Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy										DATE: February 2010	
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*				R-1 ITEM NOMENCLATURE PE 0603747N: *Undersea Warfare Advanced Tech*							
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	80.323	73.636	49.276	0.000	49.276	39.541	33.651	39.443	36.295	Continuing	Continuing
2916: *Undersea Warfare Advanced Technology*	77.929	67.660	49.276	0.000	49.276	39.541	33.651	39.443	36.295	Continuing	Continuing
9999: *Congressional Adds*	2.394	5.976	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	23.949

A. Mission Description and Budget Item Justification

The efforts described in this Program Element (PE) are based on investment directions as defined in the Naval S&T Strategic Plan approved by the S&T Corporate Board (Feb 2009). This strategy is based on needs and capabilities from Navy and Marine Corps guidance and input from the Naval Research Enterprise (NRE) stakeholders (including the Naval enterprises, the combatant commands, the Chief of Naval Operations (CNO), and Headquarters Marine Corps). It provides the vision and key objectives for the essential science and technology efforts that will enable the continued supremacy of U.S. Naval forces in the 21st century. The Strategy focuses and aligns Naval S&T with Naval missions and future capability needs that address the complex challenges presented by both rising peer competitors and irregular/asymmetric warfare.

All Navy advanced technology development in undersea target detection, classification, localization, tracking and neutralization is funded through this PE. The related technologies being developed are aimed at enabling Sea Shield, one of the three core operational concepts detailed in the Naval Transformational Roadmap. Associated efforts focus on new Anti-Submarine Warfare (ASW) operational concepts that promise to improve wide-area surveillance, detection, localization, tracking and attack capabilities against quiet adversary submarines operating in noisy and cluttered shallow water environments. The focus is on leveraging technologies that will protect the country's current capital investment in surveillance, submarine, surface ship and air ASW assets.

Due to the number of efforts in this PE, the programs described herein are representative of the work included in this PE.

Exhibit R-2, RDT&E Budget Item Justification: PB 2011 Navy	DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603747N: *Undersea Warfare Advanced Tech*

B. Program Change Summary ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
Previous President's Budget	83.565	68.037	0.000	0.000	0.000
Current President's Budget	80.323	73.636	49.276	0.000	49.276
Total Adjustments	-3.242	5.599	49.276	0.000	49.276
• Congressional General Reductions		-0.306			
• Congressional Directed Reductions		0.000			
• Congressional Rescissions	0.000	-0.095			
• Congressional Adds		6.000			
• Congressional Directed Transfers		0.000			
• Reprogrammings	-0.935	0.000			
• SBIR/STTR Transfer	-2.306	0.000			
• Program Adjustments	0.000	0.000	49.276	0.000	49.276
• Rate/Misc Adjustments	-0.001	0.000	0.000	0.000	0.000

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2009	FY 2010
Project: 9999: *Congressional Adds*		
Congressional Add: *Underwater Explosives and Warhead Research*	0.000	2.988
Congressional Add: *ASW Research Prog - Cong*	0.000	2.988
Congressional Add: *Theater Undersea Warfare Initiative*	2.394	0.000
Congressional Add Subtotals for Project: 9999	2.394	5.976
Congressional Add Totals for all Projects	2.394	5.976

Change Summary Explanation

Technical: Not applicable.

Schedule: Not applicable.

FY11 from previous President's Budget is shown as zero because no FY11-15 data was presented in President's Budget 2010.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603747N: *Undersea Warfare Advanced Tech*	PROJECT 2916: *Undersea Warfare Advanced 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
2916: *Undersea Warfare Advanced Technology*	77.929	67.660	49.276	0.000	49.276	39.541	33.651	39.443	36.295	Continuing	Continuing

