



Naval Research Laboratory



The Navy and Marine Corps Corporate Laboratory



Establishment of NRL



THOMAS A. EDISON

“GOVERNMENT SHOULD MAINTAIN A GREAT RESEARCH LABORATORY TO DEVELOP GUNS, NEW EXPLOSIVES AND ALL THE TECHNIQUE OF MILITARY AND NAVAL PROGRESSION WITHOUT ANY VAST EXPENSE.”

**THOMAS A. EDISON,
THE NEW YORK TIMES MAGAZINE
SUNDAY, MAY 30, 1915**

A WORLD-CLASS LABORATORY

- **Idea followed the sinking of the Lusitania in 1915**
- **Secretary Josephus Daniels Established Naval Consulting Board with Edison Chair, meeting October 7, 1915**
- **August 29, 1916 Congress appropriates funds to establish the Lab**
- **Delayed by WW-I, Assistant Secretary of the Navy, Theodore Roosevelt, Jr. Commissions the Lab at Bellevue site on July 2, 1923**

Navy and Marine Corps Corporate Laboratory



Agenda ICCAGRA Meeting

- **0815** Front Gate/Security Check-In – LT Brendan Cremins/Ms. Melinda Braschler
(Coffee and Bagels will be served at bldg. 222 Room 159)
- **0900** Opening Remarks – CDR JC Coffey/Jason Tomlinson
- **0915** Keynote Speaker – Mr. Rick Foch “*UAS’s in S&T Aviation*”
- **1000** International Coordination
 - EUFAR and Oct. 2010 Conference/Air Show in Toulouse– Jean-Louis Brenguier
 - Synopsis of the EUFAR meeting & Discussion
 - Possible statement by EUFAR Representative?
- **1030** *Break*
- **1045** International Coordination Cont.
 - Working Groups (30 minutes each)
 - UAS WG Updates & Discussion– Mike Hutt
- **1115** *Lunch Break (Lunch will be served)*
- **1200** Agency Updates (This should be updates from the last meeting – up to 30 minutes each)
 - NRL – CDR JC Coffey
 - CIRPAS/SCOAR –CDR Coffey
 - ONR – Mike Pollock
 - NSF/NCAR – Jim Huning
 - USGS – Tom Cecere
- **1405** *Break*
- **1420** Agency Updates Continued
 - NOAA AOC – Jim McFadden
- DOE AAF - Jason Tomlinson
 - NASA – Randy Albertson (???)
- **Finish at 1700**
- **1830 Dinner - [O'Connell's](http://www.danieloconnells.com)**
www.danieloconnells.com
- **112 King Street**
Alexandria, VA 22314
(703) 739-1124



Agenda ICCAGRA Meeting

- **Apr 07**
- **0800 Front Gate/Security Check-In – LT Brendan Cremins/Ms. Melinda Braschler**
(Coffee and Bagels will be served at bldg. 222 Room 159)
- **0830 UAS - XFC and Ion Tiger Briefing and Lab Tour – Joe Mackrell**
- **1000 Break**
- **1015 Business and some flex time in case things run over on Monday**
- **Addition of non-government members**
- **One full time employee**
- **Should ICCAGRA become the FAA’s voice for science?**
- **ISPRS ASWG overview document of the TORs**
- **Next Meeting plan**
- **Assign Tasks**
- **Open Discussion**
- **1200 Adjourn**
-
-
- **NRL, Hotel & DC Activity Information**
-
- **Attached are the directions to NRL (bldg 72 reserved parking, where we will meet you with car passages and the VIP badges), we would recommend the National Harbor for hotels and restaurants, the link is www.nationalharbor.com. If you have any questions please feel free to contact us.**
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- **Finally concerning the upcoming meeting, the Cherry Blossom Festival is from March 27th to April 11th, <http://www.nationalcherryblossomfestival.org/>. Also, the Washington Nations will be playing at home (against the Phillies) the first week of April.**



