FY 2009 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2008
Exhibit R-2

BUDGET ACTIVITY: 01
PROGRAM ELEMENT: 0601103N
PROGRAM ELEMENT TITLE: UNIVERSITY RESEARCH INITIATIVES

COST: (Dollars in Thousands)

Project Number & Title	FY 2007 Actual	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate	FY 2012 Estimate	FY 2013 Estimate
UNIVERSITY RESEARCH INITIATIVES	87,134	98,057	103,707	97,580	97,425	107,365	117,279

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program includes support for multidisciplinary basic research in a wide range of scientific and engineering disciplines that enable the U.S. Navy to maintain technological superiority, and for university research infrastructure to acquire research instrumentation needed to maintain and improve the quality of university research important to the Navy. Multidisciplinary University Research Initiative (MURI) efforts involve teams of researchers investigating high priority topics and opportunities that intersect more than one traditional technical discipline. For many military problems this multidisciplinary approach serves to stimulate innovations, accelerate research progress and expedite transition of results into Naval applications. The Defense University Research Instrumentation Program (DURIP) supports university research infrastructure essential to high quality Navy relevant research. The instrumentation program complements other Navy research programs by supporting the purchase of high cost research instrumentation that is necessary to carry out cutting-edge research. The program supports Presidential Early Career Awards for Scientists and Engineers (PECASE), single investigator research efforts performed by outstanding academic scientists and engineers early in their research careers. This program provides the knowledge base, scientific concepts, and technological advances for the maintenance of Naval power and national security.

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

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B. PROGRAM CHANGE SUMMARY:

	FY 2007	FY 2008	FY 2009
FY 2008/FY 2009 President's Budget Submission	91,724	76,637	73,037
Congressional Action	0	23,200	0
Congressional Undistributed Reductions/Rescissions	0	-635	0
Execution Adjustments	-1,219	0	0
Program Adjustments	-1,092	0	30,671
Rate Adjustments	0	0	-1
SBIR Assessment	-2,279	-1,145	0
FY 2009 President's Budget Submission	87,134	98,057	103,707

PROGRAM CHANGE SUMMARY EXPLANATION:
Technical: Not applicable.

Schedule: Not applicable.

C. OTHER PROGRAM FUNDING SUMMARY:
Not applicable.

D. ACQUISITION STRATEGY:
Not applicable.

E. PERFORMANCE METRICS:
This University Research Initiative seeks to improve the quality of defense research conducted by universities and supports the education of engineers and scientists in disciplines critical to national defense needs. The initiative is a collection of specialized research programs performed by academic research institutions. Individual project metrics are tailored to the needs of specific applied research and advanced development programs. Example metrics include extending the life of Thermal Barrier Coatings for transition to Total Ownership Cost Future Naval Capability program. It is projected that the life time of Thermal Barrier Coating on Turbine Blades can be doubled. The National Research Council of the National Academies of Science and

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Engineering's Congressionally directed "Assessment of Department of Defense Basic Research" concluded that the DoD is managing its basic research program effectively.

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B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2007	FY 2008	FY 2009
MULTIDISCIPLINARY UNIVERSITY RESEARCH INITIATIVE (MURI)	48,817	55,965	67,500

Research efforts include high priority topics that intersect more than one traditional discipline. MURI topics are selected to address Naval S&T Focus Areas as described in the Naval S&T Strategic Plan.

The MURI program is an OSD interest item and OSD directs that funding for the MURI efforts be awarded after OSD announces the awardees, which typically takes place towards the second half of the fiscal year. Since the MURI program funds academic researchers, execution of the efforts typically ramps up during the summer

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academic break months.

Fluctuations in the program value between fiscal years reflect the maturation of existing awards. MURIs are a 3-year grant award, with a 2-year executable option. The start of a large number of MURI awards in the second half of FY 2007 created a large tail in FY 2008 where full year funding is required to execute the FY 2007 starts. This results in a significant increase from FY 2007 to FY 2008. The increase between FY 2008 and FY 2009 results from the continued need to fund the FY 2007 projects and an increase in FY 2009 due to expansions of efforts.

FY 2007 Accomplishments:

- Conducted competition for $7,282K of new MURI awards to address selected high priority Naval science and technology areas, transformational initiatives, and grand challenges, including strategically important DoD research areas. Eleven topics were identified for publication via Broad Agency Announcement (BAA) to solicit proposals. These topics addressed human-unmanned systems interactions, trust management, light cellular structures for force protection, underwater acoustic communications, radiation belt dynamics and energetics, thermal management, processing and production science, exploiting nonlinear dynamics, disparate sensor networks, reactive material dynamic response, and exploiting the documented plasticity of the adult brain. Remaining balance was spent to continue MURI projects begun in prior years.