A. Mission Description and Budget Item Justification

All Navy advanced technology developments in undersea target detection, classification, localization, tracking and neutralization are funded through this project. Technologies being developed within this project are aimed at enabling Sea Shield, one of the three core operational concepts detailed in the Naval Transformational Roadmap. Associated efforts focus on new ASW operational concepts that promise to improve wide-area surveillance, detection, localization, tracking and attack capabilities against quiet adversary submarines operating in noisy and cluttered shallow water environments. Related efforts are aimed at leveraging technologies that will protect the country's current capital investment in surveillance, submarine, surface ship and air ASW assets.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
ANTI-SUBMARINE WARFARE (ASW) DISTRIBUTED SEARCH	0.000	3.345	4.367	0.000	4.367
ASW Distributed Search focuses the development of technologies for the non-covert tactical search for undersea targets ranging from hours to weeks using automated sensor systems deployed around operating areas including along key transit routes to protect naval/maritime forces, around temporarily fixed sea base regions and naval force operating areas, or around fixed defensive regions and areas of interest such as key US/Allied ports. "Non-covert" implies availability of airborne assets for sensor deployment (although other means may also be used), and the ability to employ active sonar along with passive and non-acoustic methods. "Search" is conducted in concentrated areas, typically exploiting cues received from surveillance systems. The submarine target must be detected beyond its weapons release range. The objective is to develop rapidly deployable systems employing automated detection and classification capabilities for use in both shallow and deep water operating environments. Distributed Search supports the ASW protected passage Maritime Shield operational constructs. Related efforts include the development of distributed systems employing optimization as well as active acoustic sensing and processing techniques, navy-unique transduction and underwater networking					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
technology. Efforts also include the development of Unmanned Undersea Vehicle-based and affordable off-board deployable sensing systems employing persistent detection concepts and components. These efforts provide an extended reach of organic platform-based systems through the use of new sensor concepts, improved materials for advanced sensors, optimized deployment, employment, and automated operation of distributed sensor fields. The cornerstone of Distributed Search is the development of rapidly deployable, long-endurance active sensors with automated processing suitable for use in a wide variety of operational environments. The FY 2009 to FY 2010 funding increase is due to the realignment of the Wide Area ASW Surveillance activity into this new activity. *FY 2010 Plans:* The following efforts were transferred to this new activity from the FY 2009 Wide Area ASW Surveillance activity: - Continue development of Distributed Systems Processing (DSP) threat submarine feature association and field tracking algorithms for active and passive distributed acoustic ASW systems. - Initiate development high fidelity computer-based simulation training with linked architecture that supports ASW training from the operator-level to the ASW Commander-level applicable to both surface and air platforms. *FY 2011 Base Plans:* - Continue FY 2010 efforts. - Complete development of DSP threat submarine feature association and field tracking algorithms for active and passive distributed acoustic ASW systems. Technologies will transition to the Maritime Surveillance System Program Office, NAVSEA PMS 485.					
ANTI-SUBMARINE WARFARE (ASW) PERFORMANCE ASSESSMENT	0.000	6.417	4.347	0.000	4.347