NRL Mission

- To conduct a broadly based multidisciplinary program of scientific research and advanced technological development directed toward maritime applications of new and improved materials, techniques, equipment, systems and ocean, atmospheric, and space sciences and related technologies.
- Primary in-house research for the physical, engineering, space, and environmental sciences
- Broadly based applied research and advanced technology development program in response to identified and anticipated Navy and Marine Corps needs
- Broad multidisciplinary support to the Naval Warfare Centers
- Space & space systems technology development & support
- Designated as the Navy's corporate laboratory by SECNAV 1991



NRL: The DoN's Corporate Laboratory

Focus Areas

- **Sensors, Electronics and Electronic Warfare**
 - **Materials/Processes**
 - **Battlespace Environments**
 - **Undersea Warfare**
 - **Information Systems Technology**
 - **Space Platforms**
-
- **Technology Transfer**



Naval Research Laboratory's Organizational Relationships

**Assistant Secretary of the Navy
(Research, Development & Acquisition)
The Honorable Sean Stackley**

**Chief of Naval Research
RDML Nevin P. Carr, Jr.
★ ★**

NRL

**Commanding Officer ★
CAPT. Paul C. Stewart, USN**

**Director of Research
Dr. John Montgomery**

**Business Operations
Mr. D. Therning**

**Systems Directorate
Dr. G. Borsuk**

**Materials Science and Component Technology
Dr. B. B. Rath**

**Naval Center for Space Technology
Mr. P. G. Wilhelm**

**Ocean and Atmospheric Science & Technology
Dr. E. Franchi**

Radar
Electronic Warfare
Optical Sciences
Information Technology

Chemistry
Materials Science & Technology
Comp. Phys & Fluid Dynamics
Plasma Physics
Electronics Science & Tech
Biomolecular Science & Engr

Space Systems Dev
Spacecraft Engineering

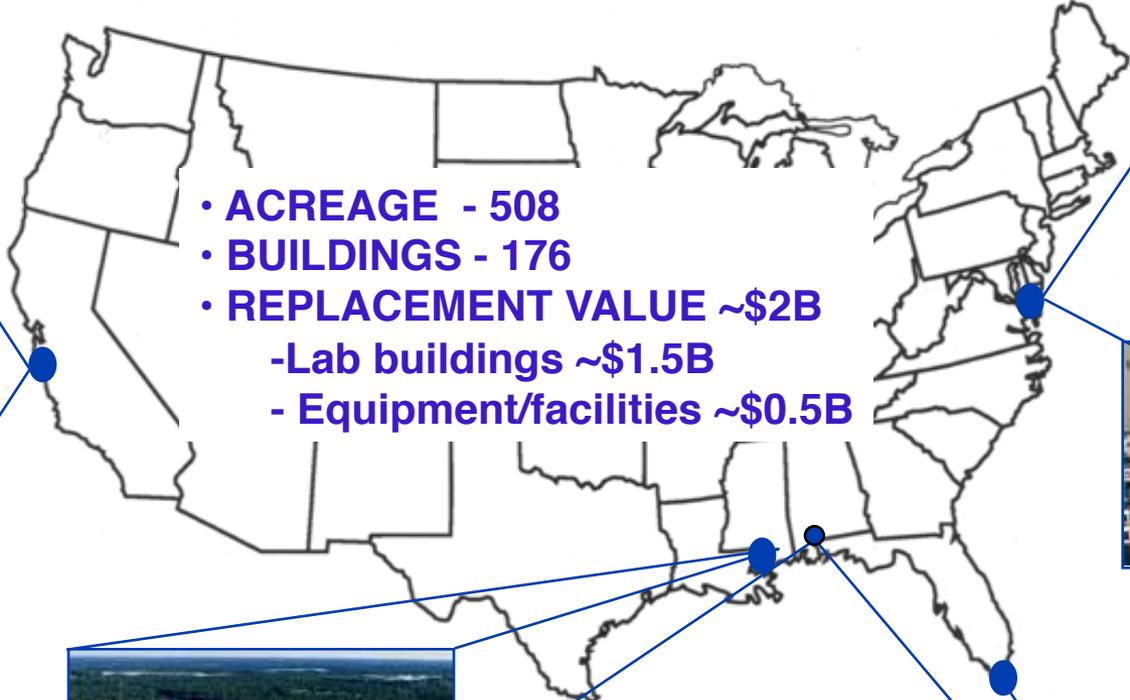
Acoustics
Remote Sensing
Oceanography
Marine Geosciences
Marine Meteorology
Space Sciences



