The Naval Postgraduate School’s Role in the Naval Research Enterprise

Dr. Leonard Ferrari
Acting Provost and Dean of Research
Naval Postgraduate School
lferrari@nps.edu
Outline

• Introduction to NPS
• Selected Research
  • Operational Support
  • Experimentation
  • Humanitarian Relief
  • Process Improvement
  • Counter-Terrorism
  • Science & Technology
• Partnerships
NPS MISSION

Provide relevant and unique advanced education and research programs in order to increase the combat effectiveness of U.S. and Allied armed forces and enhance the security of the United States.
Naval Postgraduate School

- Provides unique education and research based on the operational experience of NPS students.
- Encourages students and faculty to be innovative in finding solutions to current and near-term warfighting needs.
- Provides opportunities for:
  - NPS students and faculty to demonstrate and evaluate latest technologies in an operational environment
  - the operational community to utilize and experiment with new technologies

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Faculty Expertise Includes

- Operations Research
- Autonomous Vehicles
- Directed Energy Systems
- Software Engineering
- Combat System Physics
- Electronic Warfare
- SIGINT, MASINT and ISR
- Modeling and Simulation
- Human Systems Integration
- Materials Technology
- Information Assurance
- Systems Engineering
- Information Operations
- Computer and Information Sciences
- Counterterrorism
- Homeland Security & Defense
- Business, Management and Acquisition
NPS students are:

- Joint Service
- Coalition Partners
- Interagency
- Intergovernmental

![Pie chart showing the distribution of NPS students by service:
- Navy: 49%
- Army: 21%
- Air Force: 12%
- Marine Corps: 15%
- Coast Guard: 1%
- Other: 2%]
## NPS International Resident Degree Enrollment

<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North America</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Caribbean, Central, and South America</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>El Salvador</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Honduras</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Paraguay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Trinidad-Tobago</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Uruguay</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>11</td>
<td></td>
</tr>
<tr>
<td><strong>Australia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>147</td>
<td>11</td>
</tr>
</tbody>
</table>

### Europe

- Bosnia: 1
- Bulgaria: 2
- Czech Rep.: 2
- Estonia: 1
- France: 2
- Germany: 14
- Greece: 54
- Hungary: 2
- Latvia: 1
- Lithuania: 1
- Moldova: 1
- Norway: 2
- Poland: 8
- Portugal: 1
- Romania: 4
- Spain: 2
- Sweden: 3
- Turkey: 44
- Ukraine: 1
- U.K.: 1

### Central/East Asia, and Middle East

- Armenia: 1
- Bahrain: 4
- Israel: 1
- Jordan: 3
- Lebanon: 1
- Pakistan: 4
- Saudi Arabia: 2
- Uzbekistan: 2

### Africa

- Botswana: 1
- Ethiopia: 1
- Kenya: 1
- Nigeria: 1
- Rwanda: 1
- Senegal: 1
- Tanzania: 1
- Tunisia: 11

### Far East, Near East

- Bangladesh: 1
- India: 4
- Indonesia: 7
- Japan: 2
- Korea: 6
- Malaysia: 1
- Philippines: 3
- Singapore: 30
- Taiwan: 16
- Thailand: 1

**The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR**
Sponsored Programs

FY05 by Sponsor

- Navy (47%) $37,229K
- Air Force (6%) $5,118K
- Defense (8%) $6,309K
- Joint (2%) $1,873K
- Industry (2%) $1,214K
- Other (3%) $2,632K
- NSF (3%) $2,650K
- Army (3%) $2,282K
- Other Federal (26%) $21,120K

TOTAL: $80,430,864
Operational Support
The Center for Interdisciplinary Remotely-Piloted Aircraft Studies

Expendable Sensors:
- Wave Buoy
- T-Drop
- Visibility Sonde
- Chem Sonde

Aerodynamic Decelerator
Precision Delivery Systems

AN/MPQ-64 Sentinel Air Surveillance and Target Acquisition/Tracking Radar

GNAT 750

Predator (2)

UV 18-A Twin Otter

Remote UAV Facility

Camp Roberts

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
NPS field experiments utilize military assets and are staged near campus and around the world. Research teams are composed of faculty, students and partners such as ONR, NRL, SOCOM, LLNL and others.
February 05 TNT: 802.11B affected by radar

May, August 05 TNT UWB comms demonstrated within Cutter

Suisun Bay: UWB able to transmit between holds of a container ship with holds closed!