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
The goal of this work is to integrate ocean and atmospheric environmental characteristics with sensor performance predictions in order to develop algorithms and Tactical Decision Aids (TDAs) that will accurately predict overall sensor performance in a given environment in near real-time for both present and future situations. The results of these research efforts in conjunction with embedded state-of-the-art command and operator-level training will facilitate the optimum employment of ASW sensor systems, thus increasing their effectiveness and potentially decreasing the number of sensors used to provide coverage in a given area. This work will provide operational commanders with sensor performance predictions which allow them to accurately judge the performance of those sensors, as well as information with which to deploy them for the greatest operational effect. It will also provide information as to how the performance evolves over time due to effects such as the deformation of sensor locations by currents, sound velocity profile changes, geologic magnetic interference changes, or changes to the optical properties of the water, etc. The effort includes performance predictions for fields of sensors as well as individual sensors themselves and applies to both acoustic and nonacoustic sensors. Work includes development of ASW sensor and system performance models, and realistic simulations and measures of effectiveness that incorporate and exploit critical environmental knowledge. It includes efforts to couple ocean dynamics and acoustics, characterize ambient noise in the littorals, measure and model acoustic and optical propagation and scattering in complex environments, develop algorithms to extract environmental information from through-the-sensor measurements and quantification and prediction of uncertainty. This information is combined with the operating characteristics of particular sensors (or groups of sensors) to provide predictions of sensor performance in the environment at that particular time and in the future. The predictions will also include assessments of the prediction uncertainty due to environmental measurement and sensor performance uncertainties.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
This work aligns principally with the Assure Access and Hold at Risk S&T Focus Area in the Naval S&T Strategic Plan and contributes measurably to the Operational Environments S&T Focus Area strategic objectives. The FY 2009 to FY 2010 funding increase is due to the realignment of the Wide Area ASW Surveillance activity into this new activity. *FY 2010 Plans:* The following efforts were transferred to this new activity from the FY 2009 Wide Area ASW Surveillance activity: - Continue a research effort focusing on distributed system in-situational environmental characterization and system monitoring. - Continue a research effort to determine the placement of and follow-on control and pattern keeping of acoustic sources and mobile distributed sensor systems. - Continue research effort aimed at the ideal placement of acoustic sources and drifting sensor systems. - Complete algorithm testing of uncontrolled drifting systems using a simulator. This effort transitioned from PE 0602747N in FY 2009. - Complete test planning of source algorithms to be used to determine the optimal initial placement of uncontrolled drifting distributed systems. - Complete development of algorithms to optimize the initial placement of uncontrolled drifting systems. This effort transitioned from PE 0602747N. - Complete development of a simulator for placement of uncontrolled drifting systems. This effort transitioned from PE 0602747N in FY 2009. This effort is intended to transition to Program Executive Office Air ASW, Assault and Special Mission Programs (PMA-264). The agreement is being negotiated and the details will be entered after the TA is signed.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603747N: *Undersea Warfare Advanced Tech*	PROJECT 2916: *Undersea Warfare Advanced Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
FY 2011 Base Plans: - Continue all FY 2010 efforts less those noted as complete above.					
ANTI-SUBMARINE WARFARE (ASW) SURVEILLANCE ASW Surveillance focuses on dramatically improving detection, classification, and localization capabilities in large ocean areas relative to the capabilities of legacy ASW surveillance systems. The related technologies support the conduct of covert wide-area surveillance ranging from one day to six months. The objectives are to develop and demonstrate technologies that provide clandestine indications and warnings in far forward and contested operating areas and in complex operational environments against all submarine threats including new threats with unknown target signatures and tactics. Covertness implies use of non-observable platforms and/or deployed automated sensors employing passive sonar or other non-detectable methods. The surveillance process includes initial detection and classification. Efforts include the development of Unmanned Undersea Vehicle-based and affordable off-board deployable sensing systems employing a wide variety of surveillance concepts and components. These efforts focus on alternative detection phenomena, vector/tensor sensors, automated acoustic processing, more compact and longer lasting power sources, and high bandwidth acoustic communications links. The FY 2009 to FY 2010 funding increase is due to the realignment of the Wide Area ASW Surveillance activity into this new activity. The FY 2010 to FY 2011 funding decrease is due to the completion of Future Naval Capability (FNC) - SHD-FY06-02 - Deployable Autonomous distributed System (DADs); PALANTIR; and Submarine Track and Trail. *FY 2010 Plans:* The following efforts were transferred to this new activity from the FY 2009 Wide Area ASW Surveillance activity:	0.000	44.406	33.516	0.000	33.516