Naval Research Laboratory



MONTEREY, CA



- **ACREAGE - 508**
- **BUILDINGS - 176**
- **REPLACEMENT VALUE ~\$2B**
 - Lab buildings ~\$1.5B
 - Equipment/facilities ~\$0.5B



**PATUXENT RIVER
VXS-1 Squadron**



NRL D.C.

**Chesapeake Bay Div
Tilghman Is.
Midway Res Ctr
Blossom Point
Pomonkey**



**BAY ST. LOUIS, MS
John C. Stennis Space Center**



**MOBILE, AL
Ex-USS Shadwell**

**NAF,
KEY WEST
Marine
Corrosion
Facility**



Key Capabilities of Remote Sites

Monterey:

- Weather model development
- Forecasting
- Co-located with Fleet Numerical

Stennis :

- Ocean modeling and prediction
- Oceanographic research
- Co-located with NAVOCEANO

Mobile Bay:

- ex-USS Shadwell
- Shipboard firefighting research

Key West:

- Marine corrosion research

Chesapeake Bay Division,

Tilghman Island:

- Electronic Warfare Development
- Microwave Ocean Environment Surrogate

MRC, Blossom Point, Pomonkey:

- Spacecraft testing
- Calibration
- Control and Operations



Scientific Development Squadron ONE (VXS-1)



