced Technology), 0603125A (Combating Terrorism – Technology Development), 0603270A (Electronic Warfare Technology), 0603313A (Missile and Rocket Advanced Technology), and 0708045A (Manufacturing Technology).

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army	Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** PE 0603005A *I Combat Vehicle and Automotive Advanced Technology*

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

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

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	104.359	97.043	104.204	-	104.204
Current President's Budget	128.463	146.992	110.031	-	110.031
Total Adjustments	24.104	49.949	5.827	-	5.827
• Congressional General Reductions	-0.223	-0.051			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	37.000	50.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.238	-			
• Adjustments to Budget Years	-	-	5.827	-	5.827
• Sequestration	-10.435	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 221 / *Combat Veh Survivablty*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
221: *Combat Veh Survivablty*	-	47.948	49.487	53.765	-	53.765	55.882	62.959	67.874	63.305	-	-

The FY 2015 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. This project executes the Army's APS program to mature and demonstrate APS technologies to reduce vehicle weight by reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection and active countermeasures to achieve increased protection against current and emerging advanced threats. This project develops an APS Common Architecture that defines the component interface standards and component specifications enabling adaptable APS solutions that can be integrated across Army vehicle platforms as required.

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 in collaboration with the Army Research Laboratory (ARL), Adelphi and Aberdeen Proving Grounds, MD, Armament Research, Development and Engineering Center (ARDEC), Picatinny, NJ, Aviation and Missile Research, Development and Engineering Center (AMRDEC), Huntsville, AL and Communications-Electronics Research, Development and Engineering Center (CERDEC), Aberdeen Proving Grounds, MD and Fort Belvoir, VA.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Active Protection Systems (APS) against Kinetic Energy (KE) and Long-Range Threats:	0.376	-	-
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 PEs 0602624A, 0603004A, and 0603313A.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Supported closeout of KE APS program including collection and archiving of documents and artifacts enabling knowledge preservation and transition feasibility.			
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 by flooding the sensor with too much light (jamming) or permanently 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. This effort focuses on demonstrating the effectiveness of optical systems that protect sensors and Warfighter vision from pulsed, continuous wave and future laser threats to maintain fire control capability and situational awareness. Coordinated work is also being performed in PEs 0602120A, 0602705A, 0602712A, and 0602786A. ***FY 2013 Accomplishments:*** Fabricated a laser-protected optical design for the Abrams Gunner's Primary Sight providing protection for the gunner's eye; designed and integrated a laser-protected day camera solution for the gunner. ***FY 2014 Plans:*** Conduct vulnerability studies of electro-optical (day-camera) sensors against pulsed-laser energy threats to determine the laser energy required to render individual pixels, full pixel columns and the entire focal plane array of the sensor ineffective or damaged; and refine the integration technique required to apply the laser protection technology to electro-optical (day-camera) sensors. ***FY 2015 Plans:*** Will continue vulnerability studies to determine the energy levels required to make pixels, columns and the entire focal plane of an electro-optical (day-camera) ineffective. Will mature concepts for integrating protection materials into the optical path of electro-optical (day-camera) sensors, and evaluate the effects of sensor exposure to pulsed-laser threats on the survivability of the sensors to continue the fire control mission.	3.788	3.943	4.141
Title: Armor Technologies: ***Description:*** This effort matures, 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. This effort is done in coordination with efforts in PEs 0602105A, 0602601A, 0602618A, and 0708045A. ***FY 2013 Accomplishments:***	0.912	1.003	0.952

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Evaluated various methods for reducing delamination and rock strike damage of transparent armor and demonstrated improved performance while maintaining armor visual transparency. ***FY 2014 Plans:*** Mature and integrate advanced tactical and combat vehicle armor technologies by performing environmental, armor attachment durability and ballistic testing; explore new integration techniques for armor systems and prepare for their future integrated armor attachment durability performance testing. ***FY 2015 Plans:*** Will evaluate the performance differences between different transparent armor solutions and determine if additional testing is required to ensure consistent performance.			
Title: Occupant Centric Survivability (OCS): ***Description:*** This effort matures 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 addresses and validates the products from requirements generation through design and build to incorporate occupant centric philosophies. This effort is done in coordination with efforts in PE 0602601A, Project C05. This effort supports the Occupant Centric Platform (OCP) program. ***FY 2013 Accomplishments:*** Established baseline of state-of-the-art commercial occupant protection components such as seats, restraints, and shock absorbing materials; developed baseline models and simulations to represent an OCP design demonstrator as well as legacy vehicles to optimize occupant centric philosophies, guidelines and processes; matured and demonstrated 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:*** Integrate occupant protection technologies such as seats, restraints and energy absorbing materials onto demonstrators using an approach that focuses on protecting the occupants by designing from the inside out; mature processes for establishing occupant centric standards and guidelines developed in PE 0602601A; conduct assessments using physical models and proofs of concepts of occupant protection technologies such as seats, restraints and energy absorbing materials to validate M&S and to reduce risk for sub-system and integrated vehicle live-fire OCP test events; and mature and integrate solutions into vehicle demonstrators to reduce injuries from secondary effects such as loose cargo becoming flying hazards in blast, crash and rollover events. ***FY 2015 Plans:***	7.346	8.131	13.315

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will continue integration and demonstration of occupant protection components such as seats, restraints and energy absorbing materials into subsystem demonstrators and OCP vehicle demonstrators. Will continue analysis of performance of OCP subsystems and demonstrators; begin subsystem and integrated OCP vehicle live-fire testing to simulate under-body blast events and identify and document a rigorous analytical approach to balance protection with mobility/weight goals; continue development and refinement of occupant centric standards, guidelines and procedures/processes.			
Title: Blast Mitigation: ***Description:*** This effort fabricates and matures advanced survivability and protection components, tools and subsystems for enhanced protection against vehicle mines, improvised explosive devices (IEDs) and other underbody blast threats, and vehicle collision and rollover events that result from blast 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 performance evaluation through M&S, experimentation and instrumented test of blast-mitigating technologies in such areas as active and passive exterior/hull/cab/kits, interior energy absorbing capabilities for seats, floors, restraints, and sensors for active technologies. This effort is done in coordination with efforts in 0602601A, project C05. This effort supports the OCP program. ***FY 2013 Accomplishments:*** Fabricated, matured and integrated energy absorbing technologies on the interior and exterior of vehicle systems to mitigate the effects of underbody blast and during collision or rollover. Interior technologies included padding for walls and floors, energy absorbing seats, integrated restraints and airbags, and sensors for active components. Exterior technologies included unique hull shaping and energy absorbing materials. For blast mitigation M&S, produced data requirements needed to validate models and improved modeling capabilities; matured and integrated 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; fabricated and integrated lab evaluation capabilities such as a linear impact sled system to refine experimentation methodologies and standards for occupant protection technologies; designed lab devices for simulating fuller effects of blast/crash/impact events; created methodologies and protection standards for crash, rollover and side improvised explosive device (IED) events; conducted component and sub-system level evaluation of blast mitigation technologies. ***FY 2014 Plans:*** Continue to mature and demonstrate interior and exterior technologies such as energy absorbing materials in structural design, hull shaping and floor designs to mitigate injuries due to underbody blast events, vehicle collisions and rollovers; improve test methods to validate existing M&S models; design methodologies and assessments of blast mitigation products; improve lab and instrumentation capabilities to assess components, sub-system and system level blast mitigation capabilities; and create and maintain standards, guidelines and methodologies for specific blast mitigation technologies. ***FY 2015 Plans:***	21.158	12.207	1.799

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will integrate advanced passive and active technologies such as active blast countermeasures, energy absorbing materials and floor designs to mitigate the effects of underbody blast threats; will conduct tests to evaluate the integration methods for exterior and interior blast mitigation technologies onto components, and sub-systems; will characterize performance to build greater knowledge for occupant centric blast mitigation design guidelines/standards, M&S tools, test procedures, laboratory processes, experimentation capabilities.			
Title: Vehicle Fire Protection: ***Description:*** This effort 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. This effort supports the Occupant Centric Platform program. ***FY 2013 Accomplishments:*** Demonstrated better fire protection for vehicles and crews by improving designs and form/fit/function of existing and new chemical extinguishing agents: matured, fabricated, and integrated common crew Automatic Fire Extinguishing System (AFES) components for evaluation in combat and tactical vehicles; enhanced modeling and simulation tools for common crew AFES; optimized common crew AFES detection and response to vehicle fire events based on evaluation. ***FY 2014 Plans:*** Continue to demonstrate enhanced fire protection technologies for military platforms; evaluate and verify optimized common crew Automated Fire Extinguishing System (AFES) components to establish compliance to the crew AFES requirements; integrate design of the common crew AFES into a vehicle platform demonstrator to validate integration, test, safety, and fielding requirements for common crew AFES on vehicle demonstrators designed for Occupant Centric Platforms; validate and improve common crew AFES M&S based on test results,; and enhance in-house laboratory capabilities to improve assessment and demonstration of vehicle fire protection technologies. ***FY 2015 Plans:*** Will conduct system-level evaluation of common crew AFES technologies and utilize the analysis to develop component specifications for common crew AFES; will continue to investigate integration opportunities of common crew AFES to enable AFES commonality across vehicle fleet; and will demonstrate technologies to mitigate injuries and improve damage mitigation due to thermal events.	3.892	4.468	2.063
Title: Hit Avoidance Architecture: ***Description:*** This effort establishes, matures and demonstrates the Army's Active Protection System (APS) Common Architecture that defines the component interface standards and component specifications enabling adaptable APS solutions that can	10.476	19.735	8.507

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
be integrated into multiple Army vehicle platforms. This effort matures an evaluation test-bed to enable maturation of the APS Common Architecture. This effort helps inform requirements of fielding APS including to: develop safety release criteria, identify vehicle integration constraints and engage the User to determine how hit avoidance will impact techniques, tactics and procedures. This effort is done in coordination with efforts in PEs 0602601A, 0602618A, 0603004A, 0603270A, and 0603313A. ***FY 2013 Accomplishments:*** Conducted evaluation of hardkill and softkill APS components and established component level compliance to technology system requirements; determined technology gaps in existing APS based on Department of Defense test results and previous lessons learned; evaluated the safety, integration, test, and fielding requirements for integrating hard-kill APS onto a military vehicle platform; began establishment of an open software architecture for future component and system development. ***FY 2014 Plans:*** Conduct evaluation of APS technologies and utilize the analysis to develop component specifications for APS; develop fuze board-compliant common APS command and control processor and 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 APS components during development and integration of APS component technologies with the common processor; incorporate a laser decoy countermeasure (CM) capability into an existing infrared soft-kill CM; test and mature soft-kill countermeasure. ***FY 2015 Plans:*** Will continue APS Common Architecture maturation to include of an APS common controller. Will integrate and fabricate software and hardware for the common controller, enabling integration of active protection components that accommodate varying performance and vehicle needs. Will begin integration with Hit Avoidance Technologies and conduct hardware in the loop analyses to validate common controller meets APS interface requirements. Will conduct soft-kill countermeasure environmental and live-fire assessments.			
Title: Hit Avoidance Technologies: ***Description:*** This effort matures, integrates and demonstrates hard-kill and soft-kill Active Protection System (APS) components and integrated systems to verify the APS Common Architecture described above. In demonstrating hard-kill and soft kill-active protection technologies, requirements and specifications will be matured for future integration onto tactical and combat vehicle platforms. This effort is coordinated with efforts in PEs 0602601A, 0602618A, 0603004A, 0603270A, and 0603313A. ***FY 2015 Plans:*** Will begin maturation and integration of the soft-kill countermeasure with the APS Common Architecture and APS common controller to demonstrate soft-kill defeat of anti-tank guided missiles on a combat vehicle. Will verify the soft-kill countermeasure	-	-	22.988

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 221 / *Combat Veh Survivablty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
is compliant with the APS Common Architecture interface standards. Will begin maturation and integration of a hard-kill active protection system demonstrator using the APS Common Architecture and APS common controller and hard-kill tracking sensors and countermeasures that are matured and compliant with the architecture interfaces and protocols. Will enhance hard-kill and soft-kill simulation and hardware-in-the-loop evaluation capability to exercise and test software and hardware components to inform requirements and determine trade space for hit avoidance technologies.			
Accomplishments/Planned Programs Subtotals	47.948	49.487	53.765

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 441 / *Combat Vehicle Mobilty*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
441: *Combat Vehicle Mobilty*	-	32.291	31.578	42.050	-	42.050	44.599	44.876	43.583	44.095	-	-

The FY 2015 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. This project also matures and demonstrates water and fuel logistics technologies.

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 2013	FY 2014	FY 2015
Title: Hybrid Electric Component Development:	4.256	4.987	4.278
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 (system that integrates electric machines to assist internal combustions engines for propulsion) electric propulsion and high power electric generation. Coordinated work is also being conducted under PE 0602601A, project H91 and PE 0603005A, project 497.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 441 / *Combat Vehicle Mobilty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Matured and demonstrated on board vehicle power (OBVP) components, high temperature inverters, and controls for Integrated Starter Generator (ISG) and mild hybrid power-trains. These demonstration efforts were 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 validated high voltage architecture and power quality required to support growing combat vehicle electric power requirements for future communications, networking, IED jamming and sensors. ***FY 2014 Plans:*** Integrate onboard vehicle power (OBVP) components onto the vehicles to demonstrate increased vehicle power generation capabilities; evaluate performance of vehicle with OBVP against baseline vehicle performance; evaluate reliability of hybrid vehicle components, including electric motors and controllers; and demonstrate bidirectional vehicle-to-grid power flow and mobile microgrid capability. ***FY 2015 Plans:*** Will evaluate combat vehicle performance with integrated onboard vehicle power (OBVP) technologies that verify they provide adequate onboard electrical power to enable future communications, networking, IED jamming and sensors; will implement OBVP and hybrid component control approaches to minimize vehicle performance impacts while generating significant electrical power.			
Title: Advanced Running Gear: ***Description:*** This effort matures and demonstrates running gear components and advanced suspension technologies to increase vehicle mobility and durability in response to increased ground vehicle platform weights. Components and subsystems include new elastomer compounds, lightweight, survivable track systems and road wheels, advanced compensating track tensioners, advanced damping suspension technologies, Electronic Stability Control (ESC) systems, and preview sensing technologies linked to advanced suspension designs. Coordinated work is also being conducted under PE 0602601A, project H91 and PE 0603005A, projects 221 and 497. In FY13 and FY14, this effort supports the Occupant Centric Platform program. ***FY 2013 Accomplishments:*** Integrated and demonstrated performance of an energy regenerative suspension system for a large combat wheeled vehicle platform in a controlled environment; installed, tuned, and evaluated (ESC) systems for tactical vehicles to mitigate vehicle rollover events; matured lightweight materials for track systems to reduce platform weight; demonstrated high durability, and fire resistant elastomers for combat tracked vehicle systems. ***FY 2014 Plans:*** Fabricate, evaluate and qualify lightweight track technology improvements for the Bradley Fighting Vehicle in direct support of improving vehicle occupant survivability; investigate, baseline and characterize low rolling resistance tire compounds for tactical military applications with the goal of increased fuel efficiency; mature, fabricate and laboratory test track width adjusting	5.832	5.620	2.672

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 441 / *Combat Vehicle Mobilty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
suspension systems to improve vehicle stability; and assess flush backed track designs to establish baseline data on design improvements. ***FY 2015 Plans:*** Will fabricate, install and test an external suspension system for a 60-70 ton combat application to evaluate system durability and reliability as well as vehicle performance characteristics; will mold high capacity, lightweight track compounds for heavy (60-70 ton) combat vehicle systems and perform vehicle testing to demonstrate the durability and rolling resistance reductions of these compounds; will model suspension control architectures for system control of vehicle dynamics, ride and handling.			
Title: Combat Vehicle Subsystem Demonstrations ***Description:*** This effort contributes to the Army's ground platform risk reduction efforts which seek to address technical and integration challenges in the areas of mobility, survivability, vehicle architecture and systems integration. The primary focus of this activity is to mature and demonstrate a series of subsystem demonstrators building off of previous investment in ground combat acquisition and technology programs with the purpose of maturing key technologies to refine and inform future platform requirements and reduce risks in critical ground combat vehicle technology areas. Specifically, this effort focuses on maturing and demonstrating ground combat vehicle mobility and systems integration technologies such as powertrain subsystems, vehicle structures and concept demonstrators. This effort seeks to optimize platform efficiency and growth potential to ensure the combat fleet is able to accept new technologies as they are developed to bring advanced capability for the Warfighter. This effort is executed in coordination with PEs 0602601A, 0602618A, 0603004A, and 0603125A. ***FY 2015 Plans:*** Will mature, integrate and evaluate emerging ground vehicle subsystem and component technologies for mobility, survivability and systems integration such as advanced transmission, flooring and vehicle structures to establish subsystem and component performance baselines. Will analyze the influence of emerging ground vehicle subsystem technologies on future integrated combat vehicle designs and concepts. Will conduct modeling, analysis and trade studies for next-generation ground vehicle subsystems. Will assess developmental and existing critical technology areas such as mobility, survivability and vehicle structures for optimal platform configuration. Will conduct laboratory assessment of multiple vehicle powertrain subsystems and configurations such as engines and transmissions including both conventional and hybrid powertrain approaches.	-	-	15.022
Title: Energy Storage Systems Development: ***Description:*** The goal of this work is to enable silent watch capability and increased survivability through energy storage components for electro-magnetic armor. This is accomplished through the maturation and demonstration of advanced ground vehicle energy storage devices such as advanced chemistry batteries and high energy density capacitors. This effort leverages commercial industry battery development efforts to reduce battery volume and weight while improving their energy and power densities. This effort also matures and optimizes a common specification for battery management systems to improve the battery	3.469	2.876	3.627