FY 2008 Plans:

- Conduct competition for $5,250K of new MURI awards to address selected high priority Naval science and technology areas, transformational initiatives, and grand challenges, including strategically important DoD research areas. About seven high priority research topics will be identified for publication in a BAA to solicit proposals. Remaining balance will be spent to continue MURI projects begun in prior years.

FY 2009 Plans:

- Conduct competition for new MURI awards to address selected high priority Naval science and technology areas, transformational initiatives, and grand challenges, including strategically important DoD research areas. About six high priority research topics will be identified for publication in a BAA to solicit proposals. Remaining balance will be spent to continue MURI projects begun in prior years.

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	FY 2007	FY 2008	FY 2009
DEFENSE UNIVERSITY RESEARCH INSTRUMENTATION PROGRAM	18,911	17,630	33,407

DURIP funds are provided to universities to purchase relatively high cost research instrumentation that is normally not included in single-investigator type research grants. Individual grants range from $50K to $1M.

The DURIP program is an OSD interest item and OSD directs that funding for the DURIP efforts be awarded after OSD announces the awardees, which typically takes place towards the second half of the fiscal year. In turn, universities need to purchase the instrumentation and take delivery before any billings are generated. It frequently takes several months for delivery and billing to be completed.

The number of awards from FY 2008 to FY 2009 is due to the number of awards increasing from 74 to approximately 134.

FY 2007 Accomplishments:

- Conducted competition for 67 research instrumentation awards to universities.

FY 2008 Plans:

- Conduct competition for approximately 74 research instrumentation awards to universities.

FY 2009 Plans:

- Conduct competition for research instrumentation awards to universities.

	FY 2007	FY 2008	FY 2009
PRESIDENTIAL EARLY CAREER AWARDS	727	1,410	2,800

PECASE awards are made to academic scientists early in their research career for extremely prestigious single-investigator research in areas of vital importance to DON. Awards provide national recognition and research grants of $200K per year for five years.

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The increase in funding between FY 2007 and FY 2008 reflects initial ramp up of these five year awards from $100K per year to $200K per year. The increase in funding between FY 2008 and FY 2009 reflects the initial increase from two award selections in FY 2008 to nine award selections in FY 2009.

FY 2007 Accomplishments:

- Selected two outstanding university researchers to receive the five-year PECASE research award to conduct research of importance to the Navy. Continued PECASE programs begun in earlier years.

FY 2008 Plans:

- Select two outstanding university researchers to receive the five-year PECASE research award to conduct research of importance to the Navy. Continue PECASE programs begun in earlier years.

FY 2009 Plans:

- Select nine outstanding university researchers to receive the five-year PECASE research award to conduct research of importance to the Navy. Continue PECASE programs begun in earlier years.

CONGRESSIONAL PLUS-UPS:

	FY 2007	FY 2008
BLAST AND IMPACT RESISTANT COMPOSITES STRUCTURES FOR NAVY SHIPS	996	1,589

FY 2007 Accomplishments: This effort supported development of an improved understanding of the response of composite materials and structures to blast, shock and fire effects, and provided guidance for the design of affordable Navy ship structures with greater survivability characteristics and enhanced performance.

FY 2008 Plans: This effort will continue to investigate response of composite materials and structures to blast.

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	FY 2007	FY 2008
CELL-BASED SENSORS FOR CHEMICAL THREATS	0	1,192

This work supports cell-based sensors for chemical threats.

	FY 2007	FY 2008
CENTER FOR HETERO-FUNCTIONAL MATERIALS	0	1,987

Equipment and facilities will be acquired and commissioned, faculty and students will be hired, and work commenced to grow, characterize and subsequently apply thin film functional oxide and oxide/nitride heterostructures to device applications for improved Navy electronics platforms.

	FY 2007	FY 2008
CENTER FOR NANOSCIENCE AND NANOMATERIALS (CNN)	996	1,193

FY 2007 Accomplishments: The CNN center has developed a process by which they are growing one of the largest Carbon Nanotubes (CNTs) in the world. The center has also developed new gold/alumina nanocatalists that show remarkable activity, even at room temperature.

FY 2008 Plans: The CNN will continue to investigate, optimize and characterize the growth of the CNTs. It will also explore other nanocatalyst formulations for enhanced catalytic activity.