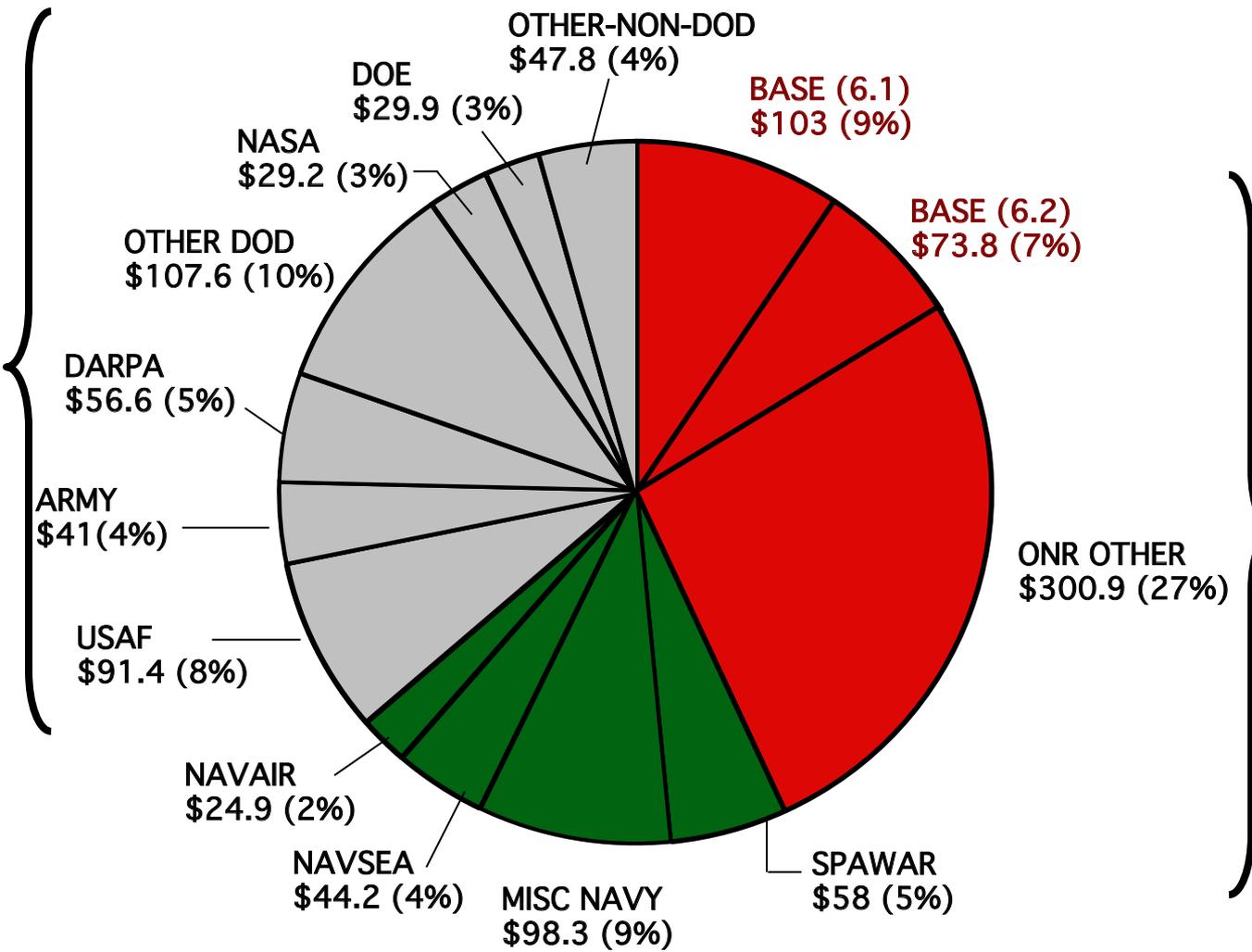
- Provides airborne research capability to NRL
- Sensor and system test bed, airborne surrogate
- Worldwide deployable
- **5** Aircraft
 - **2** Research Modified NP-3D
 - **1** AEW Rotodome NP-3D
 - **2** Research Modified RC-12
- **12** Officers, **76** Enlisted, **4** Civilians





SPONSORS FY08 COSTS TOTAL \$1,106.6 MILLION

Leveraging Joint Funding for Navy Needs



Navy funding for Navy needs



NRL S&T Base Program

\$102.5M 6.1, \$71.2M 6.2 in FY08

- IN-HOUSE BASIC AND APPLIED RESEARCH FOR THE PHYSICAL, ENGINEERING, SPACE, AND ENVIRONMENTAL SCIENCES
- RESULTS TO ADVANCE NAVAL SYSTEMS AND CAPABILITIES

16%

Battlespace Environments

Environmental processes and phenomena of the ocean, sediment near shore and marine atmosphere

Hyperspectral Imager



15%

Electronics

Research leadership on new electronic and electro-optic phenomena, materials, theory and techniques for future Naval forces and avoid technological surprise.

NRL Decoy Launcher Railgun



14%

Electromagnetic Warfare

Develops technologies for total electromagnetic battlespace awareness/dominance

Real time multi-spectral surveillance, target detection, and location



Camera Digital Transmission Targeting

9%

Space Res. & Space Tech

Understand the space environment and its effects on Naval systems. Conduct unique experiments in space, specific to future DON needs.

High Bandwidth Communications

MicroSAT in GEO



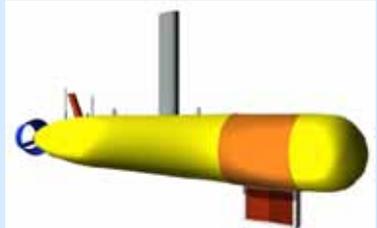
1 deg W-band Spot Beam- 400 mi Diameter.

