| Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Defense Advanced Research Projects Agency | DATE: February 2010 |
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| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* |

| 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 | 133.138 | 138.361 | 234.985 | 0.000 | 234.985 | 220.099 | 224.850 | 190.625 | 190.435 | Continuing | Continuing |
| NET-01: *JOINT WARFARE SYSTEMS* | 46.148 | 50.765 | 71.175 | 0.000 | 71.175 | 64.380 | 55.393 | 40.352 | 40.312 | Continuing | Continuing |
| NET-02: *MARITIME SYSTEMS* | 16.920 | 32.677 | 41.682 | 0.000 | 41.682 | 54.639 | 62.612 | 35.570 | 35.535 | Continuing | Continuing |
| NET-CLS: *CLASSIFIED* | 70.070 | 54.919 | 122.128 | 0.000 | 122.128 | 101.080 | 106.845 | 114.703 | 114.588 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

(U) The Network-Centric Warfare Technology program element is budgeted in the Advanced Technology Development budget activity because it addresses high payoff opportunities to develop and rapidly mature advanced technologies and systems required for today's network-centric warfare concepts. It is imperative for the future of the U.S. forces to operate flawlessly with each other, regardless of which services and systems are involved in any particular mission. The overarching goal of this program element is to enable technologies at all levels, regardless of service component, to operate as one system.

(U) The objective of the Joint Warfare Systems project is to create enabling technologies for seamless joint operations, from strategic planning to tactical and urban operations. Joint Warfare Systems leverage current and emerging network, robotic, and information technology and provide next generation U.S. forces with greatly expanded capability, lethality, and rapid responsiveness. Critical issues facing this project are: (1) U.S. opponents utilizing systems that are flexible, robust, and difficult to neutralize; and (2) U.S. doctrine that limits the use of firepower to lessen the impact of operations on noncombatants. These problems are magnified in urban and semi-urban areas where combatants and civilians are often collocated, and in peacekeeping operations where combatants and civilians are often indistinguishable. Meeting these challenges places a heavy burden on joint war planning. Understanding opponent networks is essential so that creative options can be developed to counter their strategies. Synchronization of air and ground operations to apply force only where needed and with specific effects is required.

(U) The Maritime Systems project will identify, develop and rapidly mature critical advanced technologies and system concepts for the naval forces' role in today's network centric warfare concept. Naval forces play an ever-increasing role in network centric warfare because of their forward deployed nature, their unique capability to operate simultaneously in the air, on the sea and under the sea and their versatile ability to provide both rapid strike and project sustained force. The technologies developed under this project will capitalize on these attributes, improve them and enable them to operate with other network centric forces.

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**B. Program Change Summary ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Previous President's Budget | 154.015 | 135.941 | 0.000 | 0.000 | 0.000 |
| Current President's Budget | 133.138 | 138.361 | 234.985 | 0.000 | 234.985 |
| Total Adjustments | -20.877 | 2.420 | 234.985 | 0.000 | 234.985 |
| • Congressional General Reductions | | -0.580 | | | |
| • Congressional Directed Reductions | | -12.000 | | | |
| • Congressional Rescissions | -14.572 | 0.000 | | | |
| • Congressional Adds | | 0.000 | | | |
| • Congressional Directed Transfers | | 0.000 | | | |
| • Reprogrammings | -1.978 | 0.000 | | | |
| • SBIR/STTR Transfer | -4.327 | 0.000 | | | |
| • Congressional Restoration for New Starts | 0.000 | 15.000 | 0.000 | 0.000 | 0.000 |
| • TotalOtherAdjustments | 0.000 | 0.000 | 234.985 | 0.000 | 234.985 |

**Change Summary Explanation**

FY 2009

Decrease reflects Section 8042 rescission of the FY 2010 Appropriations Act, SBIR/STTR transfer and internal below threshold reprogramming.

FY 2010

Increase reflects the FY 2010 Congressional Restoration for New Starts offset by reductions for the Section 8097 Economic Assumption, execution delays and FY 2010 new starts.

FY 2011

Not Applicable

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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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NET-01: *JOINT WARFARE SYSTEMS* | 46.148 | 50.765 | 71.175 | 0.000 | 71.175 | 64.380 | 55.393 | 40.352 | 40.312 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

(U) The objective of the Joint Warfare Systems project is to create enabling technologies for seamless joint operations, from strategic planning to tactical and urban operations. Joint Warfare Systems leverage current and emerging network, robotic, and information technology and provide next generation U.S. forces with greatly increased capability, lethality, and rapid responsiveness. Critical issues facing this project are: (1) U.S. opponents using systems that are flexible, robust, and difficult to neutralize; and (2) U.S. doctrine that limits the use of firepower to lessen the impact of operations on noncombatants. These problems are magnified in urban and semi-urban areas where combatants and civilians are often co-located, and in peacekeeping operations where combatants and civilians are often indistinguishable. Meeting these challenges places a heavy burden on joint war planning. Understanding opponent networks is essential so that creative options can be developed to counter their strategies. Synchronization of air and ground operations to apply force only where needed and with specific effects is required. This project supports all levels of the force structure including: (1) the strategic/operational level by generating targeting options against opponents' centers of gravity that have complex networked relationships; (2) the tactical/operational level by managing highly automated forces with tight coupling between air and ground platforms; and (3) the focused tactical level by developing platforms and tools, which acquire targets of opportunity and cue network-based analysis of likely enemy operations thus maximizing the effectiveness of ground forces in stability and support operations.