UWB on board USCGC Munro (multi-deck, no radar)

Collected system performance data on operational ship

Polar Star – Planned experiment w/ USCG

Data and Video in Real Time from Within a Boarded Ship to External Networks

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Optimizing Tomahawk Strikes

NPS Operations Research has developed a decision-support tool to optimize Tomahawk strike predesignation for single firing units, an entire battle group, or a complete theater.

One button on this dashboard optimizes an entire fleet-wide Tomahawk strike in seconds.
The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR

Wave-Driven Antenna

Antenna comparison in operational scenarios performed as a part of the Mustang Canter Naval Exercise

Wave-Driven out-performed the competition
Student Integrated Project

Study topics are provided by CNO N-7 and final reports are briefed Navy-wide.

A Systems Engineering and Analysis (SEA) student lead, cross campus interdisciplinary study that’s purpose is to provide educational experience in addressing large-scale warfighting issues relevant to the Navy.

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Humanitarian Relief
Katrina......
2006 Hastily Formed Network Experiments on USNS Mercy Ship
Process Improvement
The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR

Naval Ship Shock Trial Simulation

Accurately predicts the Shock Response of a surface ship in an Underwater Explosion Event.

Potential savings of over $100M for the Navy by replacing LFT&E Ship Shock Trials with modeling and simulation.
Serious Games and Simulations

NPS researchers have been pioneers in modeling, simulation and the development of games for the military.

Left: Free electron laser simulation and scene from America’s Army
Right: Deployable flight trainer
Counter-Terrorism

Red Cell Support for Maritime Security Operations

Olympics Security Maritime Interdiction Operations

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Irregular Warfare

Structure and Dynamics of Insurgency

Smart Defensive Jammer (SDJ) for Counter IED
Maritime Security

NPS has been working on MDA and MDP for the past three years with support from OSD-HD and the Congress.
Coalition Operating Area
Surveillance and Targeting System:
Thailand Phase

Investigate and match current and evolving participant operational C4ISR needs with integrated, low cost, state-of-the-art, unclassified, networked COTS solutions.
Information Assurance

CISR is an NSA Center of Excellence for Information Security and Trusted Computing
The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Flexible Spacecraft Simulator
Ultra-Quiet Platform
Space-Based Relay Mirror
Three-axis-simulator
Positioning Hexapod
Space Robot Simulator

Spacecraft Research and Design Center

The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR
Surface Heat Budget of the Arctic (SHEBA)

A year-long ice camp measuring processes controlling the sensitive air-ice-ocean feedbacks which make the Arctic particularly sensitive to global climate change.
The 2006 Naval S&T Partnership Conference is presented by NDIA with technical support from ONR

**ATMOSPHERIC MEASUREMENT LABORATORY**

**Shipboard assessment of EM/EO properties; design, develop, install instruments**

**Buoy measurements of near-surface properties; radar propagation, remote sensing**

**Land (Coastal) continuous measurements; develop forecast models**

NOAA, USN, UC, NPS, MBARI
Partnerships

• University Partnerships: UCSB, VT, LLNL, CSUMB, GMU, Stanford, UCB, UMW, NUS, UoC, NMT

• 50 CRADAS with Industry

• 35 Chair Professors

• New CNO Distinguished Fellows Program
The Nation’s top scientists, engineers, political scientists, educators, religion scholars, military strategists, economists and business leaders will be brought together, under one umbrella, to engage in the Global War on Terrorism.
Dr. Leonard Ferrari
Provost, Naval Postgraduate School
831-656-2371
lferrari@nps.edu