15%

Undersea Warfare

Research and advanced technologies for undersea sensors for ASW/MW

AUV Mine Identification



3%

Information Technology

Advanced systems and methods for wideband communications and Nava security needs

Mobile Networks



Personal Secure Phone

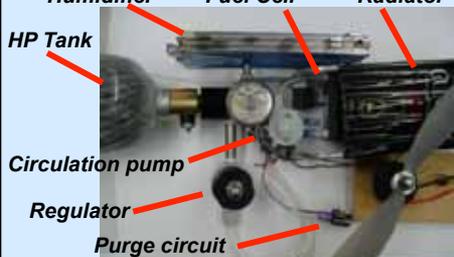
26%

Materials & Chemistry

Development of advanced functional and structural materials

Fuel Cell system

Humidifier Fuel Cell Radiator



HP Tank

Circulation pump

Regulator

Purge circuit

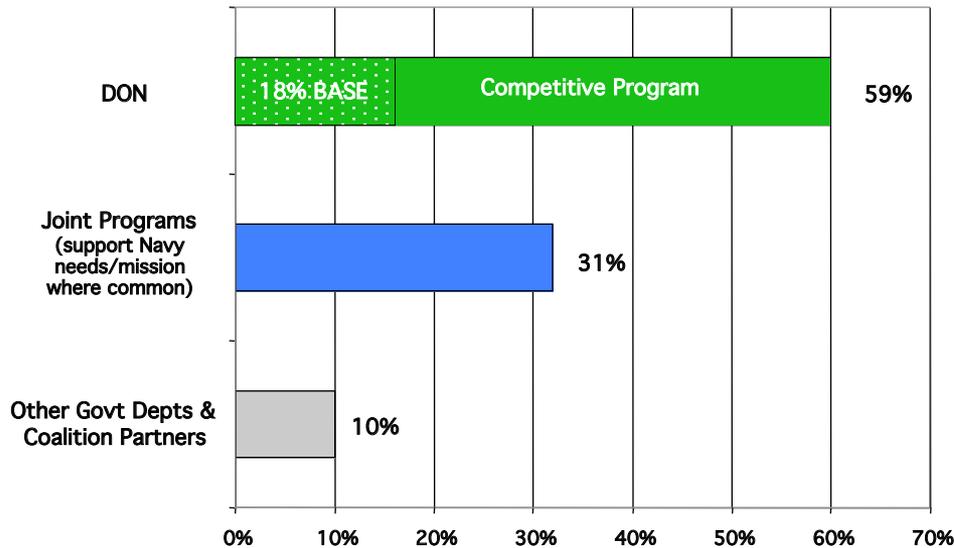
preliminary weight: 3 pounds



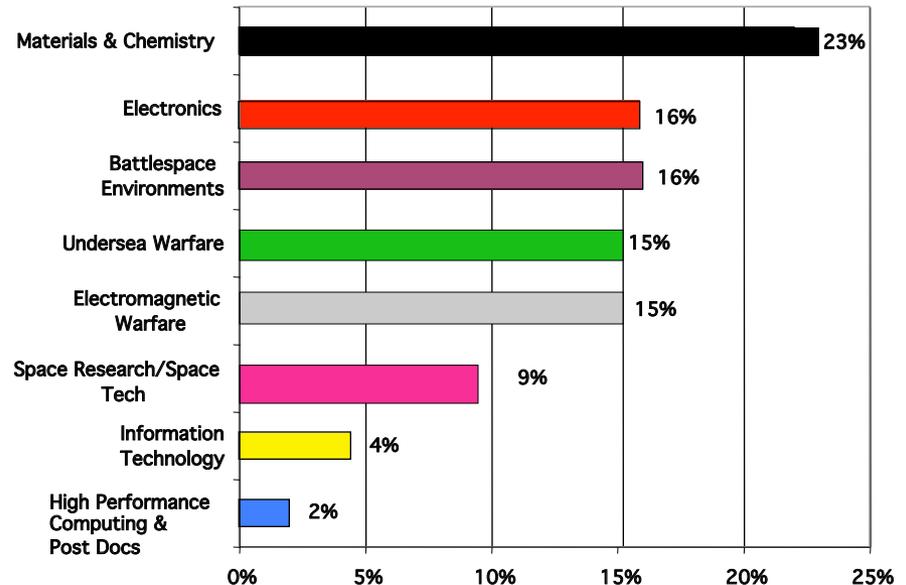
NRL Base Program

- IN-HOUSE BASIC AND APPLIED RESEARCH FOR THE PHYSICAL, ENGINEERING, SPACE, AND ENVIRONMENTAL SCIENCES
- RESULTS TO ADVANCE NAVAL SYSTEMS AND CAPABILITIES