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Geospatial Exploitation (GEO) | 4.000 | 3.351 | 1.500 | 0.000 | 1.500 |
| (U) The Geospatial Exploitation (GEO) thrust will provide a new set of geospatial intelligence (GEOINT) products, continuously updated and maintained in a form that ensures their consistency across both product elements (digital elevation models, traditional maps, 3-D structure models, census summaries, and directories) and spatial nodes (coarse resolution country data for economic analysis to fine resolution building data for platoon-level combat operations). Techniques of interest include model-based image analysis (both object recognizers and change detectors), symbolic correlators (both temporal and spatial), and emerging cognitive methods to identify changes to | | | | | |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| objects, addresses, names, and functions of natural and human-made structures. These algorithms will be scaled to operate on data streams including full-motion video, Laser Identification Detection and Ranging (LIDAR), multi- and hyper-spectral, synthetic aperture radar (SAR), and Geographic Information Systems (GIS) in addition to conventional electro-optical (EO) geospatial imagery. GEO algorithm architectures will be explored to achieve scalability through spatial, temporal and ontological partitioning. GEO technologies are planned for transition to the National Geospatial-Intelligence Agency (NGA). Activities funded within the GEO research space include:<br><br>• The Urban Reasoning and Geospatial Exploitation Technology (URGENT) program is developing a 3-D urban object recognition and exploitation system that enables advanced mission planning and situation analysis capabilities for the warfighter operating in urban environments. URGENT will create techniques for the rapid exploitation of EO and LIDAR sensor data at the city scale to recognize urban objects down to the soldier scale. URGENT will apply image processing technology to geospatially registered 2-D/3-D data collected from airborne and terrestrial sources, yielding precise annotations for the objects in an urban area. URGENT will also develop a 3-D reasoning engine to query object shapes, locations, and classifications for advanced geospatial exploitation capabilities.<br><br>• The Geospatial Representation Integrated Dataspace (GRID) program is developing an automated geospatial data fusion, modeling, and dissemination system from national assets for the tactical warfighter. Geospatial registration algorithms will automatically fuse geospatial data from multiple sources including EO, LIDAR, SAR, and hyperspectral - and encode the fused data as a temporally indexed volumetric model that drastically reduces geospatial data storage requirements while enhancing image quality. Updates will propagate to the model using a compressed geospatial data format capable of reaching the warfighter even with the bandwidth constraints of tactical networks.<br><br>*FY 2009 Accomplishments:*<br>Urban Reasoning and Geospatial Exploitation Technology (URGENT) | | | | | |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Demonstrated automated object recognition capability on fused EO and LIDAR data from aerial and terrestrial urban sources.<br>- Evaluated speed and accuracy of performance of automated object recognition in comparison with the performance of human geospatial analysts.<br><br>Geospatial Representation Integrated Dataspace (GRID)<br>- Demonstrated volumetric encoding of LIDAR, electo-optical and hyper-spectral data from national assets showing a reduction in data storage relative to the raw data without impacting performance.<br>- Demonstrated the volumetric encoding of non-optical (e.g., SAR) data with optical data.<br>- Validated through qualitative simulation that GRID technology increases troop movement rates and reduces casualties.<br><br>*FY 2010 Plans:*<br>Urban Reasoning and Geospatial Exploitation Technology (URGENT)<br>- Develop capability for rapid retraining on one or more new geospatial areas and object classes.<br>- Develop interactive user environment for military geospatial exploitation.<br>- Begin the process of transition of selected object recognition technology to a military geospatial analysis environment.<br><br>Geospatial Representation Integrated Dataspace (GRID)<br>- Increase the compression ratio of volumetric data compared to raw geospatial source data.<br>- Develop the ability to detect changes in the geometry and surface properties of the urban terrain.<br>- Develop the ability to plan paths and analyze road network trafficability through complex urban terrain using fused geospatial data.<br><br>*FY 2011 Base Plans:*<br>Urban Reasoning and Geospatial Exploitation Technology (URGENT) | | | | | |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Implement a reasoning capability that exploits knowledge from Geographic Information System (GIS) documents.<br>- Complete the process of transition of selected object recognition technology to a military geospatial analysis environment.<br><br>Geospatial Representation Integrated Dataspace (GRID)<br>- Demonstrate the volumetric encoding of electro-optical and LIDAR data from tactical as well as national assets.<br>- Develop the ability render fused geometric models into realistic 3D gamelike environments.<br>- Develop the ability to propagate changes to the dataspace throughout a distributed system on a network with severe bandwidth constraints. | | | | | |
| Network Command<br><br>(U) The Network Command program leverages recent advances in network computing, simulation, and visualization to dramatically improve collaboration among physically separate command posts and lower echelons. Network Command enables warfighters to share situation information and exploited data from the area of responsibility, develop coordinated battle plans, generate and compare alternate courses of action, and assess likely outcomes, without conventional group briefings. Network Command also enables warfighters to prepare for joint missions using high-fidelity, mixed-reality combat simulation and visualization technologies.<br><br>• The Network-Centric Situation Assessment program develops and deploys technologies to assess military situations at levels of interest above individual targets. The program uses all-source data to reconstruct unit organizations, mission relationships, logistics connections, and communications connectivity and analyzes data over time to infer movement, communication, and supply patterns. Within this context, capability analyses are provided and future courses of action are hypothesized. The objective is to understand potential capabilities and intentions of opposing forces. This effort provides greater understanding of opponents' force structures, capabilities, and operational practices, | 3.000 | 1.889 | 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 |
