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FY 2007 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET
Exhibit R-2

DATE: Feb 2006

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

COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
UNIVERSITY RESEARCH INITIATIVES	88,897	86,670	73,322	76,160	77,602	79,229	80,892

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 are important for maintaining the technological superiority of the U.S. Navy and for university research infrastructure by acquiring research instrumentation needed to maintain and improve the quality of university research important to the Navy. Multidisciplinary research efforts involve teams of researchers investigating high priority topics 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 to 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. The program also supports research relevant to the long range detection of improvised explosive devices. 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:

	<u>FY 2005</u>	<u>FY 2006</u>	<u>FY 2007</u>
FY 2006 President's Budget Submission	91,310	75,910	72,905
Congressional Action	0	11,900	0
Congressional Undistributed Reductions/Rescissions	-70	-1,140	0
FY 2005 SBIR	-2,343	0	0
Rate Adjustments	0	0	417
FY 2007 President's Budget Submission	88,897	86,670	73,322

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 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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COST: (Dollars in Thousands)

Project Number & Title	FY 2005 Actual	FY 2006 Estimate	FY 2007 Estimate	FY 2008 Estimate	FY 2009 Estimate	FY 2010 Estimate	FY 2011 Estimate
UNIVERSITY RESEARCH INITIATIVES	74,718	74,770	73,322	76,160	77,602	79,229	80,892

A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project includes support for multidisciplinary basic research in a wide range of scientific and engineering disciplines that are important for maintaining the technological superiority of the U.S. Navy and for university research infrastructure, by acquiring research instrumentation needed to maintain and improve the quality of university research important to the Navy. Multidisciplinary research efforts involve teams of researchers investigating high priority topics 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 to Naval applications. The Defense University Research Instrumentation Program (DURIP) project supports university research infrastructure essential to high quality Navy relevant research. The instrumentation project complements other Navy research programs by supporting the purchase of high cost research instrumentation that is necessary to carry out cutting-edge research. The Presidential Early Career Awards for Scientists and Engineers (PECASE) project supports single investigator research efforts performed by outstanding academic scientists and engineers early in their research careers. The Naval Research Enterprise Explosive Detection project supports research relevant to the long range detection of improvised explosive devices. This project provides the knowledge base, scientific concepts, and technological advances for the maintenance of Naval power and national security.

B. ACCOMPLISHMENTS/PLANNED PROGRAM:

	FY 2005	FY 2006	FY 2007
MULTIDISCIPLINARY UNIVERSITY RESEARCH INITIATIVE (MURI)	51,068	57,016	56,262

Research efforts include high priority topics that intersect more than one traditional discipline. Multidisciplinary University Research Initiative (MURI) topics are selected to address high priority science and technology directions of the Department of the Navy, including the four ONR Grand Challenges (Naval

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Battlespace Awareness, Electric Power Sources for the Navy and Marine Corps, Naval Materials by Design, and Multifunctional Electronics for Intelligent Naval Sensors).

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. There were a disproportionate number of new MURI awards that started in 2001. Fluctuations in MURI and DURIP funding levels for the period 2005 through 2007 result from an effort to plan an approximately equal number of new MURI awards each year. Goal is to have approximately 11 new awards each year, engaging the academic community robustly in basic research.

FY 2005 Accomplishments:

- A Broad Agency Announcement (BAA) was used to solicit proposals addressing ten ONR high priority topics. Ten research grants were awarded in response to proposals for the ten ONR topics. These awards were in the priority research areas of interferometry, dielectric materials, materials processing, wavefield prediction, nanostructured materials, semiconductors for radio frequency sensors, river and estuarine flows, magnetic sensors, hypersonic materials, and machine language. New MURI awards totaled \$5,200 in FY 2005. \$45,868 was spent to continue MURI projects begun in prior years.

FY 2006 Plans:

- Conduct competition for \$5,200K 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. Ten topics have been identified for publication in a BAA to solicit proposals. These topics address implosion, remote sensing, energetic material, dynamic ocean models, persistent surveillance, magnetostriction, human performance, fluid-structure interaction, multifunctional chip, and novel vaccines. \$51,816K will be spent to continue MURI projects begun in prior years.

FY 2007 Plans:

- Conduct competition for \$8,300K 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 sixteen high priority research topics will be identified for publication in a BAA to solicit proposals. \$47,962K will be spent to continue MURI projects begun in prior years.

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	FY 2005	FY 2006	FY 2007
DEFENSE UNIVERSITY RESEARCH INSTRUMENTATION PROGRAM	20,920	16,705	16,039

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 \$50,000 to \$1,000,000, with awards averaging about \$240,000.

As noted above in the MURI section, DURIP varies during the 2005 to 2007 period in order to plan an approximately equal number of new MURI awards each year while accommodating the end of the disproportionate number of MURI awards that began in FY 2001. The expectation is that DURIP funding would stabilize after 2008 at about \$18M.

FY 2005 Accomplishments:

- In response to the FY 2005 DURIP Broad Agency Announcement, 298 proposals requesting more than \$83 million were submitted to ONR and 88 were selected for an award.

FY 2006 Plans:

- Conduct competition for approximately 62 research instrumentation awards to universities.

FY 2007 Plans:

- Conduct competition for approximately 60 research instrumentation awards to universities.

