The Office of Naval Research - Science and Technology in Support of the US Navy and Marine Corps

Dr. Reginald G. Williams
Office of Naval Research
March 2017
The Office of Naval Research
The S&T Provider for the Navy and Marine Corps

- 4,000+ People
- 23 Locations
- $2.1B / year
- >1,000 Partners

Discover → Develop → Deliver → Technological Advantage
Partnering with the S&T Community

Government

Academia
1000 Universities/Colleges
Domestic/International

Industry
Small/Medium/Large Companies
ONR Enables Capability

Fleet

Warfighting Requirement

S&T Programs

Basic Research

ONR sponsors S&T research:

a) Creating new knowledge to ...
b) Develop technology that will ...
c) Fill a capability gap, and ... Deliver results
Warfighting Capabilities Enabled by S&T Investments

Discovery & Invention (Basic and Applied Science) ≈ 50%

Leap Ahead Innovations (Innovative Naval Prototypes) ≈ 12%

Technology Maturation (FNCs, etc.) ≈ 30%

Quick Reaction & Other S&T ≈ 8%

CURRENT FLEET/FORCE

FLEET/FORCE IN DEVELOPMENT

FUTURE FLEET/FORCE

Portfolio is balanced across near, mid and long term S&T investments
Discovery & Invention S&T is the essential foundation required for advanced technology

- Focused on 5-20 years out
- Basic Research and early Applied Research
- All research maps to the Naval S&T Strategic Plan; the projects are the building blocks for Future Naval Capabilities (FNCs) and Innovative Naval Prototypes (INPs)

Dr. David Wineland won the 2012 Nobel Prize in Physics for his work in quantum computing.

Creativity Thrives in Discovery and Invention
Basic Research

- Cavitation Erosion Resistant Coating and Matrix Materials
- Hydro-Elasticity Effects of Composite Materials
- Large-Eddy Simulation of Crashback loads

FNC

Pitch-adapting composite submarine propeller for enhanced performance with reduced weight, less maintenance and substantial acquisition and life cycle cost savings

Acquisition POR

- SEA 073R Advanced Submarine Systems Development
- PEO SUB Virginia and Follow-on class submarines

From Basic Science to the Fleet!

Academia  ONR’s Unique Mission  Industry
Naval S&T Strategy Focus Areas

- Assure Access to Maritime Battlespace (D32)
- Autonomy & Unmanned Systems (D35)
- Electromagnetic Maneuver Warfare (D31)
- Expeditionary & Irregular Warfare (D30)
- Information Dominance – Cyber (D31)
- Platform Design & Survivability (D33)
- Power & Energy (D33)
- Power Projection/Integrated Defense (D35)
- Warfighter Performance (D34)
S&T Investment Priorities

- Integrated Layered Defense Across the Entire Detect-to-Engage Continuum
- Extended Threat Neutralization Capabilities
- Future Naval Fires
- Directed Energy / Electric Weaponry

- Cyber
  - Full Spectrum Cyber Operations
  - Communications & Networks
  - Computational & Information Construct

- Cyber
  - Spectrum Dominance
  - Electronic Warfare
  - Advanced Electronics, Sensing & Response

- EM Maneuver Warfare
  - Achieve & Maintain Undersea Dominance

- UX$ MANEUVER WARFARE
  - Scalable & Robust Distributed Collaboration
  - Autonomous & Unmanned Vehicle Mobility

- Environmental Surveillance
- Warfighter Enhancement
- Synthetic Biology
- Microbial Electronics
University Research Programs fund promising new research, stimulate innovation, and attract outstanding researchers to naval-relevant research projects