|---|---|---|---|---|---|
| and then enables commanders to sustain effects-based targeting rather than simple attrition strategies. The program provides a context for discovering vulnerabilities in opposing forces and provides cues for intelligence, surveillance, and reconnaissance planning, as it suggests areas of future enemy activity that merit intense scrutiny. Technologies are planned to transition to the U.S. Army.<br><br>• The Joint Mission Rehearsal program integrates high-fidelity, mixed-reality combat simulations with situation assessment and planning tools. The objective is to allow rehearsal of joint missions, prior to actual engagements. The visualization permits the warfighter to interact with both reality and the simulation simultaneously in a manner consistent with their anticipated role in the mission. The program delivers the capability to practice and fine-tune mission plans for joint military operations and enables commanders and staff to participate from their current location instead of a training facility, thereby reducing deployment needs while improving mission planning and effectiveness. Technologies are planned to transition to the U.S. Army Simulation, Training & Instrumentation Command, United States Special Operations Command (USSOCOM), and the Marine Corps Combat Development Command (MCCDC).<br><br>*FY 2009 Accomplishments:*<br>Network-Centric Situation Assessment<br>- Completed system design and analysis.<br><br>Joint Mission Rehearsal<br>- Evaluated simulation technology for use in Army/Marine tactical scenarios.<br>- Evaluated technology for use of synthetic Opposition Forces (OPFOR) within the real world-training environment.<br><br>*FY 2010 Plans:*<br>Joint Mission Rehearsal<br>- Design a system for use in Platoon level mission rehearsal and planning. | | | | | |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Demonstrate in a simulated urban training environment with presentation of synthetic opposition forces (OPFOR). | | | | | |
| Mobile Intelligent Sensors (MIS)<br>(U) There is particular interest in exploiting new legged, wheeled, and tracked robots to create "robot-enabled sensors" that are capable of sensing, moving, and self-organizing into a viable network for reliable data exfiltration. The Mobile Intelligent Sensors (MIS) program and the Remote Detection of Suspicious Vehicles (RDSV) program are developing such advanced sensor, exploitation, networking, and battle management capabilities for joint dismounted forces. These nodes will have a sufficient level of embedded intelligence so that they can identify, learn, adapt, and traverse through or under small openings and circumnavigate barriers larger than themselves, yet be capable of carrying an operationally-meaningful day/night sensor payload. Envisioned payloads include EO/IR for day/night imaging and video surveillance/monitoring and acoustic/vibration sensing to obtain information such as foot and vehicular traffic, operation of mechanical systems, gunfire, excavation activities, etc. Technologies are planned to transition to the U.S. Army, U.S. Special Operations Command, and the U.S. Marine Corps.<br><br>*FY 2009 Accomplishments:*<br>Mobile Intelligent Sensors (MIS)<br>- Created system definition, concept of operations, and operational scenarios.<br>- Developed payload size, weight, and power requirements (SWAP) and assessed the feasibility of alternative approaches.<br>- Defined signal processing requirements and identified algorithmic approaches.<br>- Collected data for offline performance analysis.<br><br>Remote Detection of Suspicious Vehicles (RDSV)<br>- Executed transition experiments and system development of field deployable prototypes with the U.S. Army, the U.S. Marine Corps, and other Agencies. | 2.000 | 1.000 | 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 |
|---|---|---|---|---|---|
| - Demonstrated system performance in major PACOM exercise in a joint environment.<br>- Executed transition to military use in current military theater of operations.<br><br>*FY 2010 Plans:*<br>Mobile Intelligent Sensors (MIS)<br>- Develop sensors meeting SWAP requirements.<br>- Implement algorithms and integrate a prototype signal processor.<br><br>Remote Detection of Suspicious Vehicles (RDSV)<br>- Complete transition activities with the U.S. Army, U.S. Marine Corps, and other Agencies. | | | | | |
| Seismic/Acoustic Vibration Imaging (SAVI)<br>(U) The Seismic/Acoustic Vibration Imaging (SAVI) program will develop the capability to locate both buried landmines and near-surface tunnels using active acoustic and seismic sources coupled with a multi-pixel laser vibrometer. These systems will employ well characterized acoustic and seismic sources to stimulate the targets of interest from a remote platform. Focused acoustic sources will be employed to remotely stimulate plastic or metal antipersonnel and antitank mines. A laser vibrometer system will be used to detect the stimulated resonant characteristic of the mines to discriminate against natural sources of clutter. Similarly, the interaction of near-surface seismic waves with tunnels and other objects will be observed with a multi-pixel laser vibrometer system and used to assess the depth and extent of the targets in the midst of natural and man-made clutter. The systems developed under this effort will be tested against a wide variety of soil types and environments to support operations under a wide range of conditions. Upon successful development of the initial and objective systems, the capabilities will be transitioned to the Army and Marine ground forces for the development and employment of operational systems starting in FY 2011. | 16.618 | 7.954 | 1.416 | 0.000 | 1.416 |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2009 Accomplishments:*<br>- Completed the development of the component technologies required by the scalable system demonstration.