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 441 / *Combat Vehicle Mobilty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
state of charge indicator accuracy and battery state of health information to reduce the frequency of battery replacement and optimize starting, lighting, and ignition functions. Coordinated work is also being conducted under PEs 0602601A and 0602705A. ***FY 2013 Accomplishments:*** Demonstrated and integrated a battery monitoring and battery management system for combat and tactical vehicles to determine accurate state of charge and state of health information. Matured and demonstrated 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:*** Mature and optimize an advanced vehicle battery system with improved energy and power density; validate the battery system's performance in military mission scenarios to evaluate reduction on logistics footprint; test the system to military specifications; integrate battery system onto a vehicle platform; conduct performance characterization; and integrate second generation power brick battery into pulse power electro-magnetic armor system. ***FY 2015 Plans:*** Will optimize the improved second generation power brick battery for pulse power electro-magnetic armor system to evaluate power brick battery performance and ensure it meets military specifications; will leverage power brick battery design and testing to create concepts for modular, standardized new high energy, high voltage advanced batteries for mobility applications; and will generate common performance specifications for power brick and standardized high voltage battery systems.			
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 Direct Current (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 PEs 0602601A, 0602618A, and 0602705A. ***FY 2013 Accomplishments:*** Demonstrated first generation power brick based electro-magnetic armor system, began maturation of a second generation power brick based electro-magnetic armor system (reduced form factor) and continued development of the second generation high energy laser programmable pulse power supply. ***FY 2015 Plans:*** Will demonstrate a second generation power brick and mission module based electro-magnetic armor module. Will demonstrate multi-hit defeat with fast re-charge time capabilities in a lab environment with an electrical surrogate load. Will conduct follow-on	2.212	-	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 441 / *Combat Vehicle Mobilty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
ballistic testing of the electro-magnetic armor module to demonstrate multi-hit defeat capabilities enabled by the integrated power brick and mission module.			
Title: Non-Primary Power Systems: ***Description:*** This effort exploits, matures, and demonstrates Auxiliary Power Unit (APU) technologies such as a small modular/ scalable engine based APUs, a fuel cell reformer system to convert JP-8 to hydrogen, a sulfur tolerant JP-8 fuel cell APU, and novel engine based APUs for military ground vehicles and unmanned ground systems. This effort also establishes interface control documents for simplified integration of current and future APUs, improves reliability to reduce logistic burdens, as well as reduces acoustic signature for silent operation. Additionally, this effort exploits JP-8 fuel cell and engine APUs to optimize prime power in unmanned ground systems. Coordinated work is also being conducted under PE 0602601A, Project H91. ***FY 2013 Accomplishments:*** Demonstrated a JP-8 fuel cell APU system in a laboratory environment; improved small engine based APU performance for operational environments (shock, vibration and cooling) integrated and demonstrated technologies such as advanced muffler designs, air flow and mounting hardware to reduce APU acoustic signature; performed vehicle integration and demonstration of small engine APUs. ***FY 2014 Plans:*** Demonstrate a small engine based APU on an unmanned ground system; evaluate and select a modular/scalable small engine for use in a high power APU (25-45kW); integrate and evaluate active noise control hardware on an engine-based APU; and evaluate performance of various APU technologies for higher power applications. ***FY 2015 Plans:*** Will demonstrate a JP-8 fueled small power system integrated onto an unmanned ground system. Will integrate and demonstrate acoustic improvements of high power rotary engines for APU use. Will perform testing on high power small engines for rotary APU use. Will demonstrate the improvements of an integrated APU and Battery system to meet engine off power needs, such as power demands for silent watch, vehicle starting and communications and surveillance equipment. Will integrate a fuel cell power system onto a mobile platform to demonstrate silent mobility.	4.251	3.529	2.664
Title: Propulsion and Thermal Systems: ***Description:*** This effort matures 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 dissipation).This effort also 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	7.908	9.382	5.607

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 441 / *Combat Vehicle Mobilty*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
mobility requirements on combat and tactical vehicles. Lastly, this effort maximizes efficiencies within propulsion and thermal systems to reduce thermal burden on the vehicle while providing the same or greater performance capability. ***FY 2013 Accomplishments:*** Matured, fabricated and integrated components for high output, power-dense combat and tactical vehicle powertrain subsystems; conducted evaluation of advanced powertrain systems utilizing highly efficient transmissions and advanced algorithms and control strategies for combat and tactical vehicles; evaluated the integration of energy recovery components onto powertrain subsystems to determine system performance characteristics and engine performance issues associated with integration; matured power take off (PTO) system and fan control strategies for increased efficiency in combat vehicle engine cooling performance. ***FY 2014 Plans:*** Perform advanced powertrain subsystems 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; evaluate waste heat recovery technologies at a system level in a laboratory environment for performance validation; complete the power take off (PTO) system and fan control strategies for increased efficiency in engine cooling performance. ***FY 2015 Plans:*** Will mature and model an advanced powertrain system utilizing a highly efficient transmission and engine and incorporating advanced algorithms and control strategies to enhance energy efficiencies and performance capabilities for future combat vehicles.			
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, generation, quality monitoring, storage and distribution and wastewater treatment and reuse; petroleum quality monitoring, filtration, storage and distribution, hydraulic fluids; alternative fuels and fuel additives; lubricants, oil, power train fluids and coolants. This effort is done in coordination with efforts in PE 0602601A. ***FY 2013 Accomplishments:*** Matured wastewater treatment and recycling technology for demonstration in a field environment; demonstrated successful in-line water quality monitoring capability in a lab environment; characterized alternative fuels and fuel additives that improve performance and diversify energy sources; assessed the impact of using emerging alternative fuels in tactical equipment to identify and address potential changes needed in military fuel specifications; created and evaluated Petroleum, Oils and Lubricants to meet new military technology requirements such as anti-lock brakes and semi-active suspension, while exceeding	4.363	5.184	4.680

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
future and legacy equipment performance and technical requirements; evaluated nanocoolants, gear oils and hydraulic fluids which promote improved energy efficiencies and are longer lasting. ***FY 2014 Plans:*** Conduct performance assessments of waste water treatment and recycling technologies; further mature and demonstrate in-line water quality and process monitoring capability equivalent to the Water Quality Analysis Set - Purification; characterize selected alternative fuels and fuel additives to improve performance and diversify energy sources; assess the suitability of candidate alternative fuels in military ground systems; evaluate lower viscosity gear oils and hydraulic fluids that increase fuel efficiency through a reduction in hydro-dynamic friction; and continue evaluation of candidate Petroleum, Oil, Lubricants and coolants to meet new military technology requirements. ***FY 2015 Plans:*** Will conduct demonstrations of waste water treatment and recycling technologies in a field environment. Will demonstrate expanded in-line water quality and process monitoring capability to address pathogens and toxins such as giardia, cryptosporidium, and pesticides. Will characterize selected alternative fuels and fuel additives to improve performance and diversify energy sources; will evaluate candidate long life coolants designed to reduce the overall logistics burden and meet emerging requirements of military ground systems; and will evaluate fluid distribution composite hose technologies to improve logistical burdens of deploying fuel and water pipeline systems.			
Accomplishments/Planned Programs Subtotals	32.291	31.578	42.050

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 497 / *Combat Vehicle Electro*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
497: *Combat Vehicle Electro*	-	5.907	7.349	7.146	-	7.146	6.709	7.166	7.200	7.250	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Vehicle Electronics Integration Technologies:	2.200	4.342	3.288
Description: This effort matures, demonstrates and implements next generation military ground vehicle electronics and electrical power open architectures for future ground combat vehicle systems. Technologies matured and demonstrated include: next generation video/data networking and computing equipment, Silicon Carbide (SiC) high voltage power electronics and low voltage smart power distribution. Technologies will reduce currently fielded vehicle overall SWAP concerns for vehicle electronics. This effort is coordinated with efforts in PE 0602601A, project H91.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 497 / *Combat Vehicle Electro*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Finalized analysis of multiple combat vehicle architectural requirements; determined applicable power and electronics architectural vehicle functions; defined combat vehicle system states/modes; allocated functions to the states/modes and data and electrical power subsystems; fabricated a reconfigurable combat vehicle cab with simulation capability to house the next generation hardware and software technologies in a laboratory environment. ***FY 2014 Plans:*** Complete preliminary power and data maturation activities; continue to mature the architecture design such as activity and sequence diagrams, use cases, and mission scenarios, as well as produce system operation descriptions and define both physical and data component interfaces for the network and power hardware and software subsystems; begin optimization activities for electronics and electrical power component selection and/or fabrication for reconfigurable combat vehicle cab simulation. ***FY 2015 Plans:*** Will further mature and begin implementation of next generation military ground vehicle electronics and electrical power open architectures; conduct market/trade analysis and integrate applicable high and low voltage vehicle power components, command, control, communications, and combat vehicle computing hardware and software necessary for full architecture system functionality into a reconfigurable combat vehicle cab simulation.			
Title: Vehicle Electronics Architecture and Standards:	3.707	3.007	3.858
Description: This effort matures technologies and standards for existing and future combat and tactical ground vehicles. Open commercial standards will be evaluated and modified for use in military ground vehicles and possible inclusion in the Army's open, non-proprietary intra-vehicle data network e.g., Vehicular Integration for C4ISR/EW Interoperability (VICTORY). This effort will also test and evaluate standards and components for suitability of integration into vehicle platforms. This effort also supplements the design of electronic architectures to support the efficient integration of electronic components into vehicle systems through the use of open standards. Additionally, this effort matures and expands the VICTORY effort to interface with the Modular APS Architecture. This effort is coordinated with PEs 0602601A, Project H91 and 0603005, Projects 221 and 441. ***FY 2013 Accomplishments:*** Continued maturation of open vehicle electronics architectures and standards (VICTORY) to address future component integration requirements for military ground vehicles; completed VICTORY System Integration Laboratory (SIL) development to enable component compliance and interoperability evaluation against VICTORY version 1.4 standards. ***FY 2014 Plans:*** Continue to mature and refine the VICTORY standards and open architecture; begin improvement of the VICTORY SIL for compatibility with VICTORY standard version 1.6 to support component compliance testing to the latest VICTORY standard			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 497 / *Combat Vehicle Electro*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
release; mature next generation open vehicle architecture by performing analysis of current VICTORY standards for application to combat vehicle architectures. ***FY 2015 Plans:*** Will complete update of VICTORY SIL to version 1.6 and begin update of VICTORY SIL to VICTORY standard version 1.7 to demonstrate component compliance testing to latest VICTORY release. Mature and demonstrate current VICTORY interfaces (1.6 vs. 1.7) to support next generation open vehicle architectures in preparation for a data and computing architecture demonstration in FY16.			
Accomplishments/Planned Programs Subtotals	5.907	7.349	7.146

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 515 / *Robotic Ground Systems*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
515: *Robotic Ground Systems*	-	7.466	8.578	7.070	-	7.070	7.609	6.937	10.128	10.660	-	-

The FY 2015 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 autonomy enabling Unmanned Ground Vehicle (UGV) technologies including sensor technologies, perception hardware and software, and control technologies that allow the Soldier to perform other mission tasks more efficiently. 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 autonomy enabled vehicles protecting themselves and their surroundings from intruders. Mature technologies are incorporated onto existing, Army-owned UGV technology demonstrators so that performance of the enabling technologies can be evaluated.

The approach builds upon, complements, and does not duplicate previous and ongoing investments conducted under the Joint Robotics Program Office.

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 2013	FY 2014	FY 2015
Title: Unmanned Ground Systems Technology:	7.466	8.578	7.070
Description: This project matures, integrates and demonstrates advanced robotic and autonomous technologies for the tactical and combat vehicle fleets. Unmanned ground systems technologies can be employed to overcome critical Army challenges to include automated resupply and sustainment, improved tactical intelligence, and reduced physical and cognitive burden. Challenges can 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, object and local environment manipulation, local situational awareness, advanced perception, vehicle and pedestrian safety, and robotic command and control. This effort is coordinated with efforts in PEs 0602601A, project H91 and 0603005, projects 441 and 497. In FY13 and FY14, this effort supports the Occupant Centric Platform program.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	**Project (Number/Name)** 515 / *Robotic Ground Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Integrated scalable autonomy kits and control interfaces into tactical wheeled vehicles to increase Soldier safety, operational efficiency and effectiveness and culminated with technical demonstrations of this technology in a relevant environment; began integration of scalable autonomy kits and control interfaces onto wheeled combat vehicles to increase Soldier and system performance, operational tempo and mission effectiveness. ***FY 2014 Plans:*** Mature and integrate advanced autonomous maneuver, active safety and Soldier load reduction hardware, software, algorithms, control interfaces, and sensor payloads onto demonstrator vehicles to substantiate optionally manned/unmanned vehicle missions and validate emerging safety methodology and tactics, techniques and procedures; 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 operational environment; 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. ***FY 2015 Plans:*** Will mature and integrate autonomy-enabling technologies to include: drive-by-wire systems, vehicle active safety technologies, mission packages, and related software, algorithms and control interfaces. Will validate emerging safety methodologies and tactics, techniques and procedures. Will mature and integrate higher level intelligent behaviors to increase Soldier safety, operational efficiency, effectiveness, and manned/unmanned teaming. Will further integration of components and systems compliant with interoperability standards onto manned/unmanned platforms to increase re-use and reduce costs of current/future systems.			
Accomplishments/Planned Programs Subtotals	7.466	8.578	7.070

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 533 / *Ground Vehicle Demonstrations*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
533: *Ground Vehicle Demonstrations*	-	-	25.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Program Increase ***Description:*** This is a Congressional Interest Item. ***FY 2014 Plans:*** Program Increase	-	25.000	-
Accomplishments/Planned Programs Subtotals	-	25.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603005A / *Combat Vehicle and Automotive Advanced Technology*	Project (Number/Name) 53D / *NAC Demonstration Initiatives (CA)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
53D: *NAC Demonstration Initiatives (CA)*	-	34.851	25.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Alternative Energy Research	34.851	25.000	-
Description: This is a Congressional Interest Item.			
FY 2013 Accomplishments: Matured and demonstrated Grid Services Optimization; Non-Rare-Earth Materials for Motors; Thermoelectric Enabled Engine; Light Weight Vehicle Structures; Roll-up/Roll-away vehicle based power distribution & management system; Computer Aided Engineering for Batteries; novel lubricant formulations; Multi Material Joining; Advanced high efficiency flexible solar generation; Deployable Metering and Monitoring System; Alternative Fuel Certification for Aviation			
FY 2014 Plans: Alternative Energy Research			
Accomplishments/Planned Programs Subtotals	34.851	25.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603006A / *Space Application Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	3.702	5.862	6.883	-	6.883	5.592	3.928	4.049	5.194	-	-
592: *Space Application Tech*	-	3.702	5.862	6.883	-	6.883	5.592	3.928	4.049	5.194	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to Congressional General Reductions (-6 thousand); SBIR/STTR transfers (-94 thousand); Sequestration reductions (-355 thousand)
FY14 adjustments attributed to FFRDC reductions (-4 thousand) and Congressional Add (5.0 million) funding

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 global assured access enabling distributed tactical 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 Command/Army Forces Strategic Command (USASMDC/ARSTRAT) Technical Center in Huntsville, AL.

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603006A / *Space Application Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	4.157	5.866	6.879	-	6.879
Current President's Budget	3.702	5.862	6.883	-	6.883
Total Adjustments	-0.455	-0.004	0.004	-	0.004
• Congressional General Reductions	-0.006	-0.004			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.094	-			
• Adjustments to Budget Years	-	-	0.004	-	0.004
• Sequestration	-0.355	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603006A / *Space Application Advanced Technology*	Project (Number/Name) 592 / *Space Application Tech*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
592: *Space Application Tech*	-	3.702	5.862	6.883	-	6.883	5.592	3.928	4.049	5.194	-	-

The FY 2015 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.

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 Command/Army Forces Strategic Command (USASMDC/ARSTRAT) Technical Center in Huntsville, AL. This program is designated as a DoD Space Program.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Payload Technology Development	3.702	5.862	6.883
Description: This effort matures technologies for smaller, Warfighter-responsive sensor and communication payloads for use in space environments.			
FY 2013 Accomplishments: Demonstrated Beyond Line of Sight (BLOS) data communications and data exfiltration with on-orbit technical validation and EO imaging small satellites; integrated propulsion with advanced small satellite deployment capability; matured and demonstrated small satellite tasking and command and control functions in a laptop device.			
FY 2014 Plans: 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.			
FY 2015 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603006A / *Space Application Advanced Technology*	**Project (Number/Name)** 592 / *Space Application Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will conduct low cost launch vehicle engine and rocket stage performance validation; demonstrate suborbital launch, to include rocket and supporting range equipment; validate space-based mission command functionality for imaging spacecraft architecture, affordable launch technical control, and affordable launch fire control.			
Accomplishments/Planned Programs Subtotals	3.702	5.862	6.883

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603007A *I Manpower, Personnel and Training Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	8.756	7.796	13.580	-	13.580	12.719	14.367	14.787	15.222	-	-
792: *Personnel Performance & Training*	-	8.756	7.796	13.580	-	13.580	12.719	14.367	14.787	15.222	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to Congressional Reductions (-19 thousand); SBIR/STTR transfers (-188 thousand); and Sequestration reductions (-893 thousand).
FY15 funding increased for human behavioral research.

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 FY15 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603007A / *Manpower, Personnel and Training Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	9.856	7.800	7.070	-	7.070
Current President's Budget	8.756	7.796	13.580	-	13.580
Total Adjustments	-1.100	-0.004	6.510	-	6.510
• Congressional General Reductions	-0.019	-0.004			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.188	-			
• Adjustments to Budget Years	-	-	6.510	-	6.510
• Sequestration	-0.893	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603007A / *Manpower, Personnel and Training Advanced Technology*	Project (Number/Name) 792 / *Personnel Performance & Training*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
792: *Personnel Performance & Training*	-	8.756	7.796	13.580	-	13.580	12.719	14.367	14.787	15.222	-	-

The FY 2015 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 and demonstrates advanced behavioral and social science technologies that enhance the Soldier Lifecycle (e.g., selection, assignment, training, leader development) and human relations (e.g., culture of dignity, respect, and inclusion) . These technologies provide advanced personnel measures that more fully assess potential and predict performance, behavior, attitudes, and resilience. These technologies also provide innovative and effective training and mentoring methods to ensure Soldiers, leaders, and units have the knowledge, skills, and abilities to sustain positive unit climates and meet mission requirements in uncertain and complex environments. This PE validates new selection measures and performance metrics, assesses innovative training methods, and conducts scientific assessments to inform Human Capital policy and programs. Research in this PE will result in effective non-materiel solutions to help the Army adjust to changes in force size and structure, a variety of mission demands and contexts, challenges in human relations, and budgetary constraints.

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

Work in this project complements and is fully coordinated with 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 Human Capital Strategy.

