Future Naval Capabilities (FNC) Program Overview

Mike Meyers
FNC Director
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The Office of Naval Research invests in innovative operational concepts to develop the science and technology (S&T) that ensures our warfighters always have the technological edge.

ONR Mission — “to plan, foster, and encourage scientific research in recognition of its paramount importance to future Naval power and national security.” - Public Law 588 of 1946
Naval S&T Strategy

- Assure Access to Maritime Battlespace
- Autonomy & Unmanned Systems
- Electromagnetic Maneuver Warfare
- Expeditionary & Irregular Warfare
- Information Dominance/Cyber

- Platform Design & Survivability
- Power & Energy
- Strike & Integrated Defense
- Warfighter Performance

≈ 45% Discovery & Invention
(Basic and Applied Science)

≈ 30% Technology Maturation
(Innovative Naval Prototypes)

≈ 12% Leap Ahead Innovations
(Innovative Naval Prototypes)

≈ 8% Quick Reaction & Other S&T

≈ 50% of the portfolio is focused on near and mid-term capabilities
## ONR S&T Programs Comparison

<table>
<thead>
<tr>
<th>% of Portfolio</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
<th>Quick Reaction (QR)</th>
<th>Innovative Naval Prototype (INP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>~45</td>
<td>Expanding frontiers of knowledge in areas of naval interest</td>
<td>Transitioning mature S&amp;T to acquisition program of record</td>
<td>~8</td>
<td>~12</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Focus</th>
<th>General Naval needs and opportunities</th>
<th>OPNAV/MCCDC-identified capability gap</th>
<th>Transitioning mature S&amp;T to acquisition program of record</th>
<th>Solving emergent fleet / force needs</th>
<th>Demonstrating Leap-Ahead technology</th>
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<tr>
<th>Motivation</th>
<th>OPNAV/MCCDC-identified capability gap</th>
<th>Fleet-identified need</th>
<th>Significant military advantage</th>
<th>General Naval needs and opportunities</th>
<th>OPNAV/MCCDC-identified capability gap</th>
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</thead>
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<table>
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<tr>
<th>Example</th>
<th>Ocean Acoustics</th>
<th>38 MW Waterjet for LCS</th>
<th>IED Jammer</th>
<th>Electromagnetic Railgun</th>
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<table>
<thead>
<tr>
<th>Type of Innovation</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
<th>Quick Reaction (QR)</th>
<th>Innovative Naval Prototype (INP)</th>
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<tbody>
<tr>
<td>Disruptive or sustaining</td>
<td>Disruptive or sustaining</td>
<td>Disruptive or sustaining</td>
<td>Disruptive or sustaining</td>
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<table>
<thead>
<tr>
<th>Time frame</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
<th>Quick Reaction (QR)</th>
<th>Innovative Naval Prototype (INP)</th>
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<tbody>
<tr>
<td>Continuing</td>
<td>2-4 years</td>
<td>1-2 years</td>
<td>4-8 years</td>
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<tr>
<th>Typical TRL entry point</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
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<tbody>
<tr>
<td>TRL 1</td>
<td>TRL 3</td>
<td>TRL 4 to TRL 5</td>
<td>TRL 2 to TRL 3</td>
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<th>Typical TRL end point</th>
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<tbody>
<tr>
<td>TRL 3 to TRL 4</td>
<td>TRL 6</td>
<td>TRL 7</td>
<td>TRL 6</td>
<td></td>
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<table>
<thead>
<tr>
<th>Technical Difficulty</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
<th>Quick Reaction (QR)</th>
<th>Innovative Naval Prototype (INP)</th>
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<tbody>
<tr>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
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<tr>
<th>Operational Integration Complexity</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
<th>Quick Reaction (QR)</th>
<th>Innovative Naval Prototype (INP)</th>
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<tbody>
<tr>
<td>N/A</td>
<td>Usually straightforward</td>
<td>Medium</td>
<td>Medium</td>
<td>High</td>
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<tr>
<th>Approval Level</th>
<th>Discovery and Invention (D&amp;I)</th>
<th>Future Naval Capability (FNC)</th>
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<tr>
<td>ONR Department</td>
<td>Technology Oversight Group (3-Star)</td>
<td>ONR Corporate</td>
<td>Naval RDT&amp;E Corporate Board</td>
<td></td>
</tr>
</tbody>
</table>
**FNC Program Leverages Basic Research to Deliver Mature Products to Fleet/Force**

### Basic Research (6.1, 6.2) (1990s & 2000s)
- High frequency Silicon Carbide switches
- Low power bidirectional Power Converter Module (PCM) developments
- Amorphous nano-crystalline magnetics and advanced dielectric materials

### FNC Product (6.2, 6.3) (2008-2012)
Bi-directional PCM provides 2-3 times increase in power density and enables new shipboard energy storage and power distribution configurations.