	FY 2005	FY 2006	FY 2007
NRE EXPLOSIVE DETECTION	1,870	0	0

The Naval Research Enterprise Explosive Detection project addresses the Improvised Explosive Device (IED) threat and provides an investment in sensor technology, signal processing, data fusion, pattern recognition and autonomous systems technologies to detect the threat.

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FY 2005 Accomplishments:

- Initiated BAA for technical projects to support long range detection of Improvised Explosive Devices (IEDs), focusing on basic research issues associated with long wavelength (infrared and terahertz) detection of explosives. This is a one time effort.

FY 2006 Plans:

- Not applicable.

FY 2007 Plans:

- Not applicable.

	FY 2005	FY 2006	FY 2007
PRESIDENTIAL EARLY CAREER AWARDS	860	1,049	1,021

Extremely prestigious, presidential-rank, single-investigator research awards in areas of importance to the Department of the Navy, to recognize and encourage outstanding academic scientists and engineers early in their research career. PECASE awards are made by research agencies throughout the federal government. Awards provide national recognition and research grants of \$100,000 per year for five years.

FY 2005 Accomplishments:

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

FY 2006 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.

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FY 2007 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.

CONGRESSIONAL PLUS-UPS:

	FY 2005	FY 2006
CENTER FOR CATASTROPHE PREPAREDNESS AND RESPONSE, NYU	0	1,000

This effort supports research at the Center for Catastrophe Preparedness and Response, NYU.

	FY 2005	FY 2006
CENTER FOR MICROWAVE FERRITES AND MULTI-FUNCTIONAL INTEGRATED CIRCUITS	963	0

This effort supported the development of advanced ferrite materials suitable for use in DOD high performance high frequency Radar systems and other electromagnetic platforms.

	FY 2005	FY 2006
CENTER FOR SOUTHEASTERN TROPICAL ADVANCED REMOTE SENSING (CSTARS)	2,412	2,500

FY 2005: This effort supported scientific research in land, atmosphere, ice and ocean sciences, as well as more practical applications in the fields of environmental monitoring, natural hazard assessment, civil defense and defense tactical applications at the Center for Southeastern Tropical Advanced Remote Sensing.

FY 2006: This effort supports the Center for Southeastern Tropical Advanced Remote Sensing (CSTARS).

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	FY 2005	FY 2006
DEFENSE COMMERCIALIZATION RESEARCH INITIATIVE	3,859	2,800

FY 2005: This effort explored innovative new computing architectures for; collaboration, cross-cluster secure on demand computing, next generation security visualization, the next generation of knowledge management technologies, education in mathematics and science, and technology commercialization.

FY 2006: This effort supports the Defense Commercialization Research Initiative.

	FY 2005	FY 2006
MULTIFUNCTIONAL MATERIALS FOR NAVAL STRUCTURES	1,545	1,000

FY 2005: This effort developed techniques to enable the use of nanoparticles (e.g. clay) for introducing multifunctionality into marine composite matrix materials, such as the embedding of nano-engineered sensors or the introduction of self-healing characteristics. Additionally, this effort focused on developing the basic understanding needed to significantly enhance the fire, corrosion and blast/impact resistance of the marine composite matrix materials.

FY 2006: This effort will include: development of effective processing of nanoparticles with greater compatibility with marine composite matrix systems; incorporation of nanoparticles in marine composites and sandwich structures, and evaluation of mechanical/physical property enhancements; and evaluation of multifunctional attributes of affordable, fire-resistant, core materials for sandwich structures.

	FY 2005	FY 2006
NANOPARTICLE MATERIALS RESEARCH	1,065	0

This effort developed an understanding of the chemical recognition factors that drive adsorption of fouling organism cells to underwater surfaces and developed, for testing, practical samples of new designs and/or formulations. A primary focus of this effort was the micromechanical and nanomechanical characterization of these new anti-fouling/fouling-release coating designs/formulations.

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	FY 2005	FY 2006
NANOSCIENCE RESEARCH	1,446	0

This effort supported nanoscience research to overcome limitations that inhibit the fulfillment of nanomaterials' potential for widespread use in naval structures and sensors with potential dual use applications for homeland security through the development of advanced material technologies focused on innovative composite processing techniques based on computational modeling, multi-functional nanoengineered coatings, and fire and corrosion resistant materials as they relate to pre-emptive warning, prevention and containment of identified threats, and remediation.

	FY 2005	FY 2006
NATIONAL SECURITY TRAINING	963	1,800

FY 2005: This effort supported the Serrano Scholars program, at Columbia University and Hostos Community College, for preparing minority and non-traditional students for careers in foreign affairs.

FY 2006: This effort supports national security training.

	FY 2005	FY 2006
NEURAL ENGINEERING RESEARCH	963	0

This effort addressed fundamental issues to create 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 2005	FY 2006
REMOTE SENSING RESEARCH	963	0

This effort developed an 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 2005	FY 2006
RESEARCH INFRASTRUCTURE- UNIVERSITY OF WASHINGTON APL	0	2,800

This effort supports the research infrastructure at the University of Washington Applied Physics Laboratory.

C. OTHER PROGRAM FUNDING SUMMARY:

Not applicable.

D. ACQUISITION STRATEGY:

Not applicable.