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
- Continue the On-Demand Detection Classification and Localization (ODDCL) effort focusing on the development of sensor and platform designs and key components compatible with a notional Concept of Operations. - Continue system level design and integration for ODDCL. - Continue development of a tactical area prototype system for Persistent Littoral Undersea Surveillance (PLUS). - Continue a PLUS prototype system simulation test in preparation for FY 2011 at-sea experiments. - Continue analysis of data collected during the FY 2010 PLUS at-sea experiments. - Continue two at-sea experiments focused on increasing system persistence capabilities. - Complete Submarine Track & Trail (STT) Baseline advanced research efforts in the areas of advanced undersea sensors, communications, autonomy, and sensor data collection and analysis to support tracking algorithm and automated processing development. - Complete DADS deployability, survivability and classification performance improvement effort. - Complete testing of the Palantir (a non-acoustic surveillance system) sensor system. - Complete tactical test planning for the Palantir sensor. - Complete DADS at-sea classification performance improvement testing. - Complete at-sea testing of integrated STT submersibles and evaluate overall system performance. - Complete DADS deployability, covert communications and survivability testing. - Complete at-sea demonstrations of STT submersible with fully integrated sensor package. - Initiate system level integration and testing for ODDCL. - Initiate development of a vector sensor towed array and associated signal processing with performance nominally equivalent to a "thin-line" (TB-29) twin-line towed array to be compatible with the existing TB-29 array handling system. *FY 2011 Base Plans:* - Continue all efforts of FY10 less those noted as completed above. - Complete a PLUS prototype system simulation test in preparation for FY 2011 at-sea experiments. - Complete two at-sea experiments focused on increasing system persistence capabilities.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
- Initiate a PLUS prototype system simulation test in preparation for FY 2012 at-sea experiments. - Initiate analysis of data collected during the FY 2011 PLUS at-sea experiments. - Initiate two at-sea experiments focused on increasing system adaptation and optimization capabilities. - Initiate development of a vector sensor towed array and associated signal processing with performance nominally equivalent to a "thin-line" (TB-29) twin-line towed array to be compatible with the existing TB-29 array handling system.					
NEUTRALIZATION Neutralization focuses on undersea weapons technologies to counter threat submarines by increasing the Probability of Kill (PK). The ultimate goals of Neutralization efforts are to develop reduced size advanced undersea weapons with revolutionary capabilities and to fill Sea Shield mission capability gaps and demonstrate transformational capabilities for ASW weapons. The FY 2009 to FY 2010 funding decrease is due to the realignment of the Neutralization activity to the newly established Undersea Weaponry activity. *FY 2009 Accomplishments:* All efforts, except those indicated as complete below, transfer from this activity to the new Undersea Weaponry Activity in FY 2010. - Continued Lightweight Torpedo Technologies (LTT) integration of broadband and adjunct sensors for in-water data collection to result in a new dual-mode sensor guidance and control system for at-sea testing. - Continued feasibility investigations under LTT to quantify adjunct sensor configurations and signal processing approaches to enable positive discrimination of artificial targets at standoff ranges. This feasibility investigation is expected to result in five (5) new patent applications.	20.377	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
- Continued LTT sensor package development to achieve integrated coherent broadband sonar and novel adjunct sensors homing and classification capabilities for lightweight torpedo (LWT). - Continued development and integration of adjunct sensors into a lightweight torpedo sensor and design signal processing and data fusion techniques to improve target classification in areas of high contact density. - Continued in-water data collection for development of advanced counter countermeasure processing, weapon-to-weapon acoustic communication and a salvo vehicle intelligent controller. - Continued LTT feasibility investigations to select the stealth and propulsion technologies for future integration as a low cost propulsion replacement for the Mk 54 lightweight torpedo (LWT). - Continued LTT feasibility investigations and selected geo-coordinate based navigation system technologies and connectivity methods (i.e. acoustic communications, fiber link) for future development of technologies for LWT demonstration). - Continued data collection for LWT broadband and counter-countermeasures in the harsh shallow water environment of the Shore Bombardment Area site off the Southern California Off-Shore Range using an experimental test vehicle fitted with a broadband Mk 54 array. - Continued feasibility assessment of LTT to best utilize precision targeting and distributed sensors for weapon employment from high altitude and standoff range. - Continued a high fidelity weapon frequency model development effort to parallel adjunct sensor developments and provide accurate synthetic data for algorithm design and measurement. - Continued development of a high channel count LTT broadband transmitter. - Continued development and integration of a total LTT system prototype in the Mk 54 torpedo form factor for at sea demonstrations. - Continued development of a reduced size/weight CRAW for air deployment. This effort will include sensor, guidance and control, warhead, propulsion, and air frame integration tasks. - Continued CRAW in water data collection to support development of guidance and control algorithms enabling an ASW offensive capability in the Common Very Lightweight Torpedo. - Continued tests to support the development of a CRAW warhead that will achieve required performance against submarine targets, and demonstrate feasibility of achieving final goal.					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
- Completed LTT advanced counter-countermeasure algorithm and tactics development for LWT. - Completed LTT integration of broadband and adjunct sensors for in-water data collection to result in a new dual-mode sensor guidance and control system for at-sea testing. - Completed feasibility investigations under LTT to quantify adjunct sensor configurations and signal processing approaches to enable positive discrimination of artificial targets at standoff ranges. This feasibility investigation is expected to result in five (5) new patent applications. - Completed LTT sensor package development to achieve integrated coherent broadband sonar and novel adjunct sensors homing and classification capabilities for LWT. - Completed development and integration of adjunct sensors into a lightweight torpedo sensor and design signal processing and data fusion techniques to improve target classification in areas of high contact density. - Completed in-water data collection for development of advanced counter countermeasure processing, weapon-to-weapon acoustic communication and a salvo vehicle intelligent controller. - Completed demonstration of LTT underwater acoustic communications capability to enable coordinated attack and net-centric connectivity. - Completed demonstration of LTT weapon salvo capability utilizing behavior-based control. - Initiated and completed LTT development, scale up and testing prototype components. - Initiated demonstration of LTT underwater acoustic communications capability to enable coordinated attack and net-centric connectivity. (Transitioned from PE 0602747N) - Initiated demonstration of LTT weapon salvo capability utilizing behavior-based control (Transitioned from PE 0602747N) - Initiated development of an integrated LTT set-to-hit simulation capability to evaluate weapon performance gains to include robust representations of component technologies developed and demonstrated under the LTT project. - Initiated design and development of an integrated LTT full system prototype consisting of hardware and software upgrades for a final at-sea demonstration to be conducted in FY 2010. - Initiated in-water data collection on CRAW homing in presence of countermeasures.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
UNDERSEA WEAPONRY	0.000	13.492	7.046	0.000	7.046