<br>- Completed the development of high speed data processing capability to support realtime detection of buried landmines.<br>- Initiated scalable system integration for mobile detection demonstration.<br>- Initiated the development of the scalable brassboard system for mobile operations.<br><br>*FY 2010 Plans:*<br>- Complete scalable system integration for mobile buried landmine and static near surface tunnel detection.<br>- Complete scalable system outdoor demonstration of acoustic landmine hunting and limited seismic tunnel testing.<br>- Initiate scaled system development to improve coverage rate and standoff distance.<br><br>*FY 2011 Base Plans:*<br>- Demonstrate final scaled system for Active Acoustic Landmine and Active Seismic Tunnel Detection with 1000+ pixel laser vibrometer.<br>- Initiate transition to Army and Marines. | | | | | |
| Multipath Exploitation Radar (MER)<br><br>(U) The Multipath Exploitation Radar (MER) program will address radar deficiencies in urban operations: limited line of sight due to urban structures and excessive confusers due to multipath reflections. This program will exploit multipath bounces to detect and track moving targets beyond line-of-sight (LOS), and extend the area coverage rate of airborne sensors by a factor of six or more over physical line-of-sight limits. If successful, the urban coverage improvement will make it cost effective to consider airborne surveillance of an area the size of a large metropolitan area with a handful of airborne | 5.185 | 4.000 | 2.240 | 0.000 | 2.240 |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| sensors. This capability will facilitate both manned and unmanned airborne Intelligence, Surveillance and Reconnaissance (ISR) and is planned to transition to the Air Force and Army in 2011.<br><br>*FY 2009 Accomplishments:*<br>– Collected representative field data in urban environment using COTS radar to validate multipath phenomenology and support algorithm concept development.<br>– Validated physics of specular multipath radar returns in collected representative field data.<br><br>*FY 2010 Plans:*<br>- Develop and validate urban target and clutter signature models accounting for non-line-of-site propagation.<br>- Develop urban tracking algorithms that predict, detect, and incorporate multipath radar returns using knowledge of the urban terrain.<br>- Document modeling and algorithm performance against urban collected field data.<br><br>*FY 2011 Base Plans:*<br>- Determine upper bounds on track accuracy, persistence, and target density that can be achieved using NLOS returns.<br>- Develop system concept for persistent wide-area surveillance over large metropolitan areas using multiple platforms.<br>- Quantify the radar hardware and processing requirements to implement MER and identify potential transition platforms.<br>- Transition Multipath Exploitation Radar system to the Services. | | | | | |
| Human-carried Explosive Detection Stand-off System (HEDSS)<br><br>(U) Insurgent and terrorist elements are increasingly relying on human carried explosives because they are nearly impossible to visibly detect. The goal of the Human-carried Explosive Detection Stand-off System (HEDSS) program is to develop a system that can rapidly and automatically identify human- | 6.200 | 2.500 | 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 |
|---|---|---|---|---|---|
| carried explosives (HCEs) at stand-off ranges. While alternative technologies exist for HCE detection, they necessitate close-in sensing, are expensive and require extended processing times. Successful development of a HEDSS will provide reliable protection for deployed forces from suicide bombers by allowing enough time and space to interdict bombers before they cause maximum damage. The technology is planned for transition to the Army, Air Force and Marines.<br><br>*FY 2009 Accomplishments:*<br>- Developed preliminary design of HEDSS production model.<br>- Determined by analysis a unit cost versus the number of models purchased and production unit performance estimates.<br>- Measured a reduced set of targets of interest in a controlled environment using a scaled down version of the system.<br><br>*FY 2010 Plans:*<br>- Conduct extensive field testing and performance analysis. | | | | | |
| Multi Dimensional Mobility Robot (MDMR)<br><br>(U) The Multi Dimensional Mobility Robot (MDMR) program investigated concepts using serpentine mobility to achieve new ground robot capabilities for search and rescue applications. Examples of these capabilities include: overcoming obstacles that are a significant fraction of its length, crossing slippery surfaces, ascending poles, climbing steep slopes, and optically sensing its immediate surroundings.<br><br>*FY 2009 Accomplishments:*<br>- Demonstrated field capable performance. | 1.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| Network Targeting | 5.145 | 12.260 | 15.910 | 0.000 | 15.910 |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| (U) The Network Targeting program will develop advanced capabilities for a specified emitter density, operating environment, RF signal location accuracy, probability of correct RF signal identification and probability of false alarm. Each phase will progressively mature the design and technologies required to achieve system performance goals and move incrementally toward an operational system. The technology is planned to transition to the Services in FY 2013.<br><br>*FY 2009 Accomplishments:*<br>- Performed system design.<br>- Collected data for algorithm development, testing and evaluation.<br><br>*FY 2010 Plans:*<br>- Develop components and software for a system.<br>- Conduct performance validation via laboratory demonstrations in a controlled operational environment.<br><br>*FY 2011 Base Plans:*<br>- Demonstrate real-time processing on brassboard hardware.<br>- Conduct performance validation via demonstrations in a higher-complexity operational environment. | | | | | |