- The **Multidisciplinary University Research Initiative (MURI)** involves teams of researchers investigating high priority topics and opportunities that intersect more than one traditional technical discipline.
- The **Defense University Research Instrumentation Program (DURIP)** supports university research infrastructure essential to high-quality naval-relevant research.
- The **Presidential Early Career Award for Scientists & Engineers (PECASE)** recognizes and honors extraordinary achievements of young professionals at the outset of their independent research careers in S&T.
- The **Vannevar Bush Faculty Fellowship Program (VBFF)** provides extensive, long-term financial support to distinguished university faculty and staff scientists and engineers to conduct unclassified, basic research on topics of interest to DoD.
Enterprise Research Programs develop scientific and fundamental knowledge, provide the basis for future Naval systems, and maintain the health of the defense scientist and engineer workforce

- The Basic Research Challenge (BRC) competitively selects and funds promising research programs in new areas not addressed by the current basic research program
- The Applied Research Challenge (ARC) stimulates new applied research projects in areas not currently addressed by the departmental core applied research programs and explores feasibility of basic research with high risk and significant potential naval payoffs
- The Young Investigator Program (YIP) supports academic science and engineering faculty who been on tenure track within the last five years and show exceptional promise for doing creative research
Laboratory Research Programs provide naval laboratories the ability to invest in basic research of technical interest to meet laboratory mission elements

- **In-house Laboratory Independent Research (ILIR)** enables laboratories to sponsor focused, high-risk research with potential high payoffs to the Navy and Marine Corps on a discretionary basis.

- **Independent Applied Research (IAR)** focuses on performing innovative, promising applied research consistent with the mission of the claimant organizations and the current DON S&T strategy.
The Education & Workforce portfolio raises awareness of naval career opportunities, attracts and nurtures the future talent pool, and fosters the continued development of the current naval science, technology, engineering, and mathematics (STEM) workforce.

- Develop the workforce and capabilities needed today and in the future.
- Emphasize Total Force approach to workforce development.
- Align DON STEM portfolio with Federal and Office of the Secretary of Defense (OSD) directives in order to foster a highly competent and diverse DON STEM talent pipeline.
Multidisciplinary University Research Initiative (MURI) projects fund a team of researchers to investigate high priority topics and research problems that intersect more than one traditional technical discipline.

- Intended for teams investigating the topics specified in each year’s announcement
- Available to U.S. universities granting degrees in science or engineering
- $1.5 million for three years, plus two option years.
- 4 to 6 collaborating investigators with a lead Principal Investigator

Topics:

- Each topic has a topic description with title, background, objectives, research concentration areas, and resources.
- Each topic has a “Topic Chief”, with contact information
- About 20 separate topics total each year for the three services (ONR, ARO, AFOSR)

A new FOA is published each year on grants.gov. The timing is generally in spring but may vary. This year the FOA came out in April and closed in November 2016.

The Defense University Research Instrumentation Program (DURIP) supports university research instrumentation essential to high-quality Department of Defense-relevant research. DURIP funds are used for the acquisition of major equipment to augment or develop research capabilities of interest to the DOD. These awards also improve educational opportunities available to students.

- Allows universities to purchase high-cost research equipment
- Equipment to be used for research of interest to the DOD
- Advantageous to identify an interested research program or program manager
- Available to U.S. institutions of higher learning with degree granting programs in science, math or engineering
- $50,000 — $1.5 million award

A new DURIP FOA is published each year on grants.gov. The timing is generally in late spring but may vary. This year the FOA came out in March and closed in July 2016.

The Vannevar Bush Faculty Fellowship Program (formerly NSSEFF) provides extensive, long-term financial support to university faculty and staff scientists and engineers to conduct bold and ambitious “blue sky” basic research on topics of interest to DOD.

- Tenured faculty and full time staff at Ph.D.-granting educational institutions are eligible
- Single-investigator research grants, although collaboration is encouraged
- Up to $3M in total costs over the 5 year awards
- Foster long-term relationships between STEM faculty members, their students, and DOD.
- Technical subject categories of interest to the DoD are specified in each year’s announcement
- sponsored by the Basic Research Office of the Assistant Secretary of Defense for Research and Engineering and funded by the Office of Naval Research

A new FOA is published each year on grants.gov. The timing is generally in early summer but may vary. This year the FOA came out in June 2016 and closed in January 2017.