Work in this PE 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 2013	FY 2014	FY 2015
Title: Personnel Assessment	2.058	2.590	3.397
Description: This effort, previously titled "Personnel Technology," 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 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603007A / *Manpower, Personnel and Training Advanced Technology*	**Project (Number/Name)** 792 / *Personnel Performance & Training*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Matured and assessed improved non-cognitive measures for enlisted selection and classification; performed validation checks and updated enlisted longitudinal databases. ***FY 2014 Plans:*** Initiating validation of non-cognitive measures (e.g., temperament) to better match enlisted Soldiers to jobs (involves large-scale data collection and analysis, job/task analysis, and predictive modeling) across multiple job types. ***FY 2015 Plans:*** Will validate non-cognitive measures as predictors of success (e.g., attrition, performance, attitudes) for enlisted Soldiers as well as non-commissioned officers (NCOs) in special assignments; will identify strategies for conducting classification analyses. Will initiate research to develop enhanced suitability screening for military positions of trust (e.g., Sexual Harassment/Assault Response and Prevention Coordinators, Drill Sergeants.			
Title: Personnel Readiness, Performance and Conduct ***Description:*** This effort, previously titled, "Training and Leader Development," matures methods to assess, enhance, and sustain individual and unit readiness, resilience, and effectiveness to improve Soldier and unit performance. This effort also develops efficient and empirically valid measures to assess command climate and associated outcomes, and matures methods to enable leaders and units to maintain or create climates of respect, dignity and inclusion. ***FY 2013 Accomplishments:*** Matured methods to assess the effectiveness of training tools to develop adaptive Soldiers and leaders (e.g., tactical decision making and judgment proficiency); matured training applications for operational units (e.g., visual threat detection, human terrain mapping) and designed methods for training instructors to leverage emerging learning technologies. ***FY 2014 Plans:*** Developing 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; expanding training approaches for operational units using live/virtual/constructive environments to train a broad range of military operations. ***FY 2015 Plans:*** Will initiate research to prevent sexual harassment and assault through more effective training and mentoring methods. Will initiate research on valid measures of command climates of dignity, respect, and inclusion. Will validate Army instructor methods and techniques to improve instructor skills.	6.698	5.206	10.183
Accomplishments/Planned Programs Subtotals	8.756	7.796	13.580

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603007A / *Manpower, Personnel and Training Advanced Technology*	**Project (Number/Name)** 792 / *Personnel Performance & Training*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603008A *I Electronic Warfare Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	45.254	45.394	44.871	-	44.871	46.431	46.145	48.306	50.022	-	-
TR1: *TAC C4 Technology Int*	-	27.636	29.072	29.802	-	29.802	31.737	30.034	32.145	31.181	-	-
TR2: *Secure Tactical Information Integration*	-	17.618	11.322	15.069	-	15.069	14.694	16.111	16.161	18.841	-	-
TR8: *C3 DEMONSTRATIONS (CA)*	-	-	5.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to Congressional General Reductions (-78 thousand); SBIR/STTR transfers (1.203 million); and Sequestration reductions (-4.126 million)
FY15 increases for wireless personal area network research efforts.

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 and networked transceivers 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; 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, services, software and algorithms to protect tactical wired and wireless networks against modern network attacks; generate and distribute tactical cyber situational awareness; and focuses on configuration, operation, monitoring, defense and network reconstitution in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions.

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 0602783A (Computer and Software Technology), PE 0603001A (Warfighter Advanced Technology), PE0603270A (Electronic Warfare 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603008A / *Electronic Warfare Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	50.661	40.416	35.523	-	35.523
Current President's Budget	45.254	45.394	44.871	-	44.871
Total Adjustments	-5.407	4.978	9.348	-	9.348
• Congressional General Reductions	-0.078	-0.022			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.203	-			
• Adjustments to Budget Years	-	-	9.348	-	9.348
• Sequestration	-4.126	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603008A / *Electronic Warfare Advanced Technology*	Project (Number/Name) TR1 / *TAC C4 Technology Int*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
TR1: *TAC C4 Technology Int*	-	27.636	29.072	29.802	-	29.802	31.737	30.034	32.145	31.181	-	-

The FY 2015 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, transceivers, transceiver components, networking software and novel techniques to provide secure, reliable, mobile network solutions that function in complex and diverse terrains. This project concentrates on four 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 lower the size, weight power and cost of wireless networking systems deployed on Army platforms; to provide critical improvements in the ability to communicate and move large amounts of information in radio frequency (RF) contested environments, in a seamless, integrated manner across 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 Maneuver, Air and Soldier/Squad 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 2013	FY 2014	FY 2015
Title: Antenna Technologies	4.764	2.615	1.845
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 satellite communication (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 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR1 / *TAC C4 Technology Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Fabricated and demonstrated 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; demonstrated K/Ka/Q band antenna integrated with the Ka/Q band power amplifier (PA) in a relevant environment; designed and fabricated 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:*** 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. ***FY 2015 Plans:*** Will design, fabricate and evaluate distributed On-the-Move (OTM) SATCOM antenna arrays to enable extension of high throughput satellite connectivity to tactical combat vehicles without interfering with weapons and targeting systems; develop a Government standard architecture for distributed SATCOM arrays to enable interoperability between various transceivers and antenna arrays.			
Title: RF Interoperability Through Convergence ***Description:*** This effort designs transceiver hardware and software standard and proof of concept that will reduce size, weight, power and cost of multiple communications and EW systems on tactical platforms. The standard and proof of concept demonstration takes advantage of common components within the communications and EW systems to define the internal and external interfaces to communications and EW devices. The effort includes implementing and publishing a reference architecture and associated specifications for a modular, open systems approach for integrating military communications and EW devices. Work being accomplished under PE 603270A/project K16 compliments this effort. ***FY 2015 Plans:*** Will mature the radio reference architecture, specification and application program interfaces (API) to standardize radio modules and minimize life cycle cost of Army tactical communications devices on tactical vehicles; demonstrate, in a lab environment, a subset of communication systems components in an integrated package using the matured specification and API; investigate expansion of the reference architecture to include EW systems.	-	-	3.000
Title: C4ISR On-The-Move (OTM) ***Description:*** This effort provides a venue for the demonstration of new and emerging C4ISR technologies. This venue performs risk mitigation and technology assessments by evaluating the Technology Readiness Levels (TRLs) of candidate Army science and technology (S&T) and best of Industry efforts to support tactical network modernization.	8.139	9.205	8.941

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR1 / *TAC C4 Technology Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Assessed the capability, functionality, and performance of network integrated architectures and emerging technologies and capabilities that support the Army Brigade Combat Team Modernization Plan and Network Modernization Strategy; finalized and executed an assessment of new technologies and hybrid/bridging architectures for Capability Sets 13/14; conducted initial planning for and developed assessment strategies for Capability Sets 15/16 and the associated programmed increments of Joint Tactical Radio System (JTRS) (Mounted & Dismounted), Warfighter Information Network-Tactical (WIN-T), and Nett Warrior programs of record; provided a representative system of systems environment/venue to evaluate technical progress, assessed the next generation of technologies, facilitated technology transition, and performed field based risk mitigation in preparation for candidate assessment/selection for future Army Network Integration Exercise (NIE) events by assessing the TRL of Army S&T and best of industry efforts maturing in the FY13 timeframe to include Fourth Generation Long Term Evolution (4G LTE) to the edge, Soldier Radio Waveform spectrum reutilization, secure telemedicine and first look at S&T applications on the WIN-T Inc 2 infrastructure; continued to support research and development (R&D) of enabling Future Force capabilities and accelerated such capabilities to enhance and modernize the current force. ***FY 2014 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 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. ***FY 2015 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; conduct red team assessment of network technologies and architectures, assess the next generation of Army technologies and facilitate transition of S&T efforts with particular emphasis on enhancing field robustness and simplifying network set up and maintenance processes; perform risk mitigation and TRL assessment of Army S&T programs and best of industry efforts maturing in the FY15 timeframe; support the associated programmed increments of WIN-T and Nett Warrior.			
Title: Wireless Mobile Networking ***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 Satellite Communication	11.303	8.316	8.266

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR1 / *TAC C4 Technology Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
(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. 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 2013 Accomplishments:*** Matured, integrated and assessed all-digital strategic ground terminal, consisting of digital transmitter and receiver interfaces, all-digital receiver and baseband signal processor; fabricated all-digital transmitter; integrated and matured government-off-the-shelf (GOTS) applique with commercial-off-the-shelf (COTS) third generation (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; demonstrated militarized smart devices in a field relevant environment. ***FY 2014 Plans:*** 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 algorithms to improve spectral efficiency, network robustness and resistance to 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 interface (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. ***FY 2015 Plans:*** Will complete integration of all digital strategic ground terminal components and demonstrate improved bandwidth utilization at reduced size, weight and power; using the all digital strategic ground terminal, demonstrate SATCOM spectrum monitoring and control, and integrate RF signal modulation techniques to enable improved SATCOM performance against jamming; complete implementation of signals management module software; complete modifications to Soldier Radio Waveform (SRW) and radio operating environment to support frequency hopping at timeslot boundaries using parameters chosen by the software; integrate, test, and demonstrate signal management software with SRW modifications to support simultaneous communications and blue force jamming.			
Title: Network Operations (NetOps)	3.430	3.936	2.750

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR1 / *TAC C4 Technology Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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 2013 Accomplishments:*** Matured and coded software that integrates network visualization tools on touch-screen environments with network information correlation tools that enhance interoperability among disparate NetOps tools; assessed the accuracy and usability of visualization and correlation tools in the laboratory and through user feedback, and modified the software to improve the effectiveness of the new tool set; matured a software engine that translates network information sources to any format for use by network correlation tools. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will complete integration of decision software tools and processes for configuring tactical network components with existing network monitoring tools and demonstrate the capability to visualize the function and health of the multi-tiered network; demonstrate reduced cycle times to automatically generate network configurations and anomaly corrections.			
Title: Networking technologies for Wireless Personal Area Networks (WPAN) ***Description:*** This effort develops and matures wireless personal area network (WPAN) technology for the Soldier in a manner 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:*** 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,	-	5.000	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR1 / *TAC C4 Technology Int*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
radios, weapon sites, information displays and Soldier-borne sensors to develop a WPAN without impacting the size, weight power and cost of these devices. ***FY 2015 Plans:*** Will complete evaluation of multiple WPAN design solutions for performance, reliability and security; finalize specification and architecture development of WPAN hardware interfaces and software; establish WPAN standards for security and interface development; perform lab, RF chamber, and field electromagnetic compatibility, low probability of intercept and low probability of detection validation; conduct field evaluations of selected design(s) on multiple Soldier Systems.			
Accomplishments/Planned Programs Subtotals	27.636	29.072	29.802

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603008A / *Electronic Warfare Advanced Technology*	Project (Number/Name) TR2 / *Secure Tactical Information Integration*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
TR2: *Secure Tactical Information Integration*	-	17.618	11.322	15.069	-	15.069	14.694	16.111	16.161	18.841	-	-

The FY 2015 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 that focus on tactical cyber situational awareness, autonomous network defense, cross domain security and encryption solutions. Efforts focus on configuration, operation, monitoring, defense and network reconstitution in bandwidth constrained tactical environments while reducing the operator workload required to conduct these functions. This project codes, optimizes, and demonstrates software based technologies for intrusion detection, high assurance internet protocol (IP) encryption, seamless communications across security boundaries, as well as information sharing across operations and intelligence functions. These capabilities to automate, protect, monitor, report and access cyber elements of the tactical network are intended to greatly reduce Soldier burden and protect the Army's tactical network by building upon enterprise solutions from commercial, Department of Defense, Department of the Army and other government agencies. This project cumulatively builds science and technology capabilities in accordance with Army Cyber Material Development Strategy and the Office of the Secretary of Defense Cyber Community of Interest.

This project supports Army science and technology efforts in the Command, Control, Communications and Intelligence, Ground Maneuver, Air and Soldier/Squad 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 2013	FY 2014	FY 2015
Title: Collaborative Battle Management	6.021	-	-
Description: This effort matures and demonstrates Mission Command software to improve sharing and understanding of data between the intelligence and operations communities.			
FY 2013 Accomplishments: Coded, assessed and demonstrated collaboration and interoperability services such as the ability to interface Joint Battle Command Platform (JBC-P) vehicle variable message format chat with Defense Information Systems Agency-standard Extensible Messaging and Presence Protocol text chat in support of the Army Common Operating Environment; fabricated/coded and			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR2 / *Secure Tactical Information Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
assessed multi-touch mission command (MC) applications such as an electronic sand table that streamlines and improves the ability to plan, wargame and monitor Army missions; coded assessed and integrated software information assurance techniques into MC software to reduce vulnerabilities; matured and validated 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: Information Assurance ***Description:*** This effort matures and demonstrates technologies that create new methods for proactively defending resource constrained tactical wireless networks against cyber attack using nontraditional methodologies. Work being performed under PE / projects 0602782/H92 and 0602783/Y10 complement this effort. ***FY 2013 Accomplishments:*** Demonstrated 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; coded and demonstrated an intrusion detection system (IDS) response component that collaborates with an information operations (IO) response component to ascertain the source of a network attack; demonstrated IDS software agents operating on host platforms and across the network using a common network protection architecture; demonstrated a cyber toolkit for computer network defense (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; adapted and demonstrated military grade security for use on commercial smart devices like smartphones and tablets; optimized and implemented security software standards on Army networks to provide a trustworthy operating environment for commercial smart devices; coded and matured automated analysis functionalities to assure software is clean of malicious content and vulnerabilities introduced by poor software coding techniques; validated 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:*** 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 ; 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 capability to seamlessly integrate Army software assurance tools with those developed by other	11.597	11.322	15.069

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603008A / *Electronic Warfare Advanced Technology*	**Project (Number/Name)** TR2 / *Secure Tactical Information Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
DoD laboratories; design and code protection software tools for server components and design and code network security controls for the tactical cloud computing environment. ***FY 2015 Plans:*** Will mature and code software algorithms to differentiate between stealthy attacks and software coding errors to reduce the vulnerability in software applications; demonstrate dynamic moving target defense internet protocol (IP) and port network hopping techniques; demonstrate software to dynamically modify operating systems and applications to make it more difficult for an adversary to exploit Army networks; demonstrate moving target defense capability management software tools; demonstrate integration of IP and port hopping with existing protection capabilities; encode and demonstrate user behavior and operating system anomaly sensors, and anomaly based learning algorithms to provide protection against zero day malware; demonstrate ability to leverage tactical systems to augment local cyber situational awareness; demonstrate dissemination and correlation of offensive and defensive cyber data within the intelligence enterprise to enable tactical defensive cyber operations; investigate cloud based security architectures to enable self monitoring and healing of cloud security services that can perform rapid battle damage assessment and rapidly apply security services against threats; mature, fabricate and demonstrate an anti-tamper key loader for devices that use subscriber identity modules and smart cards; design and instantiate security architectures for multi-functional waveforms and converged communications and electronic warfare transceivers.			
Accomplishments/Planned Programs Subtotals	17.618	11.322	15.069

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603008A / *Electronic Warfare Advanced Technology*	Project (Number/Name) TR8 / *C3 DEMONSTRATIONS (CA)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
TR8: *C3 DEMONSTRATIONS (CA)*	-	-	5.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

Due to a database error, the FY14 Congressional increase appropriated in PE 0603006 appears here.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for C3 Demonstrations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Congressional Add ***Description:*** Congressional Add ***FY 2014 Plans:*** Congressional Add	-	5.000	-
Accomplishments/Planned Programs Subtotals	-	5.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603009A / *TRACTOR HIKE*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	6.792	9.161	7.492	-	7.492	7.557	8.126	8.705	8.743	-	-
B18: *DB18*	-	3.915	4.323	7.492	-	7.492	7.557	8.126	8.705	8.743	-	-
B31: *DB31*	-	2.877	4.838	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 decreases attributed to Congressional General Reductions (-15 thousand); Sequestrtion Reductions (-719 thousand) and reprogrammings (-1600 million) to other higher priority Army programs

FY 15 decrease (-1541 million) attributed to realignment to other higher priority Army programs

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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	9.126	9.166	9.033	-	9.033
Current President's Budget	6.792	9.161	7.492	-	7.492
Total Adjustments	-2.334	-0.005	-1.541	-	-1.541
• Congressional General Reductions	-0.015	-0.005			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.600	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.541	-	-1.541
• Other Adjustments 1	-0.719	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603009A / *TRACTOR HIKE*				Project (Number/Name) B18 / *DB18*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
B18: *DB18*	-	3.915	4.323	7.492	-	7.492	7.557	8.126	8.705	8.743	-	-

The FY 2015 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 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603009A / *TRACTOR HIKE*				Project (Number/Name) B31 / *DB31*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
B31: *DB31*	-	2.877	4.838	-	-	-	-	-	-	-	-	-

The FY 2015 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 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603015A *I Next Generation Training & Simulation Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	15.404	13.620	16.749	-	16.749	17.553	17.852	17.937	21.081	-	-
S28: *Immersive Learning Environments*	-	2.498	2.570	2.737	-	2.737	3.144	3.278	3.124	4.183	-	-
S29: *Modeling & Simulation - Adv Tech Dev*	-	3.905	6.441	8.886	-	8.886	9.280	6.974	7.076	8.112	-	-
S31: *Modeling And Simulation Infrastructure Technology*	-	9.001	4.609	5.126	-	5.126	5.129	7.600	7.737	8.786	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to Congressional General reductions (-22 thousand); SBIR/STTR transfers (-471 thousand) and Sequestration reductions (-1.360 million)
FY15 increase for immersive training demonstrations.

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 Technologies (ICT)at the University of Southern California. 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 0602785A (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 U.S. 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	17.257	13.627	13.316	-	13.316
Current President's Budget	15.404	13.620	16.749	-	16.749
Total Adjustments	-1.853	-0.007	3.433	-	3.433
• Congressional General Reductions	-0.022	-0.007			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.471	-			
• Adjustments to Budget Years	-	-	3.433	-	3.433
• Sequestration	-1.360	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*	Project (Number/Name) S28 / *Immersive Learning Environments*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
S28: *Immersive Learning Environments*	-	2.498	2.570	2.737	-	2.737	3.144	3.278	3.124	4.183	-	-

The FY 2015 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 for Creative Technologies (ICT) University Affiliated Research Center (UARC) at the University of Southern California to develop training demonstrators. These demonstrators focus on urban operations, asymmetric warfare, resilience and rehabilitation to support Warfighting units and Army Institutions (U. S. Army Training and Doctrine Command (TRADOC) and U.S. Army Medical Command (MEDCOM)). 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 (PE) 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 U.S. Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Immersive Techniques for Training Applications	2.498	2.570	2.737
Description: This effort demonstrates and matures technological advancements from PE 0602308A/Project D02 into complex state-of-the-art simulation environments in support of multi-student and team training applications.			
FY 2013 Accomplishments: Developed technologies to fully immerse Soldiers in various environments; assessed the use of distributed mobile platforms for the delivery of training software and applications to training subjects; and validated the effectiveness relative to fixed platforms.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S28 / *Immersive Learning Environments*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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; and explore advanced display technologies to prototype new low cost immersive displays for virtual training environments. ***FY 2015 Plans:*** Will investigate visual perception technologies and effects and use findings to incorporate more natural human perception/ performance in virtual training environments; and demonstrate how technologies that capture the essence of high performing instructors can be used to improve virtual classroom instruction.			
Accomplishments/Planned Programs Subtotals	2.498	2.570	2.737

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*	Project (Number/Name) S29 / *Modeling & Simulation - Adv Tech Dev*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
S29: *Modeling & Simulation - Adv Tech Dev*	-	3.905	6.441	8.886	-	8.886	9.280	6.974	7.076	8.112	-	-

The FY 2015 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 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; 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 Corps forces.