| Legged Squad Support System (LS3)<br>(U) The Legged Squad Support System (LS3) program will explore the development of a mission-relevant quadruped platform scaled to unburden the infantry squad and hence unburden the soldier. In current operations, soldiers carry upwards of 50lbs of equipment, in some cases over 100lbs, over long distances in terrain not always accessible by wheeled platforms that support infantry. As a result, the soldier's combat effectiveness can be compromised. The LS3 program will design and develop prototypes capable of carrying 400lbs of payload for 20 miles in 24 hours, negotiating terrain at endurance levels expected of typical squad maneuvers. LS3 will leverage technical breakthroughs of prior biologically inspired legged platform development efforts. It will develop system designs to | 3.000 | 8.000 | 16.083 | 0.000 | 16.083 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-01: *JOINT WARFARE SYSTEMS* |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| the scale and performance adequate for infantry squad mission applications, focusing on platform, control, and human-machine interaction capabilities, as well as secondary design considerations, such as acoustic signature. Multiple technical approaches will be explored, including electromechanical and hydraulic methods of legged actuation. Anticipated service users include the Army, Marines and Special Forces.<br><br>*FY 2009 Accomplishments:*<br>- Developed, analyzed and assessed preliminary designs to achieve a system capable of twenty miles of endurance in a twenty-four hour (unrefueled) period, carrying a 400lb payload.<br>- Simulated gait selection, execution, and transitioning.<br><br>*FY 2010 Plans:*<br>- Build subsystems that prove design validity.<br>- Model foot placement, stability against disturbances, and self-righting.<br>- Conduct subsystems testing and results analysis.<br><br>*FY 2011 Base Plans:*<br>- Complete critical design review and integration plan; initiate demonstration system fabrication.<br>- Complete initial integration of controls to demonstrate walk and trot.<br>- Integrate perception hardware. | | | | | |
| Cave Dog<br><br>(U) The Cave Dog program will provide an alternative to visual, infrared and millimeter wave radar imaging for environments in which obscurants are used that limit the imaging capability of these systems. Cave Dog will provide an acoustics-based imaging capability. By sensing reflected sound waves and combining the low resolution acoustic imaging data with architectural and contextual models of the environment, an approximate representation of the area surrounding a soldier may be developed, allowing a soldier to identify walls, doorways, and people. Cave Dog will provide the soldier with | 0.000 | 0.000 | 1.214 | 0.000 | 1.214 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
|---|---|---|
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**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| knowledge of his environment in conditions of total darkness and in the presence of smoke, dust, or other airborne particles. The Cave Dog program will focus on developing sensors as well as the software required to provide real-time processing of acoustic array data and algorithms to develop a representation of the surrounding environment based on the coarse imagery provided by the acoustic sensor and models of architectural and structural elements of the surrounding environment.<br><br>*FY 2011 Base Plans:*<br>- Conduct analysis of available sensor technologies and perform algorithm development.<br>- Demonstrate static sensor capability for acoustic detection of walls and doorways in a room. | | | | | |
| High Energy Liquid Laser Area Defense System (HELLADS)<br>(U) Building upon the achievements of the HELLADS development program budgeted in DARPA PE 0602702E, Project TT-06, the goal of the High Energy Liquid Laser Area Defense System (HELLADS) program is to develop a high-energy laser weapon system (150 kW) with an order of magnitude reduction in weight compared to existing laser systems. With a weight goal of <5 kg/kW, HELLADS will enable high-energy lasers (HELs) to be integrated onto tactical aircraft and will significantly increase engagement ranges compared to ground-based systems, enable high precision, low collateral damage, and rapid engagement of fleeting targets for both offensive and defensive missions. With the assistance of the U.S. Air Force, the HELLADS program will pursue the necessary analysis, coordination, and design activity for a prototype laser weapon system incorporating the HELLADS laser system into a test aircraft.<br><br>*FY 2011 Base Plans:*<br>- Design suitable physical and functional aircraft interfaces for the prototype system.<br>- Develop test plans and procedures; analyze, procure, and prepare suitable target systems and test range environments.<br>- Conduct necessary modeling and simulation for system performance and target interactions. | 0.000 | 0.000 | 25.000 | 0.000 | 25.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-01: *JOINT WARFARE SYSTEMS* |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Coordinate other activities necessary for safe and effective operation of the prototype system on the test aircraft. | | | | | |
| Chemical Analysis Sans Machinery (CASM)<br>(U) The Chemical Analysis Sans Machinery (CASM) program will develop novel materials and fabrication methods to produce high throughput, autonomous, low cost, chemical analysis devices.<br>*FY 2010 Plans:*<br>- Develop novel materials and technologies with unique chemical analysis properties.<br>- Fabricate materials with high throughput for chemical analysis.<br>- Fabricate materials for chemical analysis, amenable to low cost manufacturing.<br>*FY 2011 Base Plans:*<br>- Fabricate materials with more rapid response time for chemical analysis.<br>- Fabricate materials that are more reliable and sensitive for chemical analysis.<br>- Integrate novel materials and technologies into chemical analysis devices. | 0.000 | 9.811 | 7.812 | 0.000 | 7.812 |
| Accomplishments/Planned Programs Subtotals | 46.148 | 50.765 | 71.175 | 0.000 | 71.175 |