Undersea Weaponry focuses on the development of enabling technologies to counter threat submarines and surface vessels by increasing Probability of Kill (PK) and platform survivability. Weapon technology focus areas include: the Lightweight Torpedo Technologies (LTT) and the Compact Rapid Attack Weapon (CRAW) projects. The ultimate goal of this activity is to provide revolutionary capabilities needed to fill Sea Shield Warfighter Capability Gaps, to accommodate unique payload limitations through the development of modular and reduced sized undersea weapons based on common technology enablers (where possible), and to provide improved submarine cuing/wide area search in deep and shallow water ocean areas while providing the capability to rapidly transition the submarine mission to engagement/neutralization.

The FY 2009 to FY 2010 funding increase is due to the realignment of the Neutralization activity into this new activity. The FY 2010 to FY 2011 funding decrease is primarily due to the completion of the Future Naval Capability (FNC)- SHD-FY06-02 Lightweight Torpedo Technologies.

FY 2010 Plans:

The following efforts transferred to this activity from the FY 2009 Neutralization activity:

- Continue development of a reduced size/weight CRAW for air deployment. This effort will include sensor, guidance and control, warhead, propulsion, and air frame integration tasks.
- Continue CRAW in water data collection to support development of guidance and control algorithms enabling an ASW offensive capability in the Common Very Lightweight Torpedo.
- Continue tests to support the development of a CRAW warhead that will achieve required performance against submarine targets, and demonstrate feasibility of achieving final goal.
- Continue in-water data collection on CRAW homing in presence of countermeasures.
- Complete a high fidelity weapon frequency model development effort to parallel adjunct sensor developments and provide accurate synthetic data for algorithm design and measurement.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		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
- Complete LTT feasibility investigations to select the stealth and propulsion technologies for future integration as a low cost propulsion replacement for the Mk 54 lightweight torpedo (LWT). - Complete further development of advanced fusing technology for LWT started in FY09 as part of the LTT FNC project. - Complete LTT feasibility investigations and selected geo-coordinate based navigation system technologies and connectivity methods (i.e. acoustic communications, fiber link) for future development of technologies for LWT demonstration). - Complete data collection for LWT broadband and counter-countermeasures in the harsh shallow water environment of the Shore Bombardment Area site off the Southern California Off-Shore Range using an experimental test vehicle fitted with a broadband Mk 54 array. - Complete feasibility assessment of LTT to best utilize precision targeting and distributed sensors for weapon employment from high altitude and standoff range. - Complete development of a high channel count LTT broadband transmitter. - Complete development and integration of a total LTT system prototype in the Mk 54 torpedo form factor for at sea demonstrations. - Complete development of an integrated LTT set-to-hit simulation capability to evaluate weapon performance gains to include robust representations of component technologies developed and demonstrated under the LTT project. - Complete design and development of an integrated LTT full system prototype consisting of hardware and software upgrades for final at-sea demonstrations to be conducted in FY 2010. - Initiate and complete at-sea demonstration and assessment of LTT full system prototype. - Transition demonstrated Lightweight Torpedo Technologies to PE 0604610N (Lightweight Torpedo Development). *FY 2011 Base Plans:* - Continue all efforts of FY 10, less those noted as completed above. - Continue development of a reduced size/weight CRAW for air deployment. This effort will include sensor, guidance and control, warhead, and mainframe integration tasks.					