Efforts in this program element (PE) 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 U.S. Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Embedded Techniques	3.905	6.441	7.886
Description: This effort matures and demonstrates capabilities (most provided from PE 0602308A/project C90) built into or added onto operational systems, subsystems, or equipment, to enhance as well as maintain the skill proficiency of Soldiers, and maximizes component commonality among combat vehicles and Soldier computer systems.			
FY 2013 Accomplishments: Integrated component level sensors for tracking Soldier movement, and augmented reality for dismounted Soldier immersive training environments; and commenced planning for technology experiments, demonstrations and evaluations in FY14 of enhanced embedded training environments. Completed analysis and began development of individual components for			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S29 / *Modeling & Simulation - Adv Tech Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
dismounted Soldier and embedded training technology. The technology included predictive technologies, artificial intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic environment and sensors for locomotion and gesturing. ***FY 2014 Plans:*** Design embedded training components (e.g. predictive simulation) for current and future Command and Control systems for both mounted and dismounted; design components for advance sensor technology for locomotion and gesturing; advance and mature technology for developing artificial intelligence behaviors for interactive characters in a mixed kinetic/non-kinetic training scenario within a dismounted squad virtual game environment; and advance and conduct experimentation with tactile feedback technology. ***FY 2015 Plans:*** Will mature component design of algorithms for course of action embedded training on current and future command and control systems; mature component design of advance sensor technology for locomotion and gesturing, tactile feedback technology, and artificial intelligence behaviors for computer generated forces to simulate dismounted squads; and validate component technology maturity in relevant simulation environments. This effort develops virtual, mixed and augmented technologies for dismounted Soldier training.			
Title: Training Effectiveness ***Description:*** This research addresses the effectiveness of training Soldiers and teams in an immersive environments. This effort will research and develop simulations to determine the interaction of realism, immersion, acceptance, and training effectiveness. A baseline of the key dimensions of realism and immersion for current training systems will be developed and will be extended to generate guidelines for the development of future training technologies. Cost effectiveness of these training components will also be considered. ***FY 2015 Plans:*** Will identify impacts and tradeoffs associated with training effectiveness using current (training) simulation architectures and the expected training effectiveness associated with using future virtual, mixed, and augmented reality training technologies.	-	-	1.000
Accomplishments/Planned Programs Subtotals	3.905	6.441	8.886

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S29 / *Modeling & Simulation - Adv Tech Dev*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603015A / *Next Generation Training & Simulation Systems*				Project (Number/Name) S31 / *Modeling And Simulation Infrastructure Technology*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
S31: *Modeling And Simulation Infrastructure Technology*	-	9.001	4.609	5.126	-	5.126	5.129	7.600	7.737	8.786	-	-

The FY 2015 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 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 focuses 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.

Efforts in this program element (PE) 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 U.S. Army Research Laboratory (ARL), Human Research and Engineering Directorate, Simulation and Training Technology Center (STTC), Orlando, Florida.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Advanced Distributed Simulation Environments	9.001	4.609	5.126
Description: In FY14, this effort is renamed from Modeling Architecture for Technology, Research, and Experimentation (MATRIX) to Advanced Distributed Simulation Environments to reflect this effort's evolution of simulation technologies. This effort matures and demonstrates modeling and simulation technologies and techniques that support training and experimentation to assess and support system acquisition and military planning decision-making and System of Systems (SoS) architecture, technology tradeoffs, etc.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S31 / *Modeling And Simulation Infrastructure Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Matured the SoS architecture concept for analysis, event management, and simulation initialization for use throughout the Army and DoD to save time and money across a wider scope of SoS; exploited and refined next generation architectures demonstrating advances in computer science to support future training, experimentation, and acquisition decisions tools; demonstrated computer cloud technologies to increase the ability to better use and distribute M&S application services to users; investigated capabilities to demonstrate the use of data from a central authoritative source maintained by other DoD agencies to expand distributed capabilities beyond Army data sources; and refined 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:*** Refine and mature SoS 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 demonstrate a Soldiers-as-a-Service simulation (illustrating relevance of human factors data to training); identify hardware and software solutions that decrease dependence on third party solutions; formalize M&S in a cloud environment (M&S as a service tool for training and mission rehearsal simulations across geographically distributed areas); provide a tool to rapidly configure and run training simulations by maturing and translating simulations from complex scenario definitions and databases; mature and refine M&S tools targeted towards Program Executive Office for Simulation, Training and Instrumentation (PEO STRI) simulation needs. ***FY 2015 Plans:*** Will mature and demonstrate SoS simulation architecture technologies for integrating Army and DoD simulation and training programs; demonstrate an initial distributed Soldier simulation providing a more complete representation of the Soldier by including effects such as culture, individual stress, resilience, social and family relationships, individual and unit decision making, and effects on performance; mature and demonstrate M&S as a cloud-based service that supports training and mission rehearsal simulations across geographically distributed areas; advance and refine simulation and training technologies in support of the Army next generation training initiatives; and mature and transition M&S hardware and software solutions targeted towards PEO STRI simulation needs.			
Accomplishments/Planned Programs Subtotals	9.001	4.609	5.126

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603015A / *Next Generation Training & Simulation Systems*	**Project (Number/Name)** S31 / *Modeling And Simulation Infrastructure Technology*

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603020A / *Tractor rose*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	8.762	10.662	14.483	-	14.483	12.000	12.000	12.000	12.017	-	-
B84: *DB84*	-	2.259	2.499	2.540	-	2.540	-	-	-	-	-	-
DB1: *DDB1*	-	6.503	8.163	11.943	-	11.943	12.000	12.000	12.000	12.017	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 decreases attributed to Congressional Undistributed reductions (-12 thousand); Reprogrammings to other higher priority Army programs (-830 thousand); and Sequestration reductions (-321 thousand)

FY 15 reductions (-3000 million) attributed to realignment to other higher priority Army programs

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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	9.925	10.667	17.483	-	17.483
Current President's Budget	8.762	10.662	14.483	-	14.483
Total Adjustments	-1.163	-0.005	-3.000	-	-3.000
• Congressional General Reductions	-0.012	-0.005			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.830	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-3.000	-	-3.000
• Other Adjustments 1	-0.321	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603020A / *Tractor rose*				Project (Number/Name) B84 / *DB84*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
B84: *DB84*	-	2.259	2.499	2.540	-	2.540	-	-	-	-	-	-

The FY 2015 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 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603020A / *Tractor rose*				Project (Number/Name) DB1 / *DDB1*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
DB1: *DDB1*	-	6.503	8.163	11.943	-	11.943	12.000	12.000	12.000	12.017	-	-

The FY 2015 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 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603105A *I MILITARY HIV RESEARCH*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	20.920	-	-	-	-	-	-	-	-	-	-
H29: *Med Protect Agnst Hiv*	-	6.228	-	-	-	-	-	-	-	-	-	-
T16: *MILITARY HIV INITIATIVES CA*	-	14.692	-	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to increase for Congressional Add funding (+16.0 million); SBIR/STTR transfers (-188 thousand); and Sequestration reductions (-1.846 million)

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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603105A / *MILITARY HIV RESEARCH*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	6.984	-	-	-	-
Current President's Budget	20.920	-	-	-	-
Total Adjustments	13.936	-	-	-	-
• Congressional General Reductions	-0.030	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	16.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.188	-			
• Sequestration	-1.846	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603105A / *MILITARY HIV RESEARCH*				Project (Number/Name) H29 / *Med Protect Agnst Hiv*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
H29: *Med Protect Agnst Hiv*	-	6.228	-	-	-	-	-	-	-	-	-	-

The FY 2015 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 the Walter Reed Army Institute of Research, 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 2013	FY 2014	FY 2015
Title: HIV Program	6.228	-	-
Description: This project funds research to develop candidate HIV vaccines, assess their safety and effectiveness in evaluations with human subjects, and protect military personnel from risks associated with HIV infection.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603105A / *MILITARY HIV RESEARCH*	**Project (Number/Name)** H29 / *Med Protect Agnst Hiv*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Conducted initial safety studies in humans with candidate vaccines consisting of multiple subtypes in clinical trial sites in Asia and Africa and conducted 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	6.228	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army										Date: March 2014		
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603105A / *MILITARY HIV RESEARCH*				Project (Number/Name) T16 / *MILITARY HIV INITIATIVES CA*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
T16: *MILITARY HIV INITIATIVES CA*	-	14.692	-	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: HIV Research ***Description:*** This is a Congressional Interest Item. ***FY 2013 Accomplishments:*** HIV Research	14.692	-	-
Accomplishments/Planned Programs Subtotals	14.692	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603125A / *Combating Terrorism - Technology Development*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	9.199	15.046	24.270	-	24.270	27.722	27.894	25.094	25.383	-	-
DF5: *Agile Integration & Demonstration*	-	9.199	15.046	24.270	-	24.270	27.722	27.894	25.094	25.383	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY15 increases for Technology Systems Adaptive Red Teaming, Ground Platform Subsystem Demonstrations, and Ground Vehicle Power and Energy research.

A. Mission Description and Budget Item Justification

This Program Element demonstrates technologies with high payoff potential to address current technology shortfalls or future capability gaps. Efforts include: hybrid electric power technologies to reduce use of fossil fuel generators; technology development to provide significant gains in ground vehicle energy efficiency; 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 risks in operationally-representative environments and against potential threats.

This Program Element 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 0602270A (Electronic Warfare Technology), PE 0602303A (Missile Technology), PE 0602618A (Ballistics Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602784A (Military Engineering Technology), 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603270A (Electronic Warfare 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 Program Element is performed by the Army Research, Development, and Engineering Command (RDECOM) and the Army Engineer Research and Development Center (ERDC).

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603125A / *Combating Terrorism - Technology Development*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	9.716	15.054	10.136	-	10.136
Current President's Budget	9.199	15.046	24.270	-	24.270
Total Adjustments	-0.517	-0.008	14.134	-	14.134
• Congressional General Reductions	-0.013	-0.008			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.282	-			
• Adjustments to Budget Years	-	-	14.134	-	14.134
• Sequestration	-0.222	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603125A / *Combating Terrorism - Technology Development*	Project (Number/Name) DF5 / *Agile Integration & Demonstration*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
DF5: *Agile Integration & Demonstration*	-	9.199	15.046	24.270	-	24.270	27.722	27.894	25.094	25.383	-	-

The FY 2015 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 capability gaps. Efforts include: hybrid electric power technologies to reduce use of fossil fuel generators; initiatives to improve the transition of power and energy technologies into commercial and military marketplaces; technology development to provide significant gains in ground vehicle energy efficiency; 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 risks in operationally-representative 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 0602270A (Electronic Warfare Technology), PE 0602303A (Missile Technology), PE 0602618A (Ballistics Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602784A (Military Engineering Technology), 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603270A (Electronic Warfare Technology), PE 0603710A (Night Vision Advanced Technology), and PE 0603734A (Military Engineering Advanced Technology).

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

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Hybrid Intelligent Power (HI Power)	4.648	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 are plug-and-play to enable faster power grid setup times and to eliminate human error as well as to reduce soldier planning burden.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603125A / *Combating Terrorism - Technology Development*	**Project (Number/Name)** DF5 / *Agile Integration & Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Validated performance of autonomous hybrid power grid architectures and advanced control hardware and software; fabricated and demonstrated a universal generator and Environmental Control Unit (ECU) modification (MOD) kit to enable automatic start/ stop controls; fabricated microgrid power management hardware representative Brigade tactical operations center and integrated for user assessments; completed a draft performance specification. ***FY 2014 Plans:*** Continue to define 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	4.551	5.053	5.060
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, and PE 0603734A. ***FY 2013 Accomplishments:*** Designed and conducted a series of live experiments in representative operational environments, bringing together soldiers, special operators, and technology and capability developers to stress and improve force protection systems for small bases in austere environments. Assessed and integrated over 40 technology systems into scenarios at Camp Roberts, CA, Fort AP Hill, VA, Camp Blanding, FL, and Playas, NM.; systems included small radars, facial recognition sensors, unmanned aerial vehicles with small sensor payloads, entry control point screening and containment, perimeter security, hostile fire detection sensors, tactical assault kit, and integrated sensor architecture (ISA), among others. Introduced SOUTHCOM scenarios into experiments, adding to CENTCOM and AFRICOM scenarios; introduced challenge events to identify potential technology and employment vulnerabilities during denial of service attacks/conditions. Designed and executed black swan and "moneyball" table top experiments in conjunction with live exercises to examine deep futures concepts. Created initial adaptability dimensions for Warfighter Technology Tradespace Methodology (WTTM) to more explicitly assess the impact of systems design and integration on warfighters' ability to innovate locally as situations unfold; implemented WTTM for new, live scenarios reflecting distributed operations, introducing added stressors to expose vulnerabilities. Assessed, stressed, and affected improvements on force protection systems being deployed with units/teams, as well as those less mature and under development, including Android Tactical Assault Kit, Integrated Raw Sensor Data to Information, Simple Warning and Instant Forecasting Tool, and shot detection devices. ***FY 2014 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603125A / *Combating Terrorism - Technology Development*	**Project (Number/Name)** DF5 / *Agile Integration & Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will increase focus on active defense measures for small expeditionary units based on critical threats associated with one or two high-priority operational environments; will develop and integrate critical measures of success into the Warfighter technology tradespace methodology to include assessing systems' means to adapt, as well as new measures specific to one or two select new theaters; will expand quantitative protocols for field-based experiments; will implement narrative-based modeling and assessment tool for Warfighter feedback on technologies to expose and eliminate barriers affecting technology acceptance and use; will conduct a series of experiments using live and virtual scenarios and coordinated demonstrations to identify, expose, and mitigate system vulnerabilities; will leverage ongoing activities with units such as Special Operations Teams where possible to conduct in-country assessments and garner feedback on performance of high-priority systems.			
Title: Technology Systems 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 system 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, performance degradation in congested/contested environments, interoperability, and adaptability. This effort is coordinated with program element 0602618A, 0602270A and 0603270A. ***FY 2014 Plans:*** Select developing technology systems for demonstration and evaluation; analyze emerging threats and select high-priority threats for use in system experimentation; develop a set of experiments to stress performance and identify potential vulnerabilities when employed; incorporate Soldiers from a variety of Military Occupation Specialties to acquire user feedback; apply and expand the	-	4.996	9.134

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603125A / *Combating Terrorism - Technology Development*	**Project (Number/Name)** DF5 / *Agile Integration & Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Warfighter technology tradespace methodology and analysis; and provide feedback to inform technology development, systems integration, training, logistics and employment. ***FY 2015 Plans:*** Will utilize stakeholder analysis, operational scenarios and findings from technology vulnerability assessments to identify three to four high-priority developmental systems that support Army acquisition programs within areas such as intelligence, surveillance, and reconnaissance (ISR), electronic warfare, and/or communications. Will conduct in-depth, phased assessments that incorporate near-peer threats and live experiments with Warfighters to stress the systems under different scenarios and uncover vulnerabilities pertaining to systems integration, interoperability, adaptability and technology employment. Will recommend means to harden systems against vulnerabilities and reduce risks arising from operational and logistics contexts.			
Title: Ground Platform Subsystem Demonstrations ***Description:*** This effort contributes to the Army's ground platform risk reduction efforts which seek to address technical and integration challenges in the areas of mobility, survivability, vehicle architecture and systems integration. Specifically, this effort focuses on maturing and demonstrating vehicle power management, generation and distribution technologies to increase ground vehicle energy efficiencies and ensure ground platforms have enough power to enable future capabilities such as electromagnetic armor, active protections systems, IED detect and defeat technologies, advanced situational awareness and future network integration technologies. This effort is coordinated with PE 0603005A. ***FY 2015 Plans:*** Will conduct analysis of vehicle architecture and power systems. Will evaluate Government and contractor developed platform architectures and conduct trades studies, analysis and interface testing to ensure common power architecture designs meet known future vehicle power requirements. Will update VICTORY architecture standards to drive next generation combat platform data and electrical architectures to enable affordable future upgrade capability for the combat fleet. Will investigate advanced capability in platform power management and electrical power generation and distribution while reducing parasitic thermal burdens on the vehicle system.	-	-	5.000
Title: Ground Vehicle Power and Energy ***Description:*** This effort matures and demonstrates advanced technologies that enable military ground vehicles to become significantly more energy efficient. It collaborates with the U.S. Department of Energy to demonstrate technologies in: advanced combustion engines and transmissions; lightweight structures and materials; energy recovery and thermal management; alternative fuels and lubricants; hybrid propulsion systems; batteries and energy storage; and analytical tools (e.g., modeling and simulation). This effort is coordinated with program element 0602601A. ***FY 2015 Plans:***	-	-	5.076

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603125A / *Combating Terrorism - Technology Development*	**Project (Number/Name)** DF5 / *Agile Integration & Demonstration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will support the Advanced Vehicle Power Technology Alliance (AVPTA) to mature advanced modeling tools to understand the behavior of batteries at the component, cell and module/pack levels and aid future efforts to develop new energy storage systems; conduct reliability studies utilizing military form factor advanced chemistry batteries to drive military standards into the commercial sectors, with the intent to reduce the Army cost of advanced batteries; investigate advanced lightweight materials and demonstrate advanced manufacturing techniques to reduce platform structural weight and drive down associated costs; and leverage significant investments in commercial trucking industry to demonstrate fuel efficient and active safety technologies for Army tactical vehicles.			
Accomplishments/Planned Programs Subtotals	9.199	15.046	24.270

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603130A / *TRACTOR NAIL*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	3.207	3.192	3.440	-	3.440	2.398	2.357	2.399	2.415	-	-
DS8: *Tractor Nail*	-	3.207	3.192	3.440	-	3.440	2.398	2.357	2.399	2.415	-	-

The FY 2015 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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	3.487	3.194	3.440	-	3.440
Current President's Budget	3.207	3.192	3.440	-	3.440
Total Adjustments	-0.280	-0.002	-	-	-
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Other Adjustments 1	-0.280	-0.002	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603131A / *TRACTOR EGGS*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	2.560	2.366	2.406	-	2.406	2.447	2.486	2.530	2.546	-	-
DS9: *Tractor Eggs*	-	2.560	2.366	2.406	-	2.406	2.447	2.486	2.530	2.546	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 decreases attributed to Congressional General Reductions (-3 thousand); Sequestration Reductions (-186 thousand); and reprogrammings (-426 thousand) to other higher Army priorities

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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	2.323	2.367	2.404	-	2.404
Current President's Budget	2.560	2.366	2.406	-	2.406
Total Adjustments	0.237	-0.001	0.002	-	0.002
• Congressional General Reductions	-0.003	-0.001			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.426	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.002	-	0.002
• Sequestration	-0.186	-	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603270A / *Electronic Warfare Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	19.561	25.335	26.057	-	26.057	31.652	30.471	32.877	34.116	-	-
K15: *Advanced Comm Ecm Demo*	-	9.018	9.946	8.606	-	8.606	7.489	7.648	9.828	9.961	-	-
K16: *Non-Commo Ecm Tech Dem*	-	10.543	15.389	17.451	-	17.451	24.163	22.823	23.049	24.155	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to Congressional General Reductions (-37 thousand); SBIR/STTR transfers (-451 thousand); and Sequestration reductions (-1.634 million)
FY15 increase for Active Protection System threat detection sensors and electronic countermeasure techniques.