### Acquisition POR (6.4, 6.5) (2013+)
- PMS-320, Electric Ships Office
- DDG-51 Flight III, AMDR Power Conditioner

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**Bidirectional Power Converter**

DISTRIBUTION STATEMENT A. Approved for public release.
Future Naval Capabilities

• Goal: 2-4 year Product delivery timeframe
• Reports to a 3-star board: Technology Oversight Group (TOG)
• Responds to validated requirements (Naval S&T Gaps)
• Develops S&T response to requirements
  – Delivers quantifiable S&T (Products)
• Negotiates good faith Technology Transition Agreements (TTAs)
• Conducts Resource Sponsor Transition Assessment Reports (TARs)
• Delivers to acquisition Programs of Record (PORs) or directly to Fleet or Force
• Industry participation: ~60%
FNC Pillars
(9 Total)

• **Sea Shield (SHD)** - Missile defense, ASW, MIW and fleet/force protection technologies -- global defensive assurance

• **Sea Strike (STK)** - Weapons, aircraft, and expeditionary warfare technologies -- precise and persistent offensive power

• **Sea Basing (BAS)** - Logistics, shipping, and at-sea transfer technologies -- operational independence

• **FORCEnet (FNT)** – C4ISR, networking, navigation, decision support and space technologies -- architectural framework for naval warfare in the information age

• **Naval Expeditionary Maneuver Warfare** (NEMW) 
  Enhance the warfighting capabilities of naval ground forces with special emphasis on regular and irregular warfare
FNC Pillars
(9 Total)

• **Capable Manpower (CMP)** - Match Sailors and Marines to the right jobs, design intuitive systems, and train for mission essential competencies

• **Force Health Protection (FHP)** - Protect Sailors and Marines by reducing morbidity and mortality when casualties occur

• **Enterprise and Platform Enablers (EPE)** - Cross-cutting technologies to lower acquisition, operations, and maintenance costs

• **Power & Energy (P&E)** - Energy security, efficient power and energy systems, high energy and pulse power
FNC Funding by Pillar for FY15

**FY15 Total**

$457M*

*New Starts and existing Products

**Shifts Based on the Annual Product Composition**

- **Sea Strike**: 18.20%
- **Sea Shield**: 28.49%
- **Sea Basing**: 4.03%
- **Power & Energy**: 5.00%
- **Enterprise and Platform Enablers**: 6.90%
- **FORCEnet**: 20.14%
- **Capable Manpower**: 5.97%
- **Force Health Protection**: 5.57%
- **Expeditionary Maneuver Warfare**: 5.70%

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Management Process

• 9 Pillars cover full spectrum of SECNAV, CNO & CMC priorities
• Thorough vetting and review of technical merit and transition alignment
• Senior leadership review and approval

Requirements Driven – Transition Oriented!
Display Information with Uncertainty
TRANSITIONED TO ACQUISITION

A set of task-centered, intuitive, and easy to operate mission planning tools to increase safety and reduce mission risk, from initial navigation hazard identification through tactical plan, brief, execute, and assess phases.

Advanced Power Generation
DEPLOYED

Ground Renewable Expeditionary Energy Network System (GREENS) is a Man-transportable renewable energy power generation system. Solar panels and rechargeable batteries provide an average continuous output of 300 Watts, sufficient for powering a battalion combat operations center.

High Performance Topside Coatings
DEPLOYED

High performance, low solar absorbing topside/freeboard coatings with enhanced color and gloss stability.

DISTRIBUTION STATEMENT A. Approved for public release.
FNC Success Stories

Globally Netted Joint/Coalition Force Maritime Component Commander
DEPLOYED

Provides a dynamic distributed data layer, an adaptive collaborative assistant, and role relevant visualization to enable coordinated & flexible planning within/among the MHQ and the MOC.