The ONR YIP was established to attract outstanding faculty members to the Department of Navy's research program by identifying individuals that show exceptional promise for doing creative research and encourage their teaching and research careers through long term support).

- First or second full-time tenure-track or tenure-track-equivalent academic appointment within 5 years of proposal due date
- U.S. citizen, national, or permanent resident (on the date proposals are due)
- U.S. Institutions of Higher Education which award degrees in science, engineering, and/or mathematics
- Typical award $510,000 over a three year period of performance
- A new FOA is published each year on grants.gov. The timing is generally in the summer but may vary. This year the FOA came out in August 2016 and closed in November 2016.

Office of Naval Research
Home Page www.onr.navy.mil
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<thead>
<tr>
<th>Code 30</th>
<th>Expeditionary Warfare &amp; Combating Terrorism</th>
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<tbody>
<tr>
<td>Supports research in Math, Electronics, Computer &amp; Information Sciences and their applications in Command &amp; Control, Communications, Cyber, EW, Intelligence, Surveillance and Reconnaissance</td>
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**S&T Programs:**
- Command, Control, Computers and Communication (C4)
- Fires
- Force Protection
- Human Performance Training and Education
- Intelligence, Surveillance and Reconnaissance
- Logistics
- Maneuver

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**S&T Programs:**
- Applied & Computational Analysis
- Communications and Networking
- Computational Methods for Decision Making
- Electronic Warfare EO/IR Sensors and Sensor Processing
- Integrated Topside
- Machine Learning, Reasoning and Intelligence
- Mathematical Optimization
- Precision Navigation & Timekeeping

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<th>Code 32 Sea Warfare &amp; Weapons</th>
<th>Warfighter Performance</th>
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<td>Develops and delivers technologies that enable superior warfighting and energy capabilities for naval forces, platforms and undersea weaponry</td>
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**S&T Programs:**
- Advanced Sea Platforms
- Polymer Matrix Composites
- Cellular Materials
- Water Desalination and Purification

**S&T Programs:**
- Applied Instructional Research
- Biorobotics
- Capable Manpower
- Future Capability
- Command Decision Making
- Force Health Protection
- Human-Robot Interaction
- Marine Biofouling
- Neural Computation
- Undersea Medicine

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- Arctic and Global Prediction
- Littoral Geosciences and Optics
- Marine Mammals and Biology
- Marine Meteorology
- Maritime Sensing
- Ocean Acoustics
- Ocean Engineering & Marine Systems
- Physical Oceanography
- Research Facilities
- Space Environment
- Undersea Signal Processing

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**S&T Programs:**
- Directed Energy
- Electromagnetic Railgun
- Energetic Materials
- Maritime Weapons of Mass Destruction
- Science of Autonomy
- Turbine Engine Technologies

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Basic Research Proposal Success

Pre - Proposal Inquiries

Formal Proposals

Funded Grants \ Contracts

>6,000

~3,000

~1000
Successful Candidates

• Contact ONR Program Officer before submitting a proposal
• Try to understand PO’s portfolio / interests
• Review Strategic Plan to become familiar with Navy / Marine Corps terminology
• Understand how your technology satisfies a naval need / technology gap
Top Research Areas: ONR Publications 2009-2014

Academic & Industry Collaborations

Over 25,000 journal articles
Impact to scientific community: Highly cited publications


Engage with defense leaders, meet Office of Naval Research program officers, learn about new research opportunities and pitch your technology initiatives. Don’t miss this great opportunity!

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Back Up
Global & Fleet Engagement

ONR Global Offices

- ONR HQ DC
- Newport
- Norfolk
- LeJeune
- Mayport
- Norfolk
- LeJeune
- Mayport

ONR Science Advisor Locations

- Singapore
- Santiago
- London
- Prague
- São Paulo
- Newport
- DC
- San Diego

Countries with ONR funded research

- Hawaii
- São Paulo
- Tokyo
- Yokosuka
- Okinawa

We execute $2B/year with the Naval S&T community in the US and 54 countries