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 0602601A (Combat Vehicle and Automotive Technology), PE 0602618A (Ballistics Technology), PE 0603003A (Aviation Advanced Technology), PE 0603004A (Weapons and Munitions Advanced Technology), PE 0603005A (Combat Vehicle and Automotive Advanced Technology), PE 0603008A (Electronic Warfare Advanced Technology) and PE 0603313A (Missile and Rocket Advanced Technology).

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

Work in this PE is performed by the 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603270A / *Electronic Warfare Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	21.683	25.348	22.188	-	22.188
Current President's Budget	19.561	25.335	26.057	-	26.057
Total Adjustments	-2.122	-0.013	3.869	-	3.869
• Congressional General Reductions	-0.037	-0.013			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.451	-			
• Adjustments to Budget Years	-	-	3.869	-	3.869
• Sequestration	-1.634	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603270A / *Electronic Warfare Technology*	Project (Number/Name) K15 / *Advanced Comm Ecm Demo*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
K15: *Advanced Comm Ecm Demo*	-	9.018	9.946	8.606	-	8.606	7.489	7.648	9.828	9.961	-	-

The FY 2015 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/Squad, Ground Maneuver 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 2013	FY 2014	FY 2015
Title: Offensive Operations	4.694	4.976	4.908
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 2013 Accomplishments: Developed and demonstrated supporting messaging structures and human-machine interfaces to enable remote users to coordinate the planning and management of electronic warfare (EW) assets; finalized specifications and protocols to support			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K15 / *Advanced Comm Ecm Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
the collaborative on-the-move (OTM) EW functionality of future tactical EW systems; developed cyber situation awareness functionality for non-traditional tactical cyber/EW assets. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will mature techniques to enable tagging, tracking and locating missions for combined cyber/EW signals and entities of interest; mature and demonstrate joint cyber/EW architecture for combined mission operation; integrate and mature cyber/EW and signals intelligence capability into an airborne platform and assess utility of conducting missions with all three capabilities simultaneously.			
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. ***FY 2013 Accomplishments:*** Examined 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; analyzed and identified new waveforms, techniques and common hardware components needed to facilitate integration and modularity of an integrated multi-INT system; composed sensor cross cueing algorithms to increase the probability of detection of threat devices with low or indistinct emissions at greater standoff distances; extended detection capability to monitor multiple threat device emissions/transmissions simultaneously. ***FY 2014 Plans:*** 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 Distributed Common Ground Station-Army (DCGS-A) program of record for greater area situational awareness. ***FY 2015 Plans:***	4.324	4.970	3.698

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K15 / *Advanced Comm Ecm Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will develop methods to efficiently cue collocated EO/IR sensors with an RF direction finding capability; mature hardware platform that enables an RF direction finding cueing of a collocated EO/IR sensor and conduct validation assessments of system performance; finalize methods to export data to DCGS-A; demonstrate capability to supply data to the intel enterprise in a relevant environment to provide tactically relevant data to the Soldier.			
Accomplishments/Planned Programs Subtotals	9.018	9.946	8.606

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603270A / *Electronic Warfare Technology*	Project (Number/Name) K16 / *Non-Commo Ecm Tech Dem*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
K16: *Non-Commo Ecm Tech Dem*	-	10.543	15.389	17.451	-	17.451	24.163	22.823	23.049	24.155	-	-

The FY 2015 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 Maneuver, Air and Soldier/Squad 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 2013	FY 2014	FY 2015
Title: Distributed Aperture Infrared Countermeasures (DAIRCM) Technologies	4.540	4.012	4.235
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 2013 Accomplishments: Modified the pointer tracker optics to broaden the wavelength coverage from near to mid-IR to allow for simultaneous jam and receive capability; integrated modified optics and design; coded and integrated jam/receive deconfliction algorithms into pointer tracker system; demonstrated closed-loop interrogation techniques against seekers in a hardware-in-the-loop laboratory environment; conducted limited field assessment of closed-loop interrogation techniques against simulated IR missiles.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K16 / *Non-Commo Ecm Tech Dem*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will mature and fabricate a brassboard of a wideband RF warning sensor capable of detecting and identifying modern radar threat systems to airborne platforms; conduct lab testing of brassboard RF warning sensor to evaluate sensor capabilities using RF simulation hardware and software to determine effectiveness against emerging threats and document limitations in performance to enable the development of additionally required functionality.			
Title: Advanced Tactical Radio Frequency Countermeasures (ATRFCM) Technologies ***Description:*** This effort matures and demonstrates integrated EW/direction finding technologies that provide protection of air, ground and dismounts from emerging RF threats at standoff distances. Work accomplished under PE 0602120A/project H15, PE 0602270A/project 906, and PE 0603270A/project K15 complements this effort. ***FY 2013 Accomplishments:*** Enhanced software and firmware of advanced EW demonstration platform to implement and demonstrate coordinated detect/defeat capability; demonstrated increased threat coverage and protection range offered by distributed, cooperative jamming capability for protection of convoys; developed dynamic, local area timing schemes to support simultaneous/multi-function EW/defensive electronic attack (EA) capabilities; designed logic circuitry and associated software code to integrate electronic support (ES) and EA functionalities in a coordinated ES/EA capability. ***FY 2014 Plans:*** 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 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. ***FY 2015 Plans:*** Will mature techniques and architecture design to further improve interoperability between RF threat detection and neutralization systems with other systems on the platform such as communications, networking and Global Positioning System/navigation;	4.070	4.762	4.835

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K16 / *Non-Commo Ecm Tech Dem*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
design, encode and mature algorithms and architecture elements to allow for the sharing of RF and computational resources between various systems that are collocated on a platform.			
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. ***FY 2013 Accomplishments:*** Integrated interrogation (RF with weapons orientation sensors) capability to increase probability of positive friend, enemy, neutral, non-combatant identification at increased ranges; modified wireless personal area network waveforms and Soldier Radio Waveform to transmit RF position location information to existing mobile/handheld displays; modified existing weapons system software to add audible, tactile and visual cues into weapon sight for display; improved CID training mode with electronic bullet capability for existing hardware to support both mission execution and training functions; exploited multiple sensor (infrared, RF, etc.) integration to support non-cooperative CID. ***FY 2014 Plans:*** 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 Waveform, weapons orientation module and multifunction laser; document and assess user feedback and make appropriate component and integration modifications; mature non-cooperative target identification techniques.	1.933	3.115	-
Title: EW Counter Countermeasures ***Description:*** This effort matures and demonstrates hardware and software to counter emerging electronic warfare threats to command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) platforms. Work being accomplished under PE 0602270A/project 906 compliments this effort. ***FY 2014 Plans:*** Leverage technical assessments of a family of threat systems and conduct a full vulnerability assessment on these systems, generate potential mitigation strategies, determine associated concept of operations and employment scenarios; mature and	-	3.500	3.500

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K16 / *Non-Commo Ecm Tech Dem*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will extend capability to conduct hardware in the loop testing of a family of threat systems in a laboratory environment; assess current and emerging red force interference/jamming sources and characterize their performance and conduct modeling and simulation and hardware in the loop testing to determine the extent of potentially harmful effects on blue force EW/C4ISR sensors; generate candidate countermeasure techniques to neutralize these threat systems.			
Title: Active Protection System (APS) Soft Kill ***Description:*** This effort matures and demonstrates hardware, software and techniques to provide an EW soft kill capability to the APS suite. This effort supports the Army's APS program to mature and demonstrate technologies to reduce vehicle weight by reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection, and active countermeasures to achieve increased protection against current and emerging threats. Work being accomplished under PE 0602601A/project C05, PE 0602618A/project H80, PE 0603004A/project 232, PE 0603005A/project 221 and PE 0603313A/ project 263 compliments this effort. ***FY 2015 Plans:*** Will mature sensor based threat detection, classification, tracking, warning and electronic countermeasure techniques in support of the APS science and technology program; conduct modeling and simulation (M&S) of potential electronic APS capabilities to evaluate and document potential system performance in operational scenarios.	-	-	4.131
Title: Integrated RF Operations ***Description:*** This effort matures and demonstrates a capability to perform M&S of geographically dispersed RF systems to provide a coordinated, collaborative and interoperable suite of EW capabilities. A modular software architecture will allow for rapid, cost effective development and integration of new EW capabilities, target signals of interest and environmental simulations. Work being accomplished under PE 603008A/project TR1 compliments this effort. ***FY 2015 Plans:*** Will extend existing RF modeling and simulation capabilities to accurately depict the interaction between EW systems and selected signals of interest (SOI); extend the M&S capability to enable new EW techniques and threat SOI to be rapidly and accurately developed within the model environment to analyze the interaction between EW systems and various targets; validate the extended models and simulations to ensure accuracy and performance.	-	-	0.750
Accomplishments/Planned Programs Subtotals	10.543	15.389	17.451

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603270A / *Electronic Warfare Technology*	**Project (Number/Name)** K16 / *Non-Commo Ecm Tech Dem*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	80.379	83.975	44.957	-	44.957	53.312	59.974	64.907	64.154	-	-
206: *Missile Simulation*	-	1.906	2.298	1.765	-	1.765	1.744	1.702	1.742	1.757	-	-
263: *Future Msl Tech Integr(FMTI)*	-	51.902	54.916	32.403	-	32.403	31.274	37.494	41.973	42.235	-	-
704: *Advanced Missile Demo*	-	4.722	6.761	10.789	-	10.789	20.294	20.778	21.192	20.162	-	-
G03: *Area Defense Advanced Technology*	-	4.897	-	-	-	-	-	-	-	-	-	-
NA6: *Missile and Rocket Initiatives (CA)*	-	16.952	20.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to Congressional General Reductions (-124 thousand); Congressional Add funding (19.0 million); SBIR/STTR transfers (-2.480 million) and Sequestration reductions (-7.128 million)
FY14 adjustments attributed to FFRDC reduction (-34 thousand) and Congressional Add funding (20.0 million)

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 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. NA6 is a congressional increase.

Work in this PE is complimentary to PE 0602303A (Missile Technology), and is fully coordinated with PE 0602618A (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 0603125A (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 2015 Army	Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*	**R-1 Program Element (Number/Name)** 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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	71.111	64.009	42.647	-	42.647
Current President's Budget	80.379	83.975	44.957	-	44.957
Total Adjustments	9.268	19.966	2.310	-	2.310
• Congressional General Reductions	-0.124	-0.034			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	19.000	20.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.480	-			
• Adjustments to Budget Years	-	-	2.310	-	2.310
• Sequestration	-7.128	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*	Project (Number/Name) 206 / *Missile Simulation*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
206: *Missile Simulation*	-	1.906	2.298	1.765	-	1.765	1.744	1.702	1.742	1.757	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Missile Simulation	1.906	2.298	1.765
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 2013 Accomplishments: Improved simulation fidelity, run-time, integration time, and visualization capabilities including: reuse and validation of HWIL simulation modules to reduce integration time and cost; reduced the run-time required for higher fidelity scene generation, and completed HWIL modifications to allow for varying radio frequency waveforms.			
FY 2014 Plans: 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.			
FY 2015 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 206 / *Missile Simulation*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will design a radio frequency scene generation algorithm and begin hardware/software integration into hardware-in-the-loop to support testing of advanced MMW sensors. Will design an integrated, cohesive sensor development modeling and simulation environment to significantly reduce seeker design and development timeline. Will complete missile life-cycle cost model tool, optimized for use during the S&T phase of technology development to design in cost saving features.			
Accomplishments/Planned Programs Subtotals	1.906	2.298	1.765

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*	Project (Number/Name) 263 / *Future Msl Tech Integr(FMTI)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
263: *Future Msl Tech Integr(FMTI)*	-	51.902	54.916	32.403	-	32.403	31.274	37.494	41.973	42.235	-	-

The FY 2015 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 costs and 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 0602618A (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 2013	FY 2014	FY 2015
Title: Small Organic Precision Munition Integrated Technology	9.563	10.223	-
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 2013 Accomplishments: Continued to integrate image stabilization and people tracking algorithms with small seeker, conducted flight demonstration in surrogate munition to demonstrate improved tracking performance, then completed algorithm optimization based on demonstration results; integrated small form-factored laser ranging height of burst sensor, less sensitive omni-directional warhead,			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 263 / *Future Msl Tech Integr(FMTI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
and fuze optimized for lethal effects against personnel and soft targets, then evaluated effectiveness in obscured environments; integrated secure digital data link in surrogate munition and conducted hardware-in-the-loop evaluation; evaluated form-factored power source over operating temperature range to demonstrate increased shelf-life. ***FY 2014 Plans:*** 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: 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), Unmanned 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. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC) and other Air and Missile Defense programs. ***FY 2013 Accomplishments:*** Increased the software capability and updated the Technical Fire Control nodes based on analysis from the guided flight demonstrations of single RAM threats and supported multiple flight demonstrations for both interceptor concepts; integrated updated Technical Fire Control components with interceptor guidance sections and Tracking and Fire Control system components for pre-flight evaluation in HWIL; conducted 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 updated system simulation based on HWIL evaluation and flight demonstration results. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:***	7.882	6.560	2.732

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 263 / *Future Msl Tech Integr(FMTI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will continue refinements and enhancements of Technical Fire Control nodes for Counter RAM, UAS, and Cruise Missile interceptors based on current threat analysis. Will use these Technical Fire Control nodes to conduct virtual flight tests against emerging threats in HWIL.			
Title: Guided Interceptor Concept Technology for defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missiles ***Description:*** This effort demonstrates a Guided missile-based Interceptor concept initially focused to defeat 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, , UAS and/or Cruise Missile Tracking and Fire Control, in PE 0603313A Project 704, tracks the 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. The technologies demonstrated will be applicable to the Indirect Fire Protection Capability (IFPC),and other Air and Missile Defense programs. ***FY 2013 Accomplishments:*** Continued the fabrication and integration of command Guided Interceptors for flight demonstration; integrated with the Technical Fire Control node and Tracking and Fire Control System; and updated the interceptor design and system simulation based on HWIL evaluation and flight test results. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Complete Critical Design Reviews for alternative components for Guided interceptors to defeat UAS and Cruise Missile. Will test form-factor components in HWIL to provide pre-flight predictions and reduce risk Updates and refinements of the system simulation will be performed based on performance demonstrated in HWIL pre-flight predictions.	14.349	17.496	7.342
Title: Hit-to-Kill Interceptor Concept Technology for Defense against Rockets, Artillery, and Mortars (RAM), Unmanned Aerial Systems (UAS), and Cruise Missiles	20.108	16.884	7.001

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 263 / *Future Msl Tech Integr(FMTI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Description: This effort demonstrates a compact, very light weight, radar and alternative frequency guided Hit-to-Kill (HTK) 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). ***FY 2013 Accomplishments:*** Continued fabrication and integration of Hit-to-Kill Interceptors and launch systems; integrated with the Technical Fire Control and Tracking and Fire Control system; conducted pre-flight HWIL evaluation of each Hit-to-Kill interceptor to ensure successful flight demonstration; performed multiple guided flight demonstrations of live-fire shoot down of single and dual RAM threat targets; and updated the system simulation based on HWIL evaluation and flight demonstration results. ***FY 2014 Plans:*** Continue flight tests of the 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. ***FY 2015 Plans:*** Will continue flight tests of the semi-active Hit-to-Kill (HTK) interceptor. Will complete the testing of the components for an active seeker for HTK to provide a Fire Control independent solution. Will complete the fabrication and HWIL testing of the active seeker for HTK.			
Title: Javelin Command Launch Unit (CLU) with External Far Target Locator (FTL)	-	1.200	-
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 effort transitions, integrates, and demonstrates technology from PE 0602303A, Project 214, "Smaller, Lighter, Cheaper Tactical			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 263 / *Future Msl Tech Integr(FMTI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Missile Technologies" and "Micro Inertial Navigation Sensor for Networked Javelin Command Launch Unit (CLU) with Far Target Locator (FTL)". ***FY 2014 Plans:*** 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.			
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. This effort continues in FY15 in PE 0603313A, Project 704. ***FY 2014 Plans:*** 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.	-	2.553	-
Title: Low Cost Tactical Extended Range Missile ***Description:*** This effort focuses on design, fabrication, and demonstration of technologies for low-cost precision fires missile capable of deep strike engagements. The aim is to provide extended range and expanded target set capability through advanced propulsion, new payload technology, and maintain effectiveness in Global Positioning System (GPS) challenged environments through new and novel navigation technologies. ***FY 2015 Plans:*** Will conduct trade studies through simulation to determine subsystem requirements for delivery of enhanced lethal effects to long range targets; evaluate the target sets at various ranges and match payload technologies with the threat sets; match propulsion technologies with range and missile size; evaluate emerging navigation technologies for GPS challenged environments; evaluate requirements for compatibility with both current and future long range launch systems.	-	-	5.200
Title: Active Protection System Interceptor Demonstration ***Description:*** This effort matures, integrates and demonstrates modular hard-kill APS technologies with the Hit Avoidance Architecture and APS Common Controller. Specifically the hard kill APS portion and modeling and simulation efforts will be addressed by AMRDEC. This effort supports the Army's Active Protection System (APS) program to mature and demonstrate	-	-	3.125

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 263 / *Future Msl Tech Integr(FMTI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
APS technologies to reduce vehicle weight while reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection, and active countermeasures to achieve increased protection against current and emerging threats. This effort supports the development of an APS Common Architecture enabling adaptable APS solutions that can be integrated across Army vehicle platforms as required. Work being accomplished under PE 0602601A/Project C05, PE 0602618A/Project H80, PE 0603004A/Project 232, PE 0603005A/Project 221, and PE 0603270A/Project K16 compliments this effort. ***FY 2015 Plans:*** Will begin integration of a modular hard-kill active protection sub-system (including countermeasures, detection sensors, and tracking sensors) with a common controller through a common architecture for use in an integrated survivability suite on a combat vehicle.			
Title: Hunter Killer Missile Demonstration ***Description:*** This effort focuses on the designs, fabrication, integration, Hardware-in-the-Loop (HWIL) tests, and flight demonstration of technology for an affordable discriminate extended range precision missile to include critical component technologies such as advanced propulsion, seekers, fire control, datalink, guidance and controls, and airframes will be matured for demonstration. ***FY 2015 Plans:*** Will conduct trade studies to determine subsystem requirements. Will identify critical components and begin designing and maturation of those critical components such as propulsion, datalink, and tracker. Will begin development of system-level modeling and simulation necessary to mature and evaluate concepts for prediction of system capability across a broad spectrum of missions. Will evaluate fire control requirements and identify key technologies.	-	-	7.003
Accomplishments/Planned Programs Subtotals	51.902	54.916	32.403

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*	Project (Number/Name) 704 / *Advanced Missile Demo*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
704: *Advanced Missile Demo*	-	4.722	6.761	10.789	-	10.789	20.294	20.778	21.192	20.162	-	-