TYPICAL NRL PROGRAM FUNDING



NRL BASE PROGRAM (FY06)



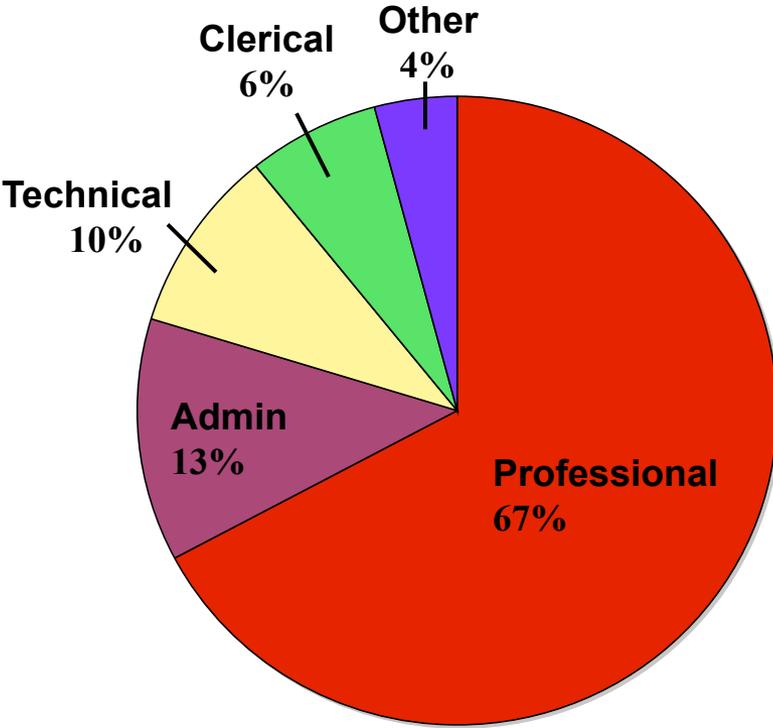


NRL PERSONNEL FY 08 (FTP Only)

TOTAL	2168 (WG INCLUDED)
BACHELOR	508
MASTER	312
DOCTORATE	732

SCIENTISTS/ENGINEERS: 1470

PHYSICISTS	365
ELECTRONICS ENGINEERS	333
*OTHER	337
CHEMISTS	88
COMPUTER SCIENTISTS	125
MECHANICAL ENGINEERS	60
ASTRONOMERS	33
AEROSPACE ENGINEERS	54
GEN PHYS SCIENTISTS	38
MATHEMATICIANS	26
METALLURGISTS	11

