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Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Office of Secretary Of Defense **DATE:** February 2010

APPROPRIATION/BUDGET ACTIVITY 0400: <i>Research, Development, Test & Evaluation, Defense-Wide</i> BA 2: <i>Applied Research</i>				R-1 ITEM NOMENCLATURE PE 0602670D8Z: <i>Human, Social and Culture Behavior (HSCB) Modeling Applied Research</i>							
COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
Total Program Element	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing
P270: <i>Human, Social and Culture Behavior (HSCB) Modeling Applied Research</i>	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing

A. Mission Description and Budget Item Justification

The HSCB Modeling Program is a vertically integrated effort to research, develop, and transition technologies, tools, and systems to programs of record and users in need. Under three integrated PEs, the Program will conduct applied research (6.2), which will then be matured and demonstrated (6.3), and the results then tested and transitioned (6.4). This HSCB line item is focused on applied research, developing an applied science base and general-use, cross-domain capabilities/tools to support the HSCB application domains of analysis, operational planning, training, and operations experimentation (wargaming). The work will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools. It will create software tools that will help intelligence analysts, operations analysts, operations planners, and wargamers represent, understand, and forecast socio-cultural behavior at the strategic, operational and tactical levels. It will provide: data infrastructure/frameworks that will facilitate subsequent model development and validation; human behavior based theory for DoD-relevant models; visualization infrastructures to rapidly assess the human terrain at strategic to tactical levels; and situation-relevant education and training tools for disparate user communities.

Database Infrastructure/Framework will facilitate subsequent model development and validation.

Human behavior based theory for DoD-relevant models will support development of software to help decision makers represent, understand, and forecast socio-cultural behavior at the strategic, tactical and operational levels.

Visualization Infrastructure will support rapid assessment of the human terrain at strategic to tactical levels.

Situation-relevant education and training tools will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools.

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B. Program Change Summary (\$ in Millions)

	<u>FY 2009</u>	<u>FY 2010</u>	<u>FY 2011 Base</u>	<u>FY 2011 OCO</u>	<u>FY 2011 Total</u>
Previous President's Budget	7.685	9.446	0.000	0.000	0.000
Current President's Budget	8.063	7.882	9.499	0.000	9.499
Total Adjustments	0.378	-1.564	9.499	0.000	9.499
• Congressional General Reductions		0.000			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds		0.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	0.988	0.000			
• SBIR/STTR Transfer	-0.204	0.000			
• Other Program Adjustments	-0.406	-1.564	9.499	0.000	9.499

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COST (\$ in Millions)	FY 2009 Actual	FY 2010 Estimate	FY 2011 Base Estimate	FY 2011 OCO Estimate	FY 2011 Total Estimate	FY 2012 Estimate	FY 2013 Estimate	FY 2014 Estimate	FY 2015 Estimate	Cost To Complete	Total Cost
<i>P270: Human, Social and Culture Behavior (HSCB) Modeling Applied Research</i>	8.063	7.882	9.499	0.000	9.499	15.843	17.991	18.322	18.662	Continuing	Continuing

A. Mission Description and Budget Item Justification

The HSCB Modeling Program is a vertically integrated effort to research, develop, and transition technologies, tools, and systems to programs of record and users in need. Under three integrated PEs, the Program will conduct applied research (6.2), which will then be matured and demonstrated (6.3), and the results then tested and transitioned (6.4). This HSCB line item is focused on applied research, developing an applied science base and general-use, cross-domain capabilities/tools to support the HSCB application domains of analysis, operational planning, training, and operations experimentation (wargaming). The work will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools. It will create software tools that will help intelligence analysts, operations analysts, operations planners, and wargamers represent, understand, and forecast socio-cultural behavior at the strategic, operational and tactical levels. It will provide: data infrastructure/frameworks that will facilitate subsequent model development and validation; human behavior based theory for DoD-relevant models; visualization infrastructures to rapidly assess the human terrain at strategic to tactical levels; and situation-relevant education and training tools for disparate user communities.

Database Infrastructure/Framework will facilitate subsequent model development and validation.

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Visualization Infrastructure will support rapid assessment of the human terrain at strategic to tactical levels.

Situation-relevant education and training tools will focus on computational/analytical socio-cultural data collection, theory development, and application methodologies and tools.