The FY 2015 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 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 2013	FY 2014	FY 2015
Title: Counter Rockets, Artillery, Mortars (RAM), unmanned aerial systems (UAS), and Cruise Missile Tracking and Fire Control	4.722	6.761	5.503
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) and other Air and Missile Defense programs.			
FY 2013 Accomplishments: 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 Cruise Missile threat and feeds that information to the technical fire control node to generate a firing solution			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 704 / *Advanced Missile Demo*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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) and other Air and Missile Defense programs. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will demonstrate and assess performance utilizing existing counter RAM, UAS, and Cruise Missile tracking and fire control systems networked information against the full range of target types (RAM, UAS, Cruise Missile), scenarios and multiple engagements utilizing simulations and HWIL.			
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 to enable interceptor integration into a net-enabled Air and Missile Defense Task Force and protection of assets. Technologies will be designed for the defeat of tactical UAS and Cruise Missile threats with secondary capabilities against Large Caliber Rockets (LCR), Short Range Ballistic Missiles (SRBM), and Tactical Air-to-Surface Missiles (TASMS) and to be interoperable with existing Integrated Air and Missile Defense (IAMD) System. This effort continues from 0603313A, Project 263 in FY14. ***FY 2015 Plans:*** Will complete initial design of a medium- to long-range interceptor including identifying critical interceptor technology and component performance requirements. Will begin development of interceptor component technologies to include propulsion, seeker, guidance, navigation and controls and begin development of an interceptor simulation.	-	-	5.286
Accomplishments/Planned Programs Subtotals	4.722	6.761	10.789

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** 704 / *Advanced Missile Demo*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*	Project (Number/Name) G03 / *Area Defense Advanced Technology*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
G03: *Area Defense Advanced Technology*	-	4.897	-	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Deployable Force Protection Missile Technology	4.897	-	-
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 2013 Accomplishments: Completed integration of missile systems with fire control technologies to demonstrate an integrated base protection system; and conducted demonstration of integrated fire control, missile systems, sensor systems, and other systems in a base protection role.			
Accomplishments/Planned Programs Subtotals	4.897	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603313A / *Missile and Rocket Advanced Technology*	**Project (Number/Name)** G03 / *Area Defense Advanced Technology*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603313A / *Missile and Rocket Advanced Technology*				Project (Number/Name) NA6 / *Missile and Rocket Initiatives (CA)*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
NA6: *Missile and Rocket Initiatives (CA)*	-	16.952	20.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Missile and Rocket advanced technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Program Increase	16.952	20.000	-
Description: This is a Congressional Interest Item ***FY 2013 Accomplishments:*** Matured, fabricated, and demonstrated advanced rocket, missile, interceptor, and guided munition technologies to enhance weapon system lethality, survivability, agility, deployability, and affordability. ***FY 2014 Plans:*** Mature, fabricate, and demonstrate advanced rocket, missile, interceptor, and guided munition technologies to enhance weapon system lethality, survivability, agility, deployability, and affordability.			
Accomplishments/Planned Programs Subtotals	16.952	20.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603322A / *TRACTOR CAGE*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	12.026	11.077	11.105	-	11.105	11.080	11.183	11.386	11.462	-	-
B92: *DB92*	-	12.026	11.077	11.105	-	11.105	11.080	11.183	11.386	11.462	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 adjustments attributed to Congressional General Reductions (-17 thousand); Sequestration reductions (-863 thousand); and internal Army reprogramming actions (2.0 million)

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 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	10.902	11.083	11.099	-	11.099
Current President's Budget	12.026	11.077	11.105	-	11.105
Total Adjustments	1.124	-0.006	0.006	-	0.006
• Congressional General Reductions	-0.017	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.004	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.006	-	0.006
• Other Adjustments 1	-0.863	-0.006	-	-	-

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603461A *I High Performance Computing Modernization Program*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	202.969	220.565	181.609	-	181.609	178.460	178.523	183.707	184.684	-	-
DS7: *High Performance Computing Modernization Program*	-	174.872	180.565	181.609	-	181.609	178.460	178.523	183.707	184.684	-	-
DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*	-	28.097	40.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

The High Performance Computing 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. 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 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603461A *I High Performance Computing Modernization Program*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	180.582	180.662	181.609	-	181.609
Current President's Budget	202.969	220.565	181.609	-	181.609
Total Adjustments	22.387	39.903	-	-	-
• Congressional General Reductions	-0.302	-0.097			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	47.600	40.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-6.354	-			
• Other Adjustments 1	-18.557	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603461A / *High Performance Computing Modernization Program*				Project (Number/Name) DS7 / *High Performance Computing Modernization Program*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
DS7: *High Performance Computing Modernization Program*	-	174.872	180.565	181.609	-	181.609	178.460	178.523	183.707	184.684	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

The High Performance Computing 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. 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 2013	FY 2014	FY 2015
Title: Department of Defense (DoD) Supercomputing Resource Centers (DSRCs)	89.504	91.329	97.020
Description: Investigates and demonstrates general and special-purpose supercomputing systems and expertise that enables the DoD RDT&E community to accomplish its tasks. Dedicated HPC project investments (DHPIs) support a short-term research need that cannot be met at the DoD Supercomputing Resource Centers (DSRCs), such as real-time, and near real-time computing requirements, and leverage significant HPC and mission expertise located at these remote sites.			
FY 2013 Accomplishments: In collaboration with industrial and academic partners provided an expanded computational hardware and software environment to support the DoD S&T community, including newly developed hardware targeted specifically at DoD needs. The five DoD Supercomputing Resource Centers (DSRCs) and 7 competitively awarded dedicated HPC project investments (DHPIs), together			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603461A / *High Performance Computing Modernization Program*	**Project (Number/Name)** DS7 / *High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
with newly developed enabling and DoD application software, delivered approximately 3.2 billion processor hours and over 3.5 quadrillion floating point operations per second in aggregate to DoD. This expansion in computational capacity was supported by advanced computational expertise that ensured the resources were 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:*** In collaboration with industrial and academic partners provided an expanded computational hardware and software environment to support DoD S&T community, including newly developed hardware targeted specifically at DoD needs. The software environment at all DoD Supercomputing Resource Centers (DSRCs) is expanded with newly developed system, support, and application software designed specifically to deliver newly acquired supercomputing capability directly to DoD users. These enhancements, together with one or more competitively awarded dedicated HPC project investments (DHPIs), will deliver an expected capability over 4 billion processor hours to DoD users. This expansion in computational capacity is supported by advanced computational expertise that ensures 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 2015 Plans:*** Technology development and expertise investments will expand the DoD's advanced computational environment, including the development and demonstration of emerging computational and system interconnect technologies to DoD's highest priority computational decision support, scientific, engineering, and test and evaluation challenges. Will award one or more competitively dedicated HPC project investments (DHPIs) to address one or more high priority DoD problems that requires the support of HPC computational resources with specific rapid turnaround or protection of sensitive data requirements. These funds will also support the advanced computational expertise that ensures that the HPC resources are available and configured to support the DoD's most challenging problems, provides analysis of the massive and complex datasets resulting from the simulations, and develops and optimizes 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. 20 of 23 DoD T&E centers have a presence on the DREN, as do 54 of the DoD's 67 S&T centers. This interconnection enables T&E events that would be impractical to accomplish otherwise, and form the discovery fabric of the S&T community. The DREN matures and demonstrates new communications technologies of relevance to DoD users, and provides the computer and network security for the HPCMP.	30.541	29.894	31.443

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603461A / *High Performance Computing Modernization Program*	**Project (Number/Name)** DS7 / *High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Provided an advanced network platform (DREN II) and matured new high performance communications and data security technologies that enabled 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 demonstrated on DREN III in excess of 10 Gbps network bandwidth provided on the highest bandwidth links. Initiated transition to new network backbone technologies that will permit development and demonstration of a new capability to achieve 100 Gbps speeds in the network core, dramatically increasing the quantity and nature of the investigations the network can support for the DoD's RDT&E community. Led and partnered in efforts within the federal networking community that ensured DoD users remained ready to take advantage of anticipated technology change. ***FY 2014 Plans:*** Complete transition to the newly developed DREN III advanced network platform 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 leading to demonstration of up to 50 Gbps network bandwidth provided on the highest bandwidth links for emerging applications in test and evaluation and big data management. Lead and partner in efforts within the federal networking community, including development of tools to transition the DoD's networks to a more proactive security posture. ***FY 2015 Plans:*** Will mature and demonstrate new high performance communications and data security technologies over the existing DREN as we work to transition DoD RDT&E users to emerging 100 Gbps capabilities; will establish both technical foundations and identify emerging groups and requirements that will be enabled by these technologies.			
Title: Software Applications	54.827	59.342	53.146
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 2013 Accomplishments:*** Computational Research for Engineering and Science (CRES): provided focused resources to accelerate S&T results in high-priority DoD mission areas through development of advanced software applications, algorithms, and computational technology supporting development of next generation ships, submarines, helicopters and fixed wing aircraft, radio frequency antennas, and unmanned aerial vehicles. Initiated a new effort to support advanced computational modeling of ground vehicles in support of Marine and Army requirements. Software Institutes: developed shared scalable applications of critical mission importance to			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603461A / *High Performance Computing Modernization Program*	**Project (Number/Name)** DS7 / *High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
exploit scalable HPC assets; examples include the Blast Protection for Platforms and Personnel effort requested by the Secretary of Defense, simulation of high power microwave devices that supported the successful counter-electronics high-powered microwave advanced missile project (CHAMP) JCTD, mobile network modeling for novel radio design, and multi-scale reactive modeling for development of insensitive munitions. Programming Environments and Training (PETTT): invested in competitively-selected computational and computer science activities supporting critical DoD applications with academic and industrial partners. Examples included training in the latest computational technologies and techniques for the DoD scientific computing community, demonstration of novel software and techniques to enable effective computational performance for large physical problems using more than 100,000 cores, demonstration of novel techniques for calculation of properties in magnetic materials, and evaluation of novel computational techniques to enable reliable calculation of viscosities and diffusivities of complex alloys.			
FY 2014 Plans: Computational Research and Engineering Acquisition Tools and Environments (CREATE)/ Computational Research for Engineering and Science (CRES): Provide focused resources to accelerate Science and Technology (S&T) results in ships, rotary and fixed wing aircraft, radio frequency antennas, and ground vehicles as development on these advanced multiphysics applications add new physics and workflow features and development continues on novel computational approaches to enable performance to scale to problem sizes of interest to the DoD (e.g., complete aircraft carriers). Software Institutes: Develop shared scalable applications of critical mission importance to exploit scalable HPC assets; examples include the Blast Protection for Platforms and Personnel, mobile network modeling, and multi-scale reactive modeling for development of insensitive munitions. The high power microwave effort will transition to a related effort supporting computational investigation of high energy lasers. 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 DoD mission needs. Selections are made on relevance to service and DoD mission areas, computational feasibility, and resources available. Invest in development and demonstration of computational techniques and execution models to support effective scaling of DoD's applications to next-generation and extreme-scale supercomputers, with specific application to representative applications of interest in blast effects.			
FY 2015 Plans: Will develop novel system software, algorithms, libraries, and computational approaches to meet challenges of emerging extreme scale systems. Computational Research and Engineering Acquisition Tools and Environments (CREATE)/ Computational Research for Engineering and Science (CRES): will develop advanced software applications, algorithms, and computational technology to address high priority DoD needs in rotary and fixed-wing aircraft, ships, radio frequency antennas, and ground vehicles. Software Institutes: will continue to develop shared scalable software applications of critical mission importance to exploit scalable HPC assets in support of high energy lasers, and Blast Protection for Platforms and Personnel. New projects may be selected competitively based on then-current DoD needs. Programming Environments and Training (PETTT): will pursue targeted, competitively-selected computational and computer science activities in support of the DoD HPC user community with academic			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603461A / *High Performance Computing Modernization Program*	**Project (Number/Name)** DS7 / *High Performance Computing Modernization Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
and industrial partners that support DoD mission needs. Selections will be made based on mission relevance, computational feasibility, and available resources. 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. Develop and demonstration of computational techniques and execution models to support effective scaling of DoD's applications to next-generation and extreme-scale supercomputers, with specific application to representative applications.			
Accomplishments/Planned Programs Subtotals	174.872	180.565	181.609

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603461A / *High Performance Computing Modernization Program*				Project (Number/Name) DW5 / *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
DW5: *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*	-	28.097	40.000	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Congressional Increase	28.097	40.000	-
Description: Congressional increase for the High Performance Computing Modernization Program.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603461A / *High Performance Computing Modernization Program*	**Project (Number/Name)** DW5 / *HIGH PERF COMP MODERN (HPCM) CONGR ADDS (CAS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Congressional increase for the High Performance Computing Modernization Program.			
FY 2014 Plans: Congressional increase for the High Performance Computing Modernization Program.			
Accomplishments/Planned Programs Subtotals	28.097	40.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603606A *I Landmine Warfare and Barrier Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	24.448	22.794	13.074	-	13.074	14.095	17.056	16.770	16.761	-	-
608: *Countermine & Bar Dev*	-	22.188	22.794	13.074	-	13.074	14.095	17.056	16.770	16.761	-	-
683: *Area Denial Sensors*	-	2.260	-	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decrease attributed to Congressional General Reductions (-46 thousand); SBIR/STTR trabsfers (-582 thousand); and Sequestration reductions (-2.128 million) FY15 funding realigned to support higher Army priorities.

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), PE 0603270 (Electronic Warfare Technology) 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 U.S. Army 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	27.204	22.806	24.018	-	24.018
Current President's Budget	24.448	22.794	13.074	-	13.074
Total Adjustments	-2.756	-0.012	-10.944	-	-10.944
• Congressional General Reductions	-0.046	-0.012			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.582	-			
• Adjustments to Budget Years	-	-	-10.944	-	-10.944
• Sequestration	-2.128	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*	Project (Number/Name) 608 / *Countermine & Bar Dev*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
608: *Countermine & Bar Dev*	-	22.188	22.794	13.074	-	13.074	14.095	17.056	16.770	16.761	-	-

The FY 2015 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 U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC)/Night Vision and Electronic Sensors Directorate (NVESD), Ft. Belvoir, VA. Minefield neutralization efforts are closely coordinated with Navy/US Marine Corps.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Explosive Hazard Detection for Manned and Unmanned Aerial Systems	8.210	6.399	-
Description: This effort provides manned and unmanned aerial systems (UASs) the capability to detect explosive threats, threat deployment activities, minefields and Home Made Explosives (HME). ***FY 2013 Accomplishments:*** Fabricated and integrated a specialized sensor meeting size, weight and power (SWaP) requirements for the Pointer Upgraded Mission Ability (PUMA) small unmanned aerial vehicle (SUAV); matured and integrated baseline algorithm and threat cueing approaches. ***FY 2014 Plans:*** 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: Ground Vehicle Explosive Hazard Detection	11.048	13.378	10.060

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*	**Project (Number/Name)** 608 / *Countermine & Bar Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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, 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. ***FY 2013 Accomplishments:*** Fabricated a ground vehicle based, three-band infrared sensor prototype and integrated it onto a representative route clearance patrol vehicle; implemented baseline algorithm and threat cueing approaches. Conducted bench-level tests and collected initial field data with the first multi-channel prototype digital GPR receiver array; incorporated technical improvements into the GPR design; built and began evaluation of a full size four-panel GPR array; began maturation of new target detection algorithms. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will demonstrate a digital GPR array in a militarily relevant environment and evaluate detection performance against buried threat devices with and without presence of electronic countermeasures; integrate ground vehicle based, forward looking electro-optical/infrared sensor on a military vehicle.			
Title: Dismounted Explosive Hazard Detection	2.930	3.017	3.014
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 demonstrator digital goggles. This helmet mounted capability will 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 Accomplishments:***			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*	**Project (Number/Name)** 608 / *Countermine & Bar Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Conducted a forward operational assessment with the modified digital goggle demonstrators integrated during the Threat/ Mine Detection for In Road Obstacles project; collected field data, evaluated performance and addressed Soldier feedback for additional hardware and detection algorithm development. Integrated novel hand held GPR and wideband metal detectors into demonstrators for data collections and explosive hazard detection algorithm improvements. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will demonstrate advanced handheld GPR antenna and improved wideband metal detection coils and collect data in field conditions for development of improved target detection algorithms.			
Accomplishments/Planned Programs Subtotals	22.188	22.794	13.074

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*	Project (Number/Name) 683 / *Area Denial Sensors*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
683: *Area Denial Sensors*	-	2.260	-	-	-	-	-	-	-	-	-	-

The FY 2015 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 U.S. Army 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 2013	FY 2014	FY 2015
Title: Area Denial Sensors	2.260	-	-
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 2013 Accomplishments:*** Demonstrated a remote low power infrared system to search and track personnel with 360 degree coverage; extended algorithms and sensors to include vehicle detection and track; developed a cued day/night imaging sensor system with algorithms for automated detection and image capture.			
Accomplishments/Planned Programs Subtotals	2.260	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603606A / *Landmine Warfare and Barrier Advanced Technology*	**Project (Number/Name)** 683 / *Area Denial Sensors*

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603607A *I JOINT SERVICE SMALL ARMS PROGRAM*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	5.478	5.027	7.321	-	7.321	5.143	5.875	5.823	5.913	-	-
627: *Jt Svc Sa Prog (JSSAP)*	-	5.478	5.027	7.321	-	7.321	5.143	5.875	5.823	5.913	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to General Congressional Reductions (-10 thousand); SBIR/STTR transfers (-131 thousand) and Sequestration reductions (-476 thousand)

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. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	6.095	5.030	7.317	-	7.317
Current President's Budget	5.478	5.027	7.321	-	7.321
Total Adjustments	-0.617	-0.003	0.004	-	0.004
• Congressional General Reductions	-0.010	-0.003			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.131	-			
• Adjustments to Budget Years	-	-	0.004	-	0.004

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		R-1 Program Element (Number/Name) PE 0603607A *I JOINT SERVICE SMALL ARMS PROGRAM*			
• Sequestration	-0.476	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603607A / *JOINT SERVICE SMALL ARMS PROGRAM*	Project (Number/Name) 627 / *Jt Svc Sa Prog (JSSAP)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
627: *Jt Svc Sa Prog (JSSAP)*	-	5.478	5.027	7.321	-	7.321	5.143	5.875	5.823	5.913	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Small Arms Weapons and Fire Control Integration	2.264	2.302	5.668
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 2013 Accomplishments: Matured and demonstrated improvements to target tracking and range determination component technologies and algorithms; integrated subcomponents into realistic fire control system envelope; used modeling and simulation to evaluate system level effectiveness; used results to assist in selection of best systems.			
FY 2014 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603607A / *JOINT SERVICE SMALL ARMS PROGRAM*	**Project (Number/Name)** 627 / *Jt Svc Sa Prog (JSSAP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will perform final developmental testing and assessments in a relevant environment; will demonstrate compatibility with current M240 machine gun in actual system environments; will achieve TRL 6 for matured component technologies and will transition Technical Data Package (TDP).			
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 2013 Accomplishments:*** 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:*** Minimize dispersion and drag variation of the M433 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.	3.214	2.725	-
Title: Advanced Small Unit (Squad) Small Arms Technology Demonstration ***Description:*** Identify, advance, and demonstrate advanced technologies leading to the ability to improve Small Unit level effectiveness and utilize new small arms technological concepts to improve range overmatch capability against like-sized threat elements. ***FY 2015 Plans:***	-	-	1.653