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

N/A

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

Specific programmatic performance metrics are listed above in the program accomplishments and plans section.

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-02: *MARITIME SYSTEMS* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NET-02: *MARITIME SYSTEMS* | 16.920 | 32.677 | 41.682 | 0.000 | 41.682 | 54.639 | 62.612 | 35.570 | 35.535 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

(U) The objective of the Maritime Systems project is to identify, develop and rapidly mature critical advanced technologies and system concepts for the naval forces' role in today's network centric warfare concept. Improvements in communications between and among submarines, surface ships and naval aircraft have allowed these forces to operate seamlessly with each other and with other Service's network centric systems. Naval forces will play an ever-increasing role in network centric warfare because of their forward deployed nature, their unique capability to operate simultaneously in the air, on the sea and under the sea and their versatile ability to provide both rapid strike and project-sustained force. The technologies developed under this project will capitalize on these attributes, improve them and enable them to operate with other network centric forces.

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Persistent Ocean Surveillance (POS) | 2.250 | 1.850 | 1.000 | 0.000 | 1.000 |
| (U) The Persistent Ocean Surveillance (POS) program combines geolocation techniques such as the global positioning system with station keeping and intra-sensor communication technologies to provide long-term ocean environment sensing buoys. These technologies, when applied with state-of-the-art undersea warfare sensors, will result in a floating field of smart sensors capable of observing the undersea environment in an area, including the presence of submarines and other undersea vehicles. A range of technologies have been considered including those that rely on the local environment (such as wind, ocean waves, solar energy, temperature differentials, etc.) for their power, miniature geolocation technologies, and technologies for sensor data storage, transmission, and intra-field communications. The Renewable At-Sea Power program focuses on efficient energy capture from the environment in order to achieve capability for fully renewable power at sea. Technology from this program will be available for transition to the U.S. Navy. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-02: *MARITIME SYSTEMS* |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2009 Accomplishments:*<br>- Conducted design study of efficient energy capture for long endurance capability.<br>- Integrated energy harvesting systems and conducted at sea testing.<br>- Developed computer simulation models.<br><br>*FY 2010 Plans:*<br>- Build instrumented platform to test improved endurance and survivability in high sea conditions.<br>- Conduct at-sea testing to validate performance of technologies and system models.<br><br>*FY 2011 Base Plans:*<br>- Integrate technologies into demonstration platform. | | | | | |
| River Eye<br><br>(U) Early entry maritime forces need maps of morphology, water depths, and currents in complex riverine/estuarine environments for mission planning and execution. This information is critical for route planning, sensor placement, rendezvous determination, vulnerability assessments, and determining objective assault engagement/disengagement strategies. For uncharted and/or denied areas, present methods are inadequate for obtaining the necessary information. Reliable remote sensing methods do not exist that produce bathymetry and water current data in waters that are sediment laden (bottom not visible) and/or sheltered (swell and significant wind waves are not likely). The River Eye effort will provide a new capability to predict or assess, in real time, river and estuary conditions to enable special operations mission planning and execution. New techniques will be developed to indirectly determine current speed and direction by remotely sensing advection of scene features. Using advanced modeling techniques, indirectly sensed current data will be used to extract bathymetry data. Forward circulation models will use the bathymetry data to predict future currents and water heights in a mission planning decision support tool. The River Eye effort is anticipated to transition to the Navy and National Geospatial-Intelligence Agency. | 3.082 | 3.025 | 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 |
|---|---|---|---|---|---|
| *FY 2009 Accomplishments:*<br>- Refined algorithms for extracting circulation currents and bathymetry in more complex environments.<br>- Performed data collections over diverse rivers and estuaries.<br>- Compared currents derived from River Eye algorithms to currents measured by acoustic Doppler current profilers and both were in agreement.<br>- Continued development of the inverse model for extracting bathymetry from indirectly sensed currents.<br>- Demonstrated highly accurate estimation of water depth and channel locations.<br><br>*FY 2010 Plans:*<br>- Improve the automation of the current extraction algorithms and inverse model to handle clouds and moving objects in the time series data.<br>- Develop a variable grid size to improve current resolution.<br>- Develop capability to identify shoals.<br>- Apply inverse model to new physical environments and improve the efficiency of the model.<br>- Demonstrate the inverse model to obtain bathymetry in an unknown environment.<br>- Transition River Eye current and bathymetry algorithms to the Navy and National Geospatial-Intelligence Agency. | | | | | |