Naval Interceptor Improvements
DEPLOYED

Improves STANDARD Missile capability to intercept & achieve mission kills on advanced threats (cruise missiles, manned aircraft & reconnaissance UAVs)

Next Generation Airborne Electronic Attack
TRANSITIONED TO ACQUISITION

Airborne electronic attack capabilities for suppression of enemy air defenses, deliver non-kinetic fires, and suppression of C3 links and data networks.
- UAV-contained Magnetic Anomaly Detector (MAD) System for autonomous or semi-autonomous use to provide ASW targeting for attack by the P-8

- Development began in 2007 under Navy SBIR Topics N07-011; N07-030; N08-218; N102-134 and STTR Topic N13A-T019

- Systems have transitioned as an enabling technology for the High Altitude ASW (HAASW) FNC for transition to the P-8
FY16 and FY17 FNC Timelines

**FY16 FNCs**
- **Gap Approval**
- **ONR Proposals**
- **Proposed FNCs Prioritized and Approved**
- **New Start Preps (BAAs, Industry Proposals, Contracts process)**
- **Technology Development & Maturation Phase**
- **S&T Start (TRL 3)**
- **S&T Finish (TRL 6)**

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**FY13**
- **ONR Proposals**

**FY14**
- **Proposed FNCs Prioritized and Approved**

**FY15**
- **Here Today**

**FY16**
- **Proposed FNCs Prioritized and Approved**

**FY17**
- **Proposed FNCs Prioritized and Approved**

**FY18**

**FY19**

**FY20**

**FY21**

DISTRIBUTION STATEMENT A. Approved for public release.
Your Opportunities to Engage

• Monitor and respond to ONR Managers’ solicitations for new technologies in the winter/spring prior to the year the FNC starts
  – RFPs (Fed Biz Ops)

• Early engagement can help us refine plans prior to BAA/RFP release

• ONR awareness of a wide range of technology approaches benefits FNC Products and the Warfighter
  – Optimize performance characteristics
  – Leverage IRAD
  – Reduce technical risk

FNC Program: a Prime Venue to Develop & Transition Technologies
<table>
<thead>
<tr>
<th>Future Naval Capability (FNC) Title</th>
<th>Pillar</th>
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<tbody>
<tr>
<td>Operational Planning Tool</td>
<td>Capable Manpower</td>
</tr>
<tr>
<td>Densified Propellant Fire From Enclosure - Confined Space (FFE/CS) Propulsion Technologies</td>
<td>Expeditionary Maneuver Warfare</td>
</tr>
<tr>
<td>Advanced Topcoat System (ATS)</td>
<td>Enterprise &amp; Platform Enablers</td>
</tr>
<tr>
<td>Incapacitation Prediction for Readiness in Expeditionary Domains - an Integrated Computational Tool (I-PREDICT)</td>
<td>Force Health Protection</td>
</tr>
<tr>
<td>Combined EO/IR Surveillance and Response System (CESARS)</td>
<td>FORCEnet</td>
</tr>
<tr>
<td>Ship-launched EW Extended Endurance Decoy (SEWEED)</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Surface Ship Periscope Detection and Discrimination (SSPDD)</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Softkill Performance and Real-Time Assessment (SPARTA)</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Reactive Electronic Attack Measures (REAM)</td>
<td>Sea Strike</td>
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## Unfunded FY16 New Starts of Interest to ONR

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<thead>
<tr>
<th>Future Naval Capability (FNC)</th>
<th>Pillar</th>
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<tbody>
<tr>
<td>Multi-Threat Passive Ship Armor</td>
<td>Enterprise &amp; Platform Enablers</td>
</tr>
<tr>
<td>Operate to Know (OtK)</td>
<td>FORCEnet</td>
</tr>
<tr>
<td>Combat Power Control</td>
<td>Power &amp; Energy</td>
</tr>
<tr>
<td>Persistent Renewable Energy for Undersea Systems (PREUS)</td>
<td>Power &amp; Energy</td>
</tr>
<tr>
<td>Autonomous Unmanned Surface Vehicles for MiW Operations</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Surface X-Band Radar (Surf-X)</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Autonomous Reacquisition Manipulator System (ARMS)</td>
<td>Sea Shield</td>
</tr>
<tr>
<td>Mine Drift Prediction Tactical Decision Aid (MDP TDA)</td>
<td>Sea Shield</td>
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Take Aways

• Your engagement with ONR is desired

• BAAs or RFPs will be released 2nd/3rd Quarter FY15 for contract award prior to FY16 New Starts

• Industry participation is typically ~60%

• FY16 New Starts will begin S&T execution on 1 Oct 2015

• Handouts on the FY16 New Starts are available in the FNC breakout room
Questions?

http://www.onr.navy.mil