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
WIDE AREA ANTI-SUBMARINE WARFARE (ASW) SURVEILLANCE	57.552	0.000	0.000	0.000	0.000

Wide Area ASW Surveillance is focused on dramatically improving the capability to sanitize large areas relative to the capabilities of legacy ASW sensors. Efforts include the development of affordable offboard systems with associated processing and robust, high-bandwidth communications links. The cornerstone of Wide Area ASW Surveillance is the ability to rapidly distribute sensors from air, surface and sub-surface platforms as well as to develop long-endurance sensors and unmanned ASW vehicles. This activity represents a shift from traditional fixed surveillance systems to autonomous, networked, multi-static operation, supported by passive/active signal processing with the objective of increased detection capabilities.

The FY 2009 to FY 2010 funding decrease is due to the realignment of efforts in this activity to the newly established ASW Distributed Search; ASW Surveillance; and Performance Assessment activities respectively.

FY 2009 Accomplishments:
The following efforts transfer to the new ASW Distributed Search activity in FY 2010:

- Continued development of DSP threat submarine feature association and field tracking algorithms for active and passive distributed acoustic ASW systems.

The following efforts transfer to the new ASW Surveillance activity in FY 2010:

- Continued STT-Baseline advanced research efforts in the areas of advanced undersea sensors, communications, autonomy, and sensor data collection and analysis to support tracking algorithm and automated processing development.
- Continued Deployable Autonomous Distributed System (DADS) deployability, survivability and classification performance improvement effort.
- Continued testing of the Palantir (a non-acoustic surveillance system) sensor system.

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B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
- Continued tactical test planning for the Palantir sensor. - Continued DADS at-sea classification performance improvement testing. - Continued at-sea testing of integrated STT submersibles and evaluate overall system performance. - Continued the ODDCL effort focusing on the development of sensor and platform designs and key components compatible with a notional Concept of Operations. - Continued development of a tactical area prototype system for PLUS. - Initiated simulation test of the PLUS prototype system in preparation for at-sea experiments. - Initiated analysis of data collected during the PLUS at-sea experiments. - Initiated two at-sea experiments focused on increasing system persistence capabilities. - Initiated DADS deployability, covert communications and survivability testing. - Initiated system level design and integration for ODDCL. - Initiated at-sea demonstrations of STT submersible with fully integrated sensor package. The following efforts transfer to the new ASW Performance Assessment activity in FY 2010: - Initiated test planning of source algorithms to be used to determine the optimal initial placement of uncontrolled drifting distributed systems. - Initiated research effort aimed at the ideal placement and control of acoustic sources and drifting sensor systems. - Initiated a research effort focusing on distributed system in-situational environmental characterization and system monitoring. - Initiated a research effort to determine the placement of and follow-on control and pattern keeping of mobile sources and distributed sensor systems. The following efforts complete; consequently they do not transfer or continue in FY 2010: - Completed development of and demonstrate an advanced development model of a DWADS					

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603747N: *Undersea Warfare Advanced Tech*	PROJECT 2916: *Undersea Warfare Advanced Technology*

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010	FY 2011 Base	FY 2011 OCO	FY 2011 Total
System for surveillance of deep ocean submarine threats. This project transitions to the Advanced Development for Undersea Systems Program Office (IWS 5.0) and the ASW Cross Functional Team (N874). Funding to support the transition is in PE 0603561N Project 02033. - Completed development of active sonar sensors and processing for wide area surveillance of deep ocean operating areas. - Completed integration and evaluation of STT tracking algorithms and automated processing. Acquisition Workforce Fund - Funded DoD Acquisition Workforce Fund.					
Accomplishments/Planned Programs Subtotals	77.929	67.660	49.276	0.000	49.276