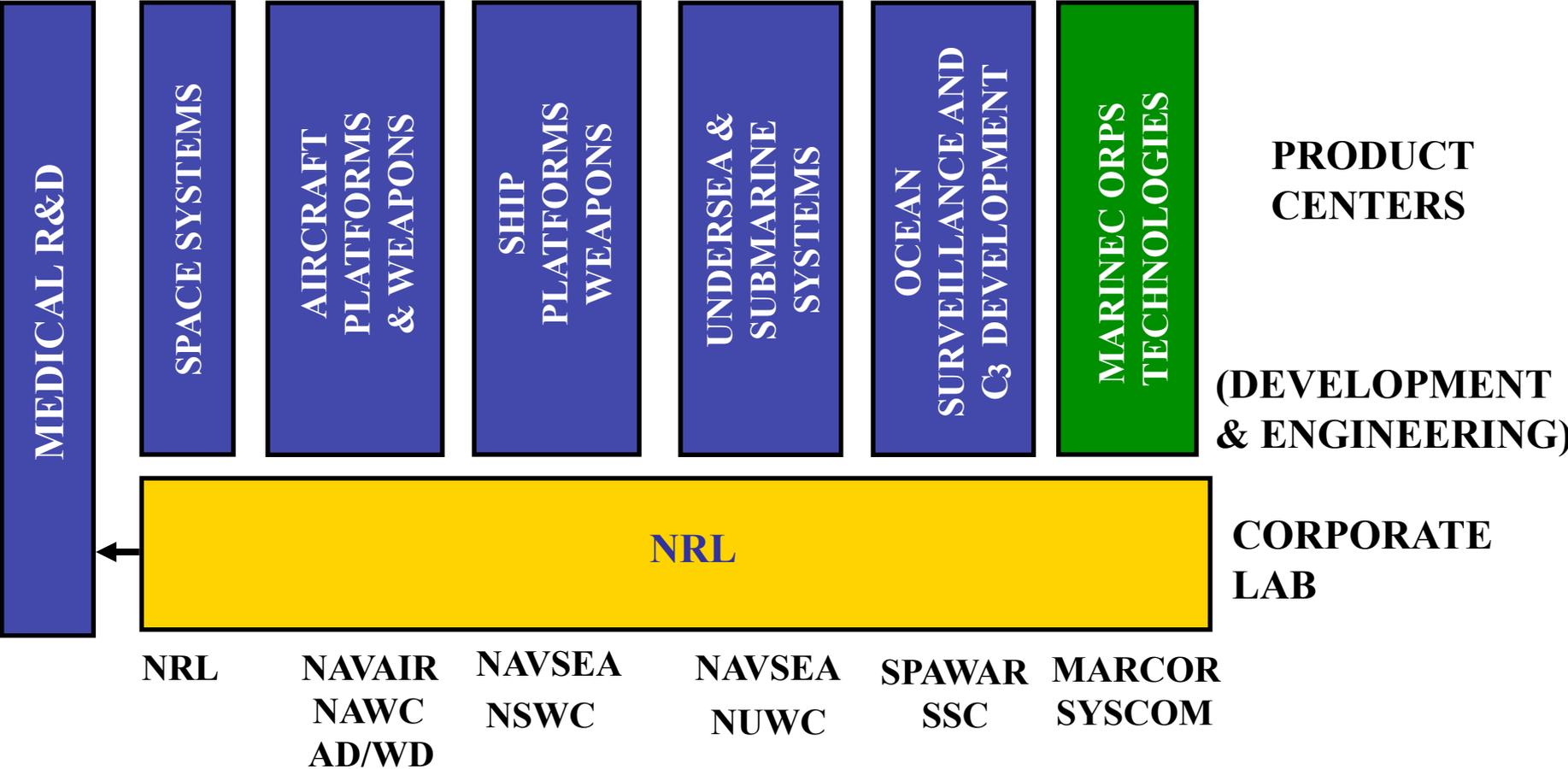


*(other includes: Biologists, Microbiologists, Chemical, General Materials, Electrical and Computer Engineers, Meteorologists and Oceanographers)



U.S. Navy Technology Infrastructure

ALL SCIENTIFIC DISCIPLINES





Institutional Programs In Support of NRL Research

- **Post doctoral Program (~120 Postdoctoral Fellows in FY07)**
A comprehensive process managed by the
**National Research Council &
Am. Soc. For Eng. Edu. (ASEE)**
- **Summer Faculty Program (~ 37 University Faculty)**
Summer appointment (10 weeks)
Managed by ASEE
- **Summer Student Program (~ 200 students)**
High School / undergraduate /graduate students
Student Career Experience Program
Student Temporary Employment Program
Student Volunteer Program
DoD S&E Apprentice Program (High School juniors)