| Tango Bravo<br><br>(U) Based on the results of the DARPA/Navy Submarine Design Study, the Tango Bravo technology demonstration program is exploring design options for a reduced-size submarine with equivalent capability of the VIRGINIA Class submarine. The implicit goal of this program is to reduce platform infrastructure and, ultimately, the cost of future design and production of submarines. The program is a collaborative effort to overcome selected technological barriers that are judged to have a significant impact on submarine platform and infrastructure cost. DARPA and the Navy, under a Memorandum of Agreement, jointly formulated technical objectives for critical technology demonstrations in: 1) shaftless | 5.669 | 6.177 | 4.632 | 0.000 | 4.632 |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| propulsion, 2) external weapons stowage and launch, 3) conformal alternatives to the existing spherical sonar array, 4) radical ship infrastructure reduction technologies that eliminate or substantially simplify hull, mechanical and electrical systems, and 5) automated attack center technologies to reduce crew manning.<br><br>(U) Anticipating success of shaftless propulsion technologies demonstrated in the Tango Bravo program, DARPA and the U.S. Navy initiated a Memorandum of Agreement in 2008 with the goal of designing, building, and testing a large scale Submarine Shaftless Stern Demonstrator (S3D) to characterize and mitigate risks associated with ship integration into a next generation submarine propulsion option. The S3D program will now focus on full-ship concept studies and the Tango Bravo Shaftless Propulsion technical risk reduction activities will conclude in FY 2011. Elements of the Tango Bravo program began transition to the Navy in FY 2009, with full transition now anticipated at the conclusion of the Shaftless Propulsion project in FY 2010.<br><br>*FY 2009 Accomplishments:*<br>- Concluded testing of the electric actuator, including approximately one million full cycles of the actuator under representative at-sea dynamic loadings and pressures, completing the Radical Ship Infrastructure Reduction project.<br>- Completed concept studies for S3D.<br><br>*FY 2010 Plans:*<br>- Complete Shaftless Propulsion demonstrator assembly.<br>- Complete Shaftless Propulsion technical risk reduction integration tasks on S3D.<br><br>*FY 2011 Base Plans:*<br>- Complete Shaftless Propulsion integrated system testing (in-air, full load motor testing).<br>- Complete Shaftless Propulsion in-water acoustic and endurance testing. | | | | | |
| Maritime Persistent Surveillance and Awareness (MPSA) | 1.419 | 2.100 | 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 |
|---|---|---|---|---|---|
| (U) The Maritime Persistent Surveillance and Awareness (MPSA) program will develop an extensible battle management automation capability to provide persistent surveillance and situational awareness to protect naval forces against overwhelming threats. MPSA will use layered and distributed sensing, and add data from all sources for the non-traditional areas of infrastructure, socio-political developments and economic indicators. These systems will enable timely and coordinated decision-making and vastly improved situational awareness under uncertainty for naval commanders. MPSA will enable intelligent deployment of sensors and network infrastructures to protect sea-based assets through effective cross-platform and multi-mission fusion and resource management with focus on stand-off and elusive threats. Automated tracking with intelligent fusion and classification, and assimilation of non-traditional information sets are of particular interest. This will require bringing additional processing power to bear, allowing implementation of complex processing algorithms. MPSA will also enable the decoupling of intelligence, surveillance, and reconnaissance/defense missions from offensive missions, improving the power projection capability of the deployed force. MPSA will depart from previous approaches in assessing the operational environment in that it will not rely solely upon military indicators, but will also expand understanding to include national infrastructure, socio-political, and economic indicators to better assess trends and threat development. The program will transition to the Navy.<br><br>*FY 2009 Accomplishments:*<br>- Developed system concepts to assimilate and process data from all sources to detect changes in national infrastructure, socio-political climate and economic indicators that could affect adversary military capacity and capabilities.<br><br>*FY 2010 Plans:*<br>- Develop methodologies to assess effectiveness of component technologies through modeling and simulation. | | | | | |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
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**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Develop system architectures for assimilation and processing of classified and open source data to detect militarily relevant changes in a nation's physical infrastructure, socio-political climate and economic indicators.<br>- Develop advanced human-computer interaction techniques to optimize human/machine performance for the naval commander. | | | | | |
| Blue Laser for Submarine Laser Communications (SLC)<br>(U) The Blue Laser for Submarine Laser Communications (SLC) program will develop the critical laser technology necessary to support the requirements for non-acoustic Anti-Submarine Warfare (ASW), mine detection, and SLC. SLC and non-acoustic ASW programs are intended to develop the world's first wall-plug efficient laser that operates both at an optimum water transmission band of open ocean water and at the wavelength of a Cesium Atomic Line Filter. There is a pressing need for improved ASW capabilities in the current operating environment, particularly in shallow water (above the thermocline) and littoral areas of operations. This laser has the potential to enable duplex communications for the submarine at unrestricted speeds and deep depths and improve the detection depth of a non-acoustic anti-submarine warfare lidar system by a significant factor. A Memorandum of Agreement (MOA) was signed among DARPA, Commander, Submarine Forces (COMSUBFOR), Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8), and Program Executive Officer, Command, Control, Communications, Computers and Intelligence (PEO C4I). The MOA establishes a joint program to conduct a demonstration of the SLC technology during a recognized fleet exercise in FY 2012. The Blue Laser technology is planned for transition to the Navy.<br>*FY 2009 Accomplishments:*<br>- Designed, built and tested a power amplifier module to verify performance optically and thermally at high power.<br>- Commenced development of a breadboard blue solid state laser with improved wall-plug efficiency.<br>- Completed compatibility testing of breadboard blue solid state laser with Cesium (Cs) atomic line filter. | 4.500 | 10.025 | 21.550 | 0.000 | 21.550 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
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**B. Accomplishments/Planned Program ($ in Millions)**