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
• 0602747N: *UNDERSEA WARFARE APPLIED RESEARCH*	9.499	8.594	11.393	0.000	11.393	11.135	10.088	6.334	1.930	0.000	58.973

D. Acquisition Strategy

N/A

E. Performance Metrics

Improve target detection, localization, and tracking and increase attack capabilities by providing the following capabilities:
- Localization of 85% or more of enemy submarines in far forward or contested waters with false locations of less than 10% of total calls.
- Effective cueing of an attack from a distance of up to 200nm.
- Improvement of the Lightweight Torpedo (Mk 54). Specific improvements are classified.
- Extending deep water active distributed system lifetime to a few months with a probability of detection (Pd) of 90% within 4 hours (field configuration) or 90% per crossing (barrier configuration), with a False Alarm Rate (FAR) of no more than 4/day.

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- Delivery from a Vertical Takeoff Unmanned Air Vehicle (VTUAV) and/or a long-range, high-speed Unmanned Air Vehicle (UAV) a compact undersea weapon capable of a high Probability of Kill (PK) given precise target localization.
- Detection and localization performance with a single-line vector sensor array nominally equivalent or superior to that of two coherently processed TB-29A arrays. Acquisition costs to be competitive with the cost of a current TB-29A and at least 30% less than the cost of two arrays. Sensor and telemetry packaging will be adequate to achieve neutral buoyancy in an existing TB-29A form factor with array power efficiency greater than 75%. Array handling will be compatible with the existing TB-29 handling system.

Increase sensor to shooter performance and the effective lifetime of distributed ASW search systems by:
- Achieving a drifting active distributed system lifetime of at least two days in areas of tactical significance while maintaining required system performance with a minimum number of sensor nodes.
- Maintaining an effective lifetime of a month for mobile active distributed systems when subjected to the action of eddies from a major ocean current.
- Predicting reseed 6 hours before performance degrades.
- Holding the Area of Uncertainty (AOU) to no larger than 10 nm2 for an hour after initial detection through the control of the coherent sources.

Through a combination of better Anti-Submarine Warfare (ASW) command-level training and improved operator training provide the following:
- Improve the ability of active sonar operators to detect targets and reject potential false alarms compared to current simulation based training.
- Increase Pd by 50%.
- Provide a decrease in FAR by a factor of two.
- Provide a reduction in the probability of a hit on a High Value Unit (HVU) by a factor of two.
- Improve the ability of the ASW Commander to position assets to increase coverage, reduce active system interference and deal effectively with competing missions.
- Reduce training cost by greater than 80% and increase the frequency of training opportunities by greater than 600% relative to live training.

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy			DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	R-1 ITEM NOMENCLATURE PE 0603747N: *Undersea Warfare Advanced Tech*	PROJECT 9999: *Congressional Adds*	

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
9999: *Congressional Adds*	2.394	5.976	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	23.949

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

B. Accomplishments/Planned Program ($ in Millions)

	FY 2009	FY 2010
Congressional Add: Underwater Explosives and Warhead Research *FY 2010 Plans:* This effort supports Underwater Explosives and Warhead Research.	0.000	2.988
Congressional Add: ASW Research Prog - Cong *FY 2010 Plans:* This effort supports ASW Research.	0.000	2.988
Congressional Add: Theater Undersea Warfare Initiative *FY 2009 Accomplishments:* This effort supported the Theater Undersea Warfare Initiative (TUSWI) by applying capabilities developed in prior years as a tactical decision aid (TDA) for the Theater ASW Commander to the problem of training the Theater ASW Commander.	2.394	0.000
Congressional Adds Subtotals	2.394	5.976

Exhibit R-2A, RDT&E Project Justification: PB 2011 Navy		DATE: February 2010
APPROPRIATION/BUDGET ACTIVITY 1319: *Research, Development, Test & Evaluation, Navy* BA 3: *Advanced Technology Development (ATD)*	**R-1 ITEM NOMENCLATURE** PE 0603747N: *Undersea Warfare Advanced Tech*	**PROJECT** 9999: *Congressional Adds*

C. Other Program Funding Summary ($ in Millions)

N/A

D. Acquisition Strategy

N/A

E. Performance Metrics

Congressional Interest Items not included in other Projects.