	FY 2007	FY 2008
CENTER FOR SOUTHEASTERN TROPICAL ADVANCED REMOTE SENSING (CSTARS)	3,984	1,987

FY 2007 Accomplishments: CSTARS worked with Office of Naval Research (ONR) and Unites States Southern Command (USSOUTHCOM) to evaluate methods for detecting and tracking ships with satellite synthetic aperture radar. They also provided data for ONR oceanographic experiments in the western Pacific Ocean.

FY 2008 Plans: CSTARS will expand its capability to receive and process radar, optical, and infrared sensors from commercial and governmental satellites. They will support ONR, USSOUTHCOM, and National Geospatial-Intelligence Agency (NGA) in efforts to classify ships at sea.

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DEFENSE COMMERCIALIZATION RESEARCH INITIATIVE TECHNOLOGY, RESEARCH, EDUCATION AND COMMERCIALIZATION CENTER (TRECC)	3,288	0

This effort supported basic research support in microelectronics and display technologies, and visualization and analysis of large-scale sensor and model-base data through collaborations with the National Science Foundation and the Office of Naval Research. Videoconferencing and portal technologies were developed with a successful "Professors to Schools" effort to provide an expanding menu of cutting-edge interactive, inter-organizational opportunities to Illinois students. This effort also supported broad technology education and research support missions including the TRECC Accelerator program and the TRECC facility in DuPage County to provide technology transfer services.

	FY 2007	FY 2008
LOW ACOUSTIC AND THERMAL SIGNATURE BATTLEFIELD POWER SOURCE	0	1,987

Investigate development of a low acoustic and low thermal signature power source for potential battlefield use.

	FY 2007	FY 2008
MULTIFUNCTIONAL MATERIALS FOR NAVAL STRUCTURES	996	0

Marine composite materials and composite sandwich structures were modified to incorporate multifunctional capabilities, through the introduction of nanoparticles, and through use of alternate core materials. Affordable, fly-ash based, fire-resistant eco-core material was modified and used in composite sandwich structures to enhance fire resistance and energy absorption capacity under dynamic loading.

	FY 2007	FY 2008
NATIONAL SECURITY TRAINING	1,096	1,987

FY 2007 Accomplishments: This effort enhanced the pool of talented applicants for Defense Department national security positions by providing students with the credentials for these careers through their participation in

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the Serrano Scholars Program at Hostos Community College of the City University of New York and the Schools of General Studies and International and Public Affairs at Columbia University.

FY 2008 Plans: This work will continue to support enhancement of pool of applicants for Defense Department national security positions.

	FY 2007	FY 2008
NEUROTECHNOLOGY CENTER	1,644	0

This effort addressed fundamental issues affecting the creation of safer, more effective human-machine interfaces by elucidating the neural computational processes that lead to movement and by developing interfaces that take advantage of this knowledge.

	FY 2007	FY 2008
RESEARCH INFRASTRUCTURE FOR THE APPLIED PHYSICS LABORATORY	3,288	3,180

FY 2007 Accomplishments: This effort supported research and other engineering related work leading to the design and development of acoustic, photonic, electro-optic and other related systems for intelligence collection, for self-noise integrity, and for ship/submarine systems monitoring; and acoustic, photonic, electro-optic and related systems for reconnaissance and for fleet needs, including medical acoustic and electro-optic systems at the Applied Physics Laboratory at the University of Washington.

FY 2008 Plans: These appropriated funds will assist the Navy, DoD and APL with additional necessary research infrastructure upgrades at APL in the area of photonics and electro-optics.

	FY 2007	FY 2008
SMART, REMOTE SENSING SYSTEMS USING NANOTECHNOLOGY	2,391	0

This effort promoted the understanding of the surface mechanisms of charge transfer in photo induced charge movement sensors, surface nanocrystal structure in thin film gas sensors and surface enhanced raman scattering-based sensors to further the understanding of sensor capabilities in the detection of explosives and their components.

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	FY 2007	FY 2008
UNIVERSITY RESEARCH INITIATIVES	0	7,950

This effort supports university research initiatives.

C. OTHER PROGRAM FUNDING SUMMARY - NAVY RELATED RDT&E:
PE 0601153N Defense Research Sciences

OTHER PROGRAM FUNDING SUMMARY - NON-NAVY RELATED RDT&E:
PE 0601103A University Research Initiatives
PE 0601103F University Research Initiatives

D. ACQUISITION STRATEGY:
Not applicable.