NRL Partnerships

- Partnerships with Industry
 - Cooperative Research and Development Agreements (CRADA)
 - Sale to Third Parties (non-Federal Government)
 - Licensing/Sublicensing
- Partnerships with Universities
 - @1000 collaborations with 250 institutions in 50 states
 - 187 collaborations in 32 foreign countries
- International Agreements/Committees
 - Involvement with 38 nations
- Joint Programs
 - MOA/MOUs



Measures of S&T Excellence

Great Science, Right Science, Payoff for the Navy

World Class Science

- Papers, patents, citations, royalties
- Nat'l Academy members, society fellows
- Percent of staff with PhD/advanced degrees
- Prestigious scientific and engineering awards

High Value for DoN

- Transitions & quick responses
- BRAC military value rankings
- Studies by DSB, NDU, NRAC, NAS, etc
- Outside customers



World Class Science

(Linkage Between U.S. Scientific Research and Patents)

Top Ten U.S. Institutions in Rank Order

Physics Papers

1. AT&T Bell Labs
2. IBM Corporation
3. Stanford University
4. Bellcore
5. **Naval Research Laboratory**
6. Lincoln Labs
7. MIT
8. Univ. of Illinois
9. UC Santa Barbara
10. Cornell University

Engineering & Tech. Papers

1. AT&T Bell Labs
2. IBM Corporation
3. Univ. of CA Berkeley
4. MIT
5. Stanford University
6. General Electric Company
7. Texas Instruments
8. **Naval Research Laboratory**
9. NC State University
10. Bellcore



High Value to DoN

In BRAC 05, of **617** DoD technical activities at **282** military installations:

- NRL was ranked **#1** for Military Value in **6** of **13** S&T technical areas and in top 10 in remaining 7. No other DoD center ranked as **#1** in more than one S&T technical area.

NRL Accomplishments

1920s



NRL commissioned

Skip distance effect



Sound Navigation and Ranging (SONAR)

1930s

First radar installed on *USS New York*



First U.S. radar patents

First concept & proposal for nuclear sub

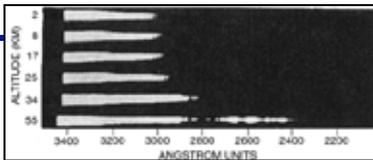


1940s



Principles of modern fracture mechanics

Submarine, airborne & OTH radars & IFF



First experiment in space

GPS prototype in orbit

Excimer laser



First fiber-optic acoustic biosensor

Lunar camera

1970s



Timation - GPS

AFFF developed

First U.S. intelligence satellite



1960s



Purple K Powder



Vanguard I launched

Synthetic lubricants

Submarine life support

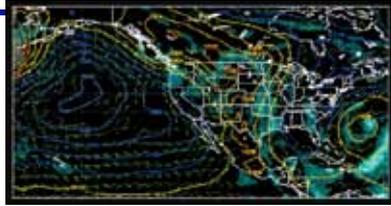
1950s

NRL Accomplishments

1980s



High-energy magnets



Navy Operational Global Atmospheric Model



Nobel Prize to Dr. Jerome Karle

First Navy CRADA signed

CBR sensors for Fleet & Homeland Security



QuadGuard



SHARP reconnaissance

1990s

Bio-based sensors for Desert Storm



NQR detection for explosives & narcotics



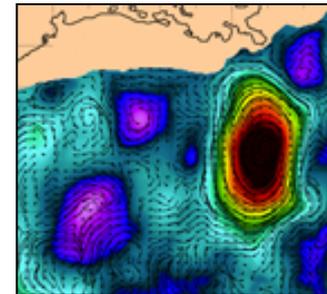
Dragon Eye UAV



WindSat Spacecraft



Decadal impact of El Niño discovered



First operational global eddy-resolving ocean model

Specific Emitter ID



Clementine Spacecraft

2000s



Naval Research Laboratory



Questions?

The Navy and Marine Corps Corporate Laboratory