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2010 Plans:*<br>- Complete design, build, and test of the breadboard blue solid state laser.<br>- Demonstrate laser / filter capability in a laboratory environment.<br>- Commence detailed design of flight brassboard transmitter.<br>- Commence optical, mechanical and electrical designs.<br>- Build and test optical, mechanical and electrical subassemblies for integration into the brassboard transmitter.<br>- Commence building, integration, and testing of amplifier modules into a full power output subsystem.<br>- Commence integrating the laser module transmitter with the receiver module.<br><br>*FY 2011 Base Plans:*<br>- Complete building, integration, and testing of amplifier modules in a full power output subsystem.<br>- Deliver, test and demonstrate flight brassboard transmitter for wavelength, energy per pulse, repetition rate, beam quality, pulsewidth, and wall-plug efficiency necessary for SLC and non-acoustic ASW. | | | | | |
| Thermal Management System for Ship Decks (TMD)<br><br>(U) It is anticipated that the high engine exhaust temperatures from the next generation of Vertical Take Off and Landing (VTOL) aircraft deployed on navy ships will dramatically reduce the life of both the deck structure and the non-skid surfaces. The Thermal Management System for Ship Decks (TMD) will address this problem by demonstrating a heat distribution system with an integrated thermally stable non-skid coating. Upon satisfactory completion of the development and certification of the design, the TMD will be transitioned to the Navy for integration into amphibious assault ships.<br><br>*FY 2010 Plans:*<br>- Develop and construct scaled modular passively cooled thermal management system. | 0.000 | 3.500 | 4.000 | 0.000 | 4.000 |

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
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| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-02: *MARITIME SYSTEMS* |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| *FY 2011 Base Plans:*<br>- Conduct assessment of thermo physical properties of non-skid coatings and develop thermally resistant non-skid coating.<br>- Develop and construct a small-scale, non-skid, coated, passively cooled thermal management system.<br>- Provide thermal management design and computational assessment to the Navy. | | | | | |
| Deep Sea Operations (DSOP)<br>(U) The Deep Sea Operations program will achieve game changing advantages through operations in the deep ocean exploiting maritime persistent surveillance and communications technologies. The deep ocean offers the ability to distribute, conceal and protect maritime assets and operations that today are readily described as concentrated, exposed, and vulnerable. The unfavorable extreme conditions of pressure, temperature, and signal propagation challenge the ability to operate in this frontier. Breakthroughs are needed in several areas: 1) Development of energy and power for persistence and propulsion, including energy harvesting, energy delivery, and solutions for air-independent propulsion; 2) Development of alternatives for through-water communications for high-bandwidth data exfiltration and command and control; and 3) Development of new sensing modalities to exploit unique signatures and deep ocean conditions, including overcoming acoustic aperture constraints through advanced synthetic aperture sonar or virtual laser-defined hydrophones for high resolution detection and classification. Success will lead to systems that capitalize on these breakthroughs to provide high payoff capability relevant to anti-submarine warfare, infrastructure protection, shore monitoring, and forward staging operations. The program will transition to the Navy.<br>*FY 2010 Plans:*<br>- Conduct simulation and trade space analysis.<br>- Conduct at-sea data collection supporting signature characterizations, processing development and feasibility assessments. | 0.000 | 6.000 | 10.500 | 0.000 | 10.500 |

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| - Initiate design of sub-system architectures.<br><br>*FY 2011 Base Plans:*<br>- Design multiple configurable systems.<br>- Develop key subsystems and conduct any necessary in water testing.<br>- Collect additional signature and environmental data needed to support technology designs. | | | | | |
| Accomplishments/Planned Programs Subtotals | 16.920 | 32.677 | 41.682 | 0.000 | 41.682 |

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

N/A

**D. Acquisition Strategy**

N/A

**E. Performance Metrics**

Specific programmatic performance metrics are listed above in the program accomplishments and plans section.

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | | DATE: February 2010 |
|---|---|---|---|
| APPROPRIATION/BUDGET ACTIVITY<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | R-1 ITEM NOMENCLATURE<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | PROJECT<br>NET-CLS: *CLASSIFIED* | |

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NET-CLS: *CLASSIFIED* | 70.070 | 54.919 | 122.128 | 0.000 | 122.128 | 101.080 | 106.845 | 114.703 | 114.588 | Continuing | Continuing |

**A. Mission Description and Budget Item Justification**

This project funds classified DARPA programs that are reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

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

| | FY 2009 | FY 2010 | FY 2011 Base | FY 2011 OCO | FY 2011 Total |
|---|---|---|---|---|---|
| Classified DARPA Program | 70.070 | 54.919 | 122.128 | 0.000 | 122.128 |
| This project funds Classified DARPA Programs. Details of this submission are classified.<br><br>*FY 2009 Accomplishments:*<br>Details will be provided under separate cover.<br><br>*FY 2010 Plans:*<br>Details will be provided under separate cover.<br><br>*FY 2011 Base Plans:*<br>Details will be provided under separate cover. | | | | | |
| Accomplishments/Planned Programs Subtotals | 70.070 | 54.919 | 122.128 | 0.000 | 122.128 |

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

N/A

**D. Acquisition Strategy**

N/A

| Exhibit R-2A, RDT&E Project Justification: PB 2011 Defense Advanced Research Projects Agency | | DATE: February 2010 |
|---|---|---|
| **APPROPRIATION/BUDGET ACTIVITY**<br>0400: *Research, Development, Test & Evaluation, Defense-Wide*<br>BA 3: *Advanced Technology Development (ATD)* | **R-1 ITEM NOMENCLATURE**<br>PE 0603766E: *NETWORK-CENTRIC WARFARE TECHNOLOGY* | **PROJECT**<br>NET-CLS: *CLASSIFIED* |

**E. Performance Metrics**

Details will be provided under separate cover.