B. Accomplishments/Planned Program (\$ in Millions)

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
socio-cultural behavior models, their theoretical foundation and the translation of theory into model constructs.						
<p>Human Behavior Based Theory for DoD Models</p> <p>Conduct the research necessary to develop and refine theoretical constructs and validate them using empirical data. Apply validation techniques across the spectrum of applications (Intelligence, Influence Operations, Planning) to quantitative models of socio-cultural factors in coalition warfare and socio-cultural factors of military significance for emerging conflicts. Develop a human behavior modeling framework that is independent of specific socio-cultural values, attitudes and beliefs.</p> <p><i>FY 2009 Accomplishments:</i> Most models and forecasting tools are built upon experiences in a single region, a single coalition force, etc. and are not generalizable to other regions. In FY09, the program developed both more detailed and validated limited scope models as well as more generalizable models and tools that can be reused for other regions of interest, allowing DoD to give more consideration to human, social and cultural factors in early (Phase 0) planning.</p> <p><i>FY 2010 Plans:</i> Focus on the application of hybrid modeling environments where hybrid means using a combination of the major modeling modalities (systems dynamics, game theoretic and agent). Develop the theory to support hybrid, generalizable models across the spectrum from tactical to operational to strategic. Research the effectiveness of generalizable models at the tactical, operational and strategic levels and determine the data fidelity requirements for each level of modeling. Conduct the research necessary to more fully understand the socio-cultural factors influencing model outputs.</p> <p><i>FY 2011 Base Plans:</i> Continue application of hybrid modeling environments where hybrid means using a combination of the major modeling modalities (systems dynamics, game theoretic and agent). Continue to develop</p>		2.758	3.298	3.875	0.000	3.875

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B. Accomplishments/Planned Program (\$ in Millions)						
		FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
for filling them. Expected focus will include leveraging serious gaming techniques for virtual training and mission rehearsal.						
Visualization Infrastructure Develop common categorization of meta-information (i.e., the data source and pedigree, what types of uncertainty are associated with it, how old is the data, etc.) in existing visualization tools/decision aiding systems. Develop methods for visually and digitally depicting the incomplete, subjective, volatile, and/or imprecise nature of cultural information to support manual and automated analysis. <i>FY 2009 Accomplishments:</i> Developed visualization methods for displaying uncertainty in common geospatial tools currently used by DoD. The dynamic complexity of human behavior, beliefs and cultures means that there will always be some level of uncertainty to forecasting and mapping the human terrain. It is vital to accurately represent this degree of uncertainty in geospatial toolsets, decision aids, etc. Developed generalizable methods/tools for displaying this uncertainty. <i>FY 2010 Plans:</i> Develop visualization tools and infrastructures that display hybrid data sources such as geospatial layers, person and group relationships, and related socio-cultural data in ways that are easy for the user to assimilate and that address how evidence is created using provided data and how uncertainty propagates throughout the system. Incorporate visualization tools into broader modeling toolkits for more effective use. <i>FY 2011 Base Plans:</i> Continue development of visualization infrastructure that displays hybrid data sources. Expected focus will include research of visualization capability that will provide end-to-end support for commanders at all levels for operational planning and effects assessment.		1.178	1.236	0.827	0.000	0.827
Military Photomedicine		1.147	0.000	0.000	0.000	0.000

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B. Accomplishments/Planned Program (\$ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
<p>Research and development projects focusing on Photomedicine solutions to several medical problems of wounded warriors. Projects include: Conduits for Damaged or Missing Nerve Repair; Normalization of Severe Wound Scars; and Traumatic Brain Injury - Mechanism of Treatment by Non-invasive Near-Infrared Light.</p> <p><i>FY 2009 Accomplishments:</i> Conducted human studies to develop photochemical tissue bonding for specific military needs including eye, skin, tendon, and nerve damage. Continued development of nerve conduits, preclinical studies and design of a portable laser activator to be used in military medicine. Performed optimization studies on fractional laser resurfacing as a means to remodel skin tissue and clinically modify and reduce scarring. Analyzed the exposure of near-infrared light as a reduction or prevention to loss of brain neurons following traumatic head injury. Performed preclinical studies to understand and optimize its potential treatment for traumatic brain injury.</p>					
Accomplishments/Planned Programs Subtotals	8.063	7.882	9.499	0.000	9.499

C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total	FY 2012	FY 2013	FY 2014	FY 2015	Cost To Complete	Total Cost
• PE 0603670D8Z BA 3 : <i>HSCB Advanced Development</i>	8.443	10.395	11.510		11.510	19.187	21.765	22.119	22.513	Continuing	Continuing
• PE 0604670D8Z BA 4 : <i>HSCB Research and Engineering</i>	5.392	6.950	7.459		7.459	12.206	14.759	14.983	15.206	Continuing	Continuing

D. Acquisition Strategy

N/A

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E. Performance Metrics

N/A

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