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603607A / *JOINT SERVICE SMALL ARMS PROGRAM*	**Project (Number/Name)** 627 / *Jt Svc Sa Prog (JSSAP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Will demonstrate enabling technologies that a double maximum effective range of door-breaching munition from 33m to 66m; double the maximum effective range to 2km for .50 caliber ammunition; increase probability of hit and hard target penetration; and double probability of hit for rifles from 0-600m.			
Accomplishments/Planned Programs Subtotals	5.478	5.027	7.321

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603710A *I NIGHT VISION ADVANCED TECHNOLOGY*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	33.328	44.387	44.138	-	44.138	44.228	45.270	40.395	44.297	-	-
K70: *Night Vision Adv Tech*	-	19.511	20.390	27.343	-	27.343	28.935	27.983	22.951	26.838	-	-
K73: *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	-	-	8.000	-	-	-	-	-	-	-	-	-
K86: *Night Vision, Abn Sys*	-	13.817	15.997	16.795	-	16.795	15.293	17.287	17.444	17.459	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY13 decreases attributed to General Congressional Reductions (-62 thousand); SBIR/STTR transfers (-790 thousand) and Sequestration reductions (-3.037 million)

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 0602211A (Aviation 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 U.S. Army 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	37.217	36.407	42.338	-	42.338
Current President's Budget	33.328	44.387	44.138	-	44.138
Total Adjustments	-3.889	7.980	1.800	-	1.800
• Congressional General Reductions	-0.062	-0.020			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	8.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.790	-			
• Adjustments to Budget Years	-	-	1.800	-	1.800
• Sequestration	-3.037	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	Project (Number/Name) K70 / *Night Vision Adv Tech*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
K70: *Night Vision Adv Tech*	-	19.511	20.390	27.343	-	27.343	28.935	27.983	22.951	26.838	-	-

The FY 2015 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 U.S. Army 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 2013	FY 2014	FY 2015
Title: Weapon Sight Technology	3.000	6.102	6.186
Description: This effort develops, integrates and demonstrates critical components for the next generation of weapon sight systems for mounted and dismounted Soldier use to provide improved actionable intelligence and the tools to assist in recognizing and identifying friend or foe.			
FY 2013 Accomplishments: Integrated and demonstrated Optical Augmentation (OA) hardware; completed final weapon sight integration and ruggedization for testing and evaluation; demonstrated 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: 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			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K70 / *Night Vision Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
finding and wireless data component technologies for lighter weight, lower power, clip-on weapon sight with improved range performance. ***FY 2015 Plans:*** Will improve sensor processing efficiency and demonstrate crew served weapon sight with increased range, ID capability and reduced SWaP; leverage new optical design and high performance uncooled IR detector to complete design of next generation sniper weapon sight with reduced SWaP; begin design studies of conformal head mounted composite waveguide displays with day/night usability and wireless interface for remote display of weapon sight imagery.			
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 and lethality. ***FY 2013 Accomplishments:*** Validated, matured and optimized hardware designs which provide high resolution persistent surveillance imagery with picture in picture capability in order to identify specific areas of interest.	2.637	-	-
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. ***FY 2013 Accomplishments:*** Matured high definition infrared (IR) focal plane arrays (FPAs) and modeled their range and resolution performance; matured components and constructed brassboard system to demonstrate radar/IR/laser Slew-to-Cue in an operational environment. ***FY 2014 Plans:*** 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	4.123	6.108	5.455

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K70 / *Night Vision Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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. ***FY 2015 Plans:*** Will mature and validate algorithms for ground to air infrared search and track capabilities; optimize techniques to include rotating camera(s), stacked prisms, and staring arrays to improve 360 degree coverage and increase affordability; demonstrate high resolution target tracking and identification for target handoff and engagement.			
Title: Advanced Sensors for Precision	9.751	8.180	10.688
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 Infrared (IR) imaging technology, 3-D imaging sensor techniques, emerging multispectral laser technologies and precise far target location technology to increase target detection range, extended target and reduce target acquisition timelines. This effort supports the Army's Active Protection System (APS) program to mature and demonstrate APS technologies to reduce vehicle weight while reducing reliance on armor through the use of other means such as sensing, warning, hostile fire detection, and active countermeasures to achieve increased protection against current and emerging threats. ***FY 2013 Accomplishments:*** Fabricated, optimized, evaluated and demonstrated 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; matured algorithms and validated multi-purpose sensor performance for hostile fire detection and situational awareness applications; integrated 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:*** Integrate next generation, high definition component technologies to rapidly detect and identify 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. ***FY 2015 Plans:*** Will validate low cost integrated uncooled IR sensors for situational awareness and muzzle flash detection; improve design for active threat sensor detection of uncooled and cooled infrared sensors; mature clutter rejection techniques for reduced false alarms and threat sensor point of origin determination; exploit existing and emerging laser technologies and determine limitations			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K70 / *Night Vision Adv Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
for suppression of threat night vision and electro-optic imaging sensors; begin development of concept demonstrator hardware to demonstrate detection/suppression in a single waveband.			
Title: Sensor Interoperability ***Description:*** This effort provides a high-level construct that addresses Dynamic, Distributed, Discovery (D3) of systems and sensors within a multi-layered interoperability characterization. The primary goal of the integrated sensor architecture (ISA) is developing and demonstrating an architecture that allows sensors to readily integrate into a network and share sensor/system data and information. ***FY 2015 Plans:*** Will model and simulate the sensor portion of the Computing Environment (CE); mature and evaluate sensor to network standards including implementation specifications and guides; implement standards, demonstrate, evaluate and refine interoperability of Electro-optic/Infrared, radar sensors, chemical, biological, radioactive, nuclear, explosive (CBRNE) systems, biometric sensors; mature and demonstrate sensor imagery and metadata products as well as D3 configuration capability.	-	-	4.000
Title: Soldier System Architecture ***Description:*** This effort designs, develops and matures soldier sensor, optics, displays and electronic system interfaces that will be incorporated into the larger Soldier system architecture to improve the individual Soldier's effectiveness / efficiency, reducing burden and while reducing total operational costs. This effort is coordinated with PE 0603001A/J50, PE 0602716A/Project H70, PE 0602786A/Project H98, 060315A/Project S28, and 0603004A/Project 232. ***FY 2015 Plans:*** Will develop Measures of Effectiveness / Measures of Performance (MOE/MOP) for the sensor, optics, displays and electronic systems used by the individual Soldier and integrate these MOE/MOPs into the overall Soldier System Architecture.	-	-	1.014
Accomplishments/Planned Programs Subtotals	19.511	20.390	27.343

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K70 / *Night Vision Adv Tech*

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	Project (Number/Name) K73 / *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
K73: *NIGHT VISION SENSOR DEMONSTRATIONS (CA)*	-	-	8.000	-	-	-	-	-	-	-	-	-

The FY 2015 OCO Request will be submitted at a later date.

A. Mission Description and Budget Item Justification

Congressional Interest Item funding for Night Vision advanced technology development.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Program Increase	-	8.000	-
Description: This is a Congressional Interest Item.			
FY 2014 Plans: This is a Congressional Interest Item.			
Accomplishments/Planned Programs Subtotals	-	8.000	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	Project (Number/Name) K86 / *Night Vision, Abn Sys*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
K86: *Night Vision, Abn Sys*	-	13.817	15.997	16.795	-	16.795	15.293	17.287	17.444	17.459	-	-

The FY 2015 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 U.S. Army 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 2013	FY 2014	FY 2015
Title: Airborne Unmanned Persistent Imaging	6.391	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). The technology will be applied to smaller/lighter UASs as miniaturized large format sensors mature.			
FY 2013 Accomplishments: Conducted flight test and demonstration of enhanced RSTA and targeting capabilities with a high definition (HD), dual-band infrared focal plane array-based turret; collected airborne imagery to support development of processing subsystem; trained, tested and optimized the image exploitation subsystem for persistent wide area activity monitoring.			
FY 2014 Plans: 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			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K86 / *Night Vision, Abn Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
provide imagery and target report products to the small unit network; 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 2013 Accomplishments:*** Completed fabrication of initial engineering prototype displays with advanced monocular optics and low power miniature liquid crystal displays; demonstrated and assessed key head-borne ergonomic parameters such as size and weight, center of gravity, display brightness/contrast and resolution; integrated with HGU-56P helmet; conducted laboratory performance characterization and fabricated system demonstrator for flight testing. ***FY 2014 Plans:*** 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.	7.426	6.913	-
Title: Multifunction Imagers for Rotary Wing ***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. Work in this effort is coordinated with degraded visual environments efforts in PE 0602211A, Aviation Technology, Project 47A. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will fabricate a dual-purpose IR sensor with the dual speed ROIC; continue integration of dual-purpose IR sensors with other low-light night vision technology; develop pilotage image processing algorithms in the dual purpose IR sensor; develop threat warning	-	4.354	10.049

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603710A / *NIGHT VISION ADVANCED TECHNOLOGY*	**Project (Number/Name)** K86 / *Night Vision, Abn Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
algorithms for use with IR sensor operating at 1000 Hz frame rate; begin flight testing to validate pilotage sensor and processing technologies for performance in degraded visual environments.			
Title: Local Area ISR for Tactical Small Units ***Description:*** This effort develops and demonstrates sensors enabling simultaneous display of wide and narrow field-of-view (FOV) infrared imagery for enhanced situational awareness/targeting and multi-band image fusion and the ability to image battlefield laser spot locations for improved targeting accuracy and reduced fratricide caused by laser misalignment. ***FY 2015 Plans:*** Will conduct design trade study to retrofit existing turret with optical components to provide simultaneous wide FOV and independently steerable narrow FOV capability through optical beam splitting of the existing common sensor payload dual-band midwave/longwave infrared camera; begins maturation of a compact, high definition, 3-band (visible, near infrared, shortwave infrared) camera module to enable imaging of battlefield lasers and multi-band image fusion.	-	-	4.746
Title: Pilotage Sensor Fusion ***Description:*** This effort develops and matures sensor fusion utilizing combinations of sensing modalities (active and/or passive) and associated real-time processing algorithms and architectures to produce synthetic scene representations that provide increased information content as opposed to scenes produced from existing single mode sensor solutions. ***FY 2015 Plans:*** Will collect field data from multiple sensor modalities (e.g. passive/active infrared, radar, shortwave lidar) under degraded visual environment (DVE) conditions; identify exploitable features associated with each modality; begin development of algorithm approaches to produce synthetic scenes for presentation to the pilot.	-	-	2.000
Accomplishments/Planned Programs Subtotals	13.817	15.997	16.795

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603728A *I Environmental Quality Technology Demonstrations*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	12.398	11.739	9.197	-	9.197	8.690	8.696	7.931	7.989	-	-
002: *Environmental Compliance Technology*	-	2.124	1.922	3.172	-	3.172	2.697	2.679	1.797	1.807	-	-
025: *Pollution Prevention Technology*	-	3.309	3.020	-	-	-	-	-	-	-	-	-
03E: *Environmental Restoration Technology*	-	6.965	6.797	6.025	-	6.025	5.993	6.017	6.134	6.182	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 decreases attributed to Congressional General reductions (-28 thousand); SBIR/STTR transfers (-207 thousand); and Sequestration reductions (-993 thousand) FY15 funding realigned to support higher Army priorities.

A. Mission Description and Budget Item Justification

This program element (PE) matures and demonstrates technologies that assist the Army in becoming environmentally compliant and limiting future liability without compromising readiness or training assets critical to the success of the future force. Project 002 demonstrates tools and methods for compliance with environmental laws relevant to conservation of natural and cultural resource laws while providing a flexible realistic training 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 maturation and demonstration of technologies for advanced life cycle analysis, advanced sensing, and advanced remediation of Army-unique toxic or hazardous materials. This program demonstrates technological feasibility 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 in modernization programs. Technologies demonstrated focus on reducing current and future environmental liability costs.

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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603728A / *Environmental Quality Technology Demonstrations*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	13.626	11.745	12.537	-	12.537
Current President's Budget	12.398	11.739	9.197	-	9.197
Total Adjustments	-1.228	-0.006	-3.340	-	-3.340
• Congressional General Reductions	-0.028	-0.006			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.207	-			
• Adjustments to Budget Years	-	-	-3.340	-	-3.340
• Other Adjustments 1	-0.993	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603728A / *Environmental Quality Technology Demonstrations*	Project (Number/Name) 002 / *Environmental Compliance Technology*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
002: *Environmental Compliance Technology*	-	2.124	1.922	3.172	-	3.172	2.697	2.679	1.797	1.807	-	-

The FY 2015 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. Army facilities are subject to fines and facility shutdowns for violation of federal, state, and local environmental regulations. 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 2013	FY 2014	FY 2015
Title: Sustainable Ranges and Lands	2.124	1.922	3.172
Description: This effort provides ecosystem vulnerability assessment and ecosystem analysis, monitoring, modeling and mitigation technologies to support sustainable, unconstrained, realistic access and use of the Army's ranges and lands. This effort demonstrates environmentally safe and cost effective technologies to manage and reduce the increase in noise and pollution concerns associated with training ranges.			
FY 2013 Accomplishments: Developed, demonstrated, and validated a field portable sensor for detection of hazardous and toxic compounds in water including heavy metals, perclorate and general toxicity; developed, tested, and demonstrated smart cell sensors for intracellular			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603728A / *Environmental Quality Technology Demonstrations*	**Project (Number/Name)** 002 / *Environmental Compliance Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
markers of toxicity and stress, interdigitated electrode arrays (IdEA) for measuring cell membrane integrity, and biomarker detection systems for sensing extracellular signs of damage; tested and validated results using real world field samples for incorporation into final portable sensor hardware component and system design specifications. ***FY 2014 Plans:*** 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. ***FY 2015 Plans:*** Will develop and evaluate gray water treatment and reuse system (G-WTRS) that is designed to reduce water demand and sustainment cost at 600-3000 personnel contingency operating bases; will perform pilot scale testing of G-WTRS prototype; will conduct baseline flow, water quality, energy consumption, and maintenance testing; will optimize G-WTRS design and operation based on pilot scale testing for maximal performance and energy efficiency; will facilitate Army Evaluation Center's certification of G-WTRS; will mature an intuitive integrated planning, design, and analysis model that addresses power, water, waste and protection related design and resource requirements for contingency bases ranging in size from 50-2000 population; will validate standalone models for power, water, waste (solid, sanitary, and hazardous) and protection; will mature characterization and forecasting capabilities to assess multi-scale ecological response to compliance mandated altered fire regimes and the consequences for accessible, sustainable and realistic military training lands.			
Accomplishments/Planned Programs Subtotals	2.124	1.922	3.172

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603728A / *Environmental Quality Technology Demonstrations*	Project (Number/Name) 025 / *Pollution Prevention Technology*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
025: *Pollution Prevention Technology*	-	3.309	3.020	-	-	-	-	-	-	-	-	-

The FY 2015 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 2013	FY 2014	FY 2015
Title: Pollution Prevention Technology	3.309	3.020	-
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 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603728A / *Environmental Quality Technology Demonstrations*	**Project (Number/Name)** 025 / *Pollution Prevention Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Rocket and Missile Propellants: qualified and tested lead-free propellant in 2.75-inch Hydra rocket system; Conventional Ammunition: initiated insensitive munitions testing on environmentally benign formulation in relevant end item; Pyrotechnics: integrated high nitrogen materials into pyrotechnic signal prototypes. ***FY 2014 Plans:*** Conventional Ammunition: Conduct large-scale performance and insensitive munitions testing on environmentally benign formulation in relevant end item; Pyrotechnics: Integrate chromate-free delay composition into relevant end item; Toxic Metal Reduction: Demonstrate alternatives to chromic acid anodizing for common aircraft substrates; Zero Footprint Camp: Select and mature high-payoff approaches for reducing fresh water demand and wastewater generation in contingency bases.			
Accomplishments/Planned Programs Subtotals	3.309	3.020	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603728A / *Environmental Quality Technology Demonstrations*	Project (Number/Name) 03E / *Environmental Restoration Technology*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
03E: *Environmental Restoration Technology*	-	6.965	6.797	6.025	-	6.025	5.993	6.017	6.134	6.182	-	-

The FY 2015 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 by addressing the management/mitigation of materials and chemicals released to the natural environment and residual environmental effects of military training and operations. The emphasis of this effort includes remediation 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 and chemicals in the environment. 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 predict and identify 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 mitigation 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 2013	FY 2014	FY 2015
Title: Sustainable Ordnance Mitigation and Management	1.308	1.497	1.335
Description: This effort develops real time detection and discrimination methodologies for unique and emerging non-metallic UXO.			
FY 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603728A / *Environmental Quality Technology Demonstrations*	**Project (Number/Name)** 03E / *Environmental Restoration Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Matured emergent technology in smart sensors and real time assessment of UXO discrimination for enhanced range maintenance, sustainability and construction support. ***FY 2014 Plans:*** Develop a networked semi- to-fully-autonomous mobile platform with the operational capability to mitigate hazardous UXOs on military ranges. ***FY 2015 Plans:*** Will develop electromagnetic induction algorithms for detection and discrimination of emerging non-metallic intermediate electrically conductive materials- based munitions, and models and algorithms applicable to difficult sensing environments.			
Title: Hazard Assessment for Military Materials ***Description:*** This effort demonstrates tools to assess hazard and risk of Army-unique chemicals and material. The tools provide for rapid environmental baseline survey reporting and screening assessments of existing and future militarily relevant compounds and allow for improved predictive risk assessment and provide environmental life cycle assessment capability. ***FY 2013 Accomplishments:*** Provided novel screening assays for neurotoxicity and reproductive toxicity, and predictive models integrated with toxicology and genomic screening protocols; matured 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:*** Demonstrate a toolkit with optimized sensor technologies for rapid and reliable data collection providing real time analysis for contamination within an operational environment. ***FY 2015 Plans:*** Will integrate a suite of environmental-quality sensors with analytical capabilities to provide environmental guidance and data visualization associated with environmental monitoring in Army operations in theater; will develop rapid hazard screening tools for new Army compounds.	1.207	0.863	0.722
Title: Technologies for Sustainable and Green Operations and Acquisition ***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 2013 Accomplishments:***	2.654	2.287	2.044

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603728A / *Environmental Quality Technology Demonstrations*	**Project (Number/Name)** 03E / *Environmental Restoration Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Determined effectiveness of green remediation technologies on munitions constituents and selected appropriate field sites for validation; predicted the effects of landscape contouring and identified optimal placement of treatment systems to ensure the selection of efficient and cost-effective treatment designs; incorporated 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:*** Provide an integrated approach to contamination management in range and installation design; develop 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; develop 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. ***FY 2015 Plans:*** Develop cost-effective, efficient, and integrative tools for remediation of contaminated wastewater from insensitive munitions production. Tools are planned for rapid transition under technology transition agreement with the Project Director Joint Services for next generation Army ammunition Industrial Base Insensitive Munitions (IM) Wastewater Treatment technologies.			
Title: Risk Prediction and Decision Technologies ***Description:*** The goal of this effort is to develop and provide integrated science and technology solutions to Army environmental challenges with a focus on acquisition lifecycle models to predict environmental attributes of emerging chemicals and materials that will proactively minimize impacts to the mission and to the Soldier. ***FY 2013 Accomplishments:*** Matured 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:*** 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. ***FY 2015 Plans:*** Will develop and demonstrate appropriate data, scenarios, and processes necessary for conducting the life cycle analysis of the antimony (Sb) containing small arms formulations, and for new insensitive munitions formulations, IMX 101 and 104. Economic life	1.796	2.150	1.924

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603728A / *Environmental Quality Technology Demonstrations*	**Project (Number/Name)** 03E / *Environmental Restoration Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
cycle assessments will provide scientifically defensible approaches for determining environment risk, and increase confidence in anticipating product impact with respect to environmental regulatory requirements when fielding.			
Accomplishments/Planned Programs Subtotals	6.965	6.797	6.025

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army												Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603734A *I Military Engineering Advanced Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	30.503	23.705	17.613	-	17.613	15.281	15.817	17.559	17.967	-	-
T08: *Combat Eng Systems*	-	30.503	23.705	17.613	-	17.613	15.281	15.817	17.559	17.967	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY15 funding realigned to support higher Army priorities.

A. Mission Description and Budget Item Justification

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

B. Program Change Summary ($ in Millions)	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO	FY 2015 Total
Previous President's Budget	28.458	23.717	20.874	-	20.874
Current President's Budget	30.503	23.705	17.613	-	17.613
Total Adjustments	2.045	-0.012	-3.261	-	-3.261
• Congressional General Reductions	-0.046	-0.012			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	5.000	-			
• SBIR/STTR Transfer	-0.639	-			
• Adjustments to Budget Years	-	-	-3.261	-	-3.261

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*		R-1 Program Element (Number/Name) PE 0603734A *I Military Engineering Advanced Technology*			
• Other Adjustments 1	-2.270	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army			Date: March 2014
Appropriation/Budget Activity 2040 / 3	R-1 Program Element (Number/Name) PE 0603734A / *Military Engineering Advanced Technology*	Project (Number/Name) T08 / *Combat Eng Systems*	

COST ($ in Millions)	Prior Years	FY 2013	FY 2014	FY 2015 Base	FY 2015 OCO #	FY 2015 Total	FY 2016	FY 2017	FY 2018	FY 2019	Cost To Complete	Total Cost
T08: *Combat Eng Systems*	-	30.503	23.705	17.613	-	17.613	15.281	15.817	17.559	17.967	-	-

The FY 2015 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Geo-Enabled Mission Command Enterprise	3.457	4.129	5.113

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603734A / *Military Engineering Advanced Technology*	**Project (Number/Name)** T08 / *Combat Eng Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Description: This effort matures methods and demonstrates data, information, and software tools and architectures to bring physical and human terrain and effects data into decision frameworks for consistent and accurate implementation in the Army Geospatial Enterprise (AGE). This provides ready-access of low-overhead, light-weight, analytic tools to other Services and DoD and increases situational awareness of the operational environment in support of mission planning and operations. ***FY 2013 Accomplishments:*** Matured and evaluated 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; demonstrated applications of algorithms and architectures with 100% open software and standards; matured and delivered a wiki-like software environment to obtain, authenticate, and share socio-cultural data, information and concepts; developed tools for terrain and cultural feature extraction and begin the data enterprise framework integration; developed a unified sensor coverage framework and adaptive sensor performance assessment for active and passive counter-insurgency defeat tool; matured an optimized, operational pattern analysis tool focusing on physical, social, cultural, adversarial, and friendly datasets. ***FY 2014 Plans:*** 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; 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. ***FY 2015 Plans:*** Will evaluate and mature methods and techniques to facilitate efficient sharing of common geospatial information within Common Operating Environment and Army Programs of Record through delivery and exchange of geospatial data, information, and analytics between and among computing environments (e.g., Mobile/Handheld, Mounted, Data Center, Sensor, Command Post) within the Common Operating Environment.			
Title: Deployable Force Protection Technology Integration Demonstrations and Red Teaming ***Description:*** This effort matures, integrates and demonstrates rapidly deployable threat detection, situation assessment, passive protection and active defensive technology-enabled capabilities to meet critical capability gaps for troops operating remotely at smaller bases or integrated with local communities. The needs at these smaller bases (less than 300 persons, not all U.S. troops) are unique based on constraints in transportability, manpower, organic resources, lack of hardening of structures, resupply, and training for example. Moreover, lack of interoperability and scalability 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	18.597	16.096	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603734A / *Military Engineering Advanced Technology*	**Project (Number/Name)** T08 / *Combat Eng Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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 2013 Accomplishments:*** Developed low-logistics, rapidly deployable, overhead cover system for select critical asset protection; demonstrated perimeter standoff enforcement capabilities and entry control point technologies; demonstrated reinforcement of existing structures typical of conditions in operating environments; evaluated deployable radio frequency direction finding system to locate hostile activity; demonstrated integrated architecture for sensor components/systems; demonstrated enhanced detection capabilities for identifying hostiles; conducted full-scale demonstrations and user assessments and conducted 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 2014 Plans:*** Develop 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; develop 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). ***FY 2013 Accomplishments:*** Demonstrated advanced numerical methods for coupling occupant response to shock resulting from improvised explosive device (IED) detonations. ***FY 2014 Plans:***	0.677	0.724	0.500

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603734A / *Military Engineering Advanced Technology*	**Project (Number/Name)** T08 / *Combat Eng Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Demonstrate a comprehensive model of vehicle responses 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 provides the Army with accurate predictions of the effect of IEDs on vehicles. ***FY 2015 Plans:*** Will demonstrate live fire full-scale model benchmark tests for evaluation, and model validation under a range of soil and operational threat conditions.			
Title: Austere Entry and Maneuver Support Demonstrations ***Description:*** This effort develops improved means for achieving Force Projection in coastal, estuary and riverine environments and an integrated sensing and simulation system for predicting physical conditions in these operational environments. ***FY 2013 Accomplishments:*** Demonstrated 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; demonstrated sensor utilization and characterization of operational conditions at austere ports and offload sites for determining infrastructure load carrying capability. ***FY 2014 Plans:*** Demonstrate a high performance computing computational testbed that allows for evaluation of sensor and platform tradeoff studies of potential off-loading platforms and soldiers in the 9-man squad. ***FY 2015 Plans:*** Will demonstrate simulation capability to enable rapid remote assessment of real-time structural capacity of infrastructure (airfields, ports, roads), river, estuary, and near shore; will demonstrate initial assessment of littoral environment for entry operations; will demonstrate initial austere airfield point of debarkation (APOD) assessment geospatial overlay capability to ENFIRE program; and will demonstrate reduced-order hydrodynamic models for an operational littoral environment.	2.772	0.256	5.000
Title: Integrated Base Protection ***Description:*** This effort demonstrates integrated protective technologies to plan and expediently construct Combat Outposts (COPs) and Patrol Bases (PBs). ***FY 2014 Plans:*** 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;	-	2.500	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603734A / *Military Engineering Advanced Technology*	**Project (Number/Name)** T08 / *Combat Eng Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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.			
Title: Adaptive Protection Demonstrations ***Description:*** This effort demonstrates protection solutions for critical assets, including fixed and semi-fixed facilities, required to support shifting operational focus. A focus will be on technologies to defeat new advanced weapons threats to include low-logistics protective construction and facility protection, use of indigenous materials, innovative structural hardening and retrofit, and the synergistic use of camouflage, concealment and deception to increase the effectiveness of protection to critical assets. This effort also demonstrates integrated protective technologies for force protection basing to include planning and expedient protective construction for combat outposts. ***FY 2015 Plans:*** Will demonstrate the use of indigenous materials from areas of interest in protective construction for critical assets against effects of new advanced weapons threats; will demonstrate initial force protection basing planning and protective construction for combat outposts to increase survivability of personnel and equipment against rocket and mortar attack; will demonstrate baseline effectiveness in the use of camouflage, concealment, and deception techniques to increase survivability of fixed and semi-fixed facilities against new threat weapons by decreasing the probability of direct hit on critical assets; and will demonstrate capability to construct expedient protection solutions for combat outposts and evaluate manpower requirements.	-	-	7.000
Title: 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 2013 Accomplishments:*** Completed the technical, functional, and operational assessments of MAPCAT software prototype. Assessments determined MAPCAT is mature and ready for additional modernization and conversion of geospatial mapping capabilities to DoD compliance. Initiated software improviements to address software inconsistencies identified during technical assessment. Completed report listing potential modernization and additional assessment opportunities.	5.000	-	-
Accomplishments/Planned Programs Subtotals	30.503	23.705	17.613

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603734A / *Military Engineering Advanced Technology*	**Project (Number/Name)** T08 / *Combat Eng Systems*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2, RDT&E Budget Item Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603772A *I Advanced Tactical Computer Science and Sensor Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
Total Program Element	-	22.900	32.995	39.164	-	39.164	41.296	42.565	45.523	46.383	-	-
101: *Tactical Command and Control*	-	10.580	22.341	19.140	-	19.140	15.101	15.071	15.611	17.275	-	-
243: *Sensors And Signals Processing*	-	12.320	10.654	20.024	-	20.024	26.195	27.494	29.912	29.108	-	-

The FY 2015 OCO Request will be submitted at a later date.

Note

FY 13 decreases attributed to Congressional Undistributed reductions (-53 thousand); Sequestration reductions (-1916 million); and SBIR/STTR transfers (-357 thousand)

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 (Electronic Warfare Technology), PE 0602705A (Electronics and Electronic Devices), PE 0602782A (Command, Control, Communications Technology), and PE 0603270A (Electronic Warfare 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 2015 Army					Date: March 2014
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 3: *Advanced Technology Development (ATD)*			R-1 Program Element (Number/Name) PE 0603772A *I Advanced Tactical Computer Science and Sensor Technology*		
B. Program Change Summary ($ in Millions)	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO**	**FY 2015 Total**
Previous President's Budget	25.226	33.012	40.046	-	40.046
Current President's Budget	22.900	32.995	39.164	-	39.164
Total Adjustments	-2.326	-0.017	-0.882	-	-0.882
• Congressional General Reductions	-0.053	-0.017			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.357	-			
• Adjustments to Budget Years	-	-	-0.882	-	-0.882
• Sequestration	-1.916	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*				Project (Number/Name) 101 / *Tactical Command and Control*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
101: *Tactical Command and Control*	-	10.580	22.341	19.140	-	19.140	15.101	15.071	15.611	17.275	-	-

The FY 2015 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).

This project supports Army science and technology efforts in the Command, Control, Communications and Intelligence 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, Development, and Engineering Command, Communications-Electronics Research, Development, and Engineering, Center (CERDEC), Aberdeen Proving Ground, MD.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Title: Integrated Mission Command (MC)	7.145	11.104	15.113
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.			
FY 2013 Accomplishments: Coded and demonstrated 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; coded and integrated			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*	**Project (Number/Name)** 101 / *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
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; coded MC software capabilities to help with mission planning, execution and tracking unit progress in meeting mission goals within the Command Post CE; added 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:*** 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. ***FY 2015 Plans:*** Will code, integrate, and validate a Company level (dismounted, mounted, CP) MC suite to provide actionable intelligence and timely information sharing over a Company level low bandwidth tactical network; code and integrate additional decision support and collaboration tools, including knowledge management and necessary database connections, that will increase situational awareness/understanding, decrease tactical surprise and deliver pertinent mission information from dismounted to CP; validate this suite's capability to allow Soldiers to access relevant information available on the network most effectively, accounting for Soldier cognitive abilities and contextual framework for ease of use and to ensure relevance of the delivered information to the upper echelons; for company level low bandwidth environments code, integrate, and validate an enhanced MC suite of 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 geographical and GPS denied terrains.			
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.	3.435	4.490	4.027

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*	**Project (Number/Name)** 101 / *Tactical Command and Control*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
FY 2013 Accomplishments: Pursued two parallel approaches to integrating novel pos/nav capabilities, using JTRS radios for one approach and Android smartphones for the other, for both approaches, implemented sensor integration algorithms that incorporate navigation enhancements such as radio frequency-ranging and network assisted navigation in combination with selected pos/nav sensor equipment; completed fabrication and integration of brassboard radio/sensor navigation systems for laboratory assessment of system performance ***FY 2014 Plans:*** 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 modernized code (M Code) capable secure GPS chips. ***FY 2015 Plans:*** Will demonstrate sensor fusion for navigation systems for dismounted Soldiers and ground vehicles to allow modular and scalable system designs providing configuration flexibility to meet Soldier specific needs for navigation; integrate mature sensors into navigation systems such as radio frequency ranging sensors, vision based sensors, pseudolite receivers and signals of opportunity sensors to reduce dependence upon GPS; evaluate advanced anti-jam antennas and M Code GPS receivers integrated with multi-global navigation satellite system receivers; design, code, and develop interfaces, protocols and software for networked navigation devices to share information and enhance navigation solutions for network users.			
Title: Collaborative Battle Management ***Description:*** This effort matures and demonstrates mission command (MC) software to improve sharing and understanding of data between the intelligence and operations communities. ***FY 2014 Plans:*** 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.	-	6.747	-
Accomplishments/Planned Programs Subtotals	10.580	22.341	19.140

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*	**Project (Number/Name)** 101 / *Tactical Command and Control*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army											Date: March 2014	
Appropriation/Budget Activity 2040 / 3					R-1 Program Element (Number/Name) PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*				Project (Number/Name) 243 / *Sensors And Signals Processing*			
COST ($ in Millions)	**Prior Years**	**FY 2013**	**FY 2014**	**FY 2015 Base**	**FY 2015 OCO #**	**FY 2015 Total**	**FY 2016**	**FY 2017**	**FY 2018**	**FY 2019**	**Cost To Complete**	**Total Cost**
243: *Sensors And Signals Processing*	-	12.320	10.654	20.024	-	20.024	26.195	27.494	29.912	29.108	-	-

The FY 2015 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 Maneuver 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 2013	FY 2014	FY 2015
Title: Measurement and Signature Intelligence Technologies (MASINT) for clandestine tagging, tracking and locating (TTL)	2.870	-	-
Description: This effort matures and demonstrates MASINT sensors and software techniques capable of detecting, tracking, and/or identifying human activities and/or infrastructures. The emphasis is to identify appropriate technical approaches, demonstrate embedded processing, and mature algorithms for multi-mode fusion of sensor data. Candidate technologies include: fiber optic seismic/magnetic sensors, highly sensitive for detection of walking personnel with/without weapons and/or tunneling detection; air 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 2013 Accomplishments:			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*	**Project (Number/Name)** 243 / *Sensors And Signals Processing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
Designed and fabricated an extended range facial recognition sensor and optimize code of associated facial-matching algorithms; demonstrated 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: Collaborative ISR Sensors	3.933	5.095	10.466
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 air defense & area/base camp protection. This effort implements an open architecture that is extensible to multiple base sizes and environments and allows growth for future ISR sensors. Work being accomplished under PE 62270/906 complements this effort. ***FY 2013 Accomplishments:*** Coded, demonstrated and assessed software algorithms that allow existing radar systems to track targets and performed air surveillance simultaneously; integrated software algorithm into counter target acquisition systems (lightweight counter-mortal radar (LCMR)) to improve the accuracy of target recognition, identification and classification; coded software and firmware to correlate data from 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:*** 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). ***FY 2015 Plans:*** Will conduct an assessment of a variety of moving target indicator (MTI) data sources to establish metrics for quality of MTI data sets to improve radar design; establish a software development process to mature new and alternative concepts for increasing the information content of radar data and tracks; conduct an assessment to determine an optimal design of a multi-static beamforming radar; assess current counterfire and ISR radar programs of record to determine component, configuration and software modifications to design a more accurate multistatic (separated multiple transmit/receive elements) radar and to determine their potentials to search, track and classify small unmanned aerial systems (UAS); develop requirements for doppler resolution, search volume and update rate for improvements that are necessary for the system to perform a counter UAS mission; develop requirements for a low size, weight and power, man portable system to detect and locate small arms fire, dismounts and			

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
vehicles over a 360 degree search area; research the advantage of using existing gunshot detection systems to cue a radar to provide a more precise location of the shooter and reduce the probability of a false alarm.			
Title: Omni-directional Situational Awareness (SA) (Airborne) radar technologies ***Description:*** This effort matures and demonstrates low power multi-function SA sensors for small UAS and other aircraft to improve sensing and detection capabilities in support of wide-area persistent surveillance. ***FY 2015 Plans:*** Will design a stationary airborne dismount moving target indicator (DMTI) penetrating radar capability for use on a fixed wing, moving platform; conduct modeling and simulation to evaluate processing techniques that could be applied to the fixed wing DMTI scenario.	-	-	3.009
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. ***FY 2013 Accomplishments:*** Composed, coded and assessed automated exploitation and fusion analysis tools, applications, and services that provide advanced planning, execution and assessment capabilities to support the tactical edge user; coded and demonstrated applications and services to generate actionable intelligence in support of simultaneous offense, defense, stability, and civil support missions; defined new data fields and associated values necessary to improve action-ability of tactical intelligence products; coded and assessed new correlation and pattern analysis algorithms that incorporated these new data fields; coded and assessed complex analysis and prediction software to aid the decision making process. ***FY 2014 Plans:*** 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 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	5.517	5.559	6.549

Exhibit R-2A, RDT&E Project Justification: PB 2015 Army		Date: March 2014
Appropriation/Budget Activity 2040 / 3	**R-1 Program Element (Number/Name)** PE 0603772A / *Advanced Tactical Computer Science and Sensor Technology*	**Project (Number/Name)** 243 / *Sensors And Signals Processing*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2013	FY 2014	FY 2015
supports timely situation understanding for a small unit; will conduct networked laboratory experiments to validate this framework and gather user feedback. ***FY 2015 Plans:*** Will develop software tools and analytics to produce intelligence products from big data sets (e.g. biometric databases); integrate Company Intelligence Support Team workflow tools, predictive analytics and data distribution services into the previously defined, network constrained environment; demonstrate integrated automated exploitation and fusion analysis tools, intelligence to SA transformation services, threat prediction software, and enterprise data feeds, quantify the improved ability of the end users to execute their missions and document the performance of the capabilities being demonstrated.			
Accomplishments/Planned Programs Subtotals	12.320	10.654	20.024

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A