

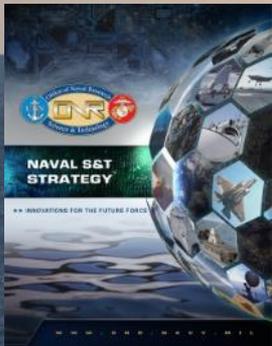


The Office of Naval Research

The S&T Provider for the Navy and Marine Corps



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



Discover

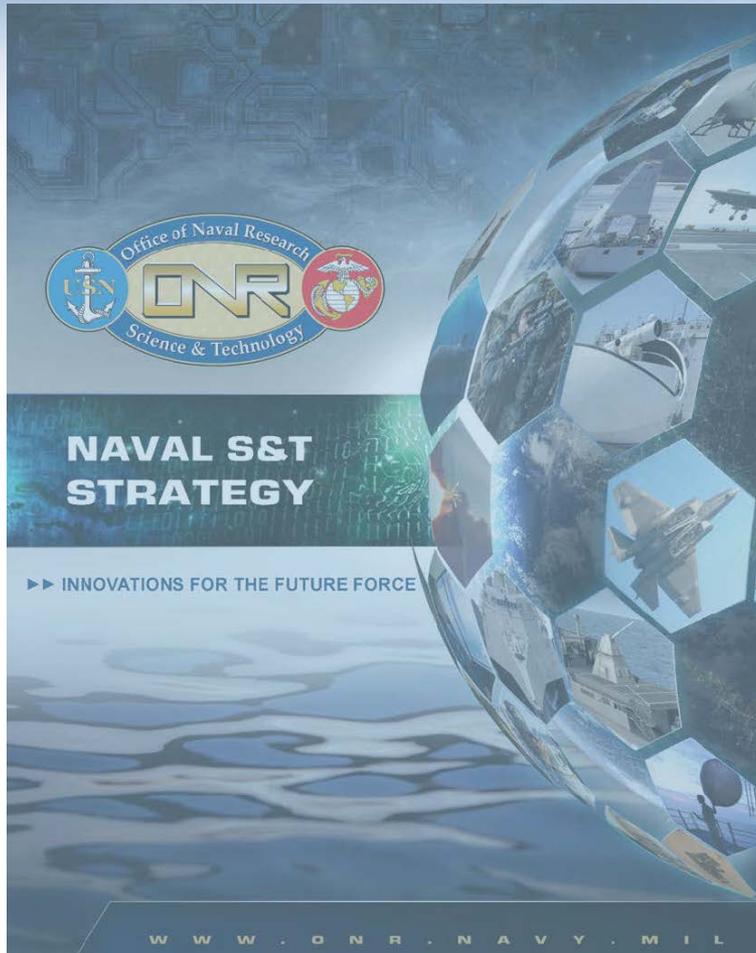
Develop

Deliver

Technological Advantage



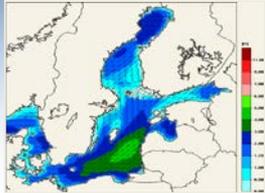
ONR S&T



- Assure Access to Maritime Battlespace
- Autonomy and Unmanned Systems
- Electromagnetic Maneuver Warfare
- Expeditionary and Irregular Warfare
- Information Dominance - Cyber
- Platform Design and Survivability
- Power and Energy
- Power Projection and Integrated Defense
- Warfighter Performance

<https://www.onr.navy.mil/en/About-ONR/science-technology-strategic-plan.aspx>

Naval S&T Focus Areas



Assure Access to the Maritime Battlespace

- Ocean/Atmospheric Sciences
- Underwater Acoustics
- Ocean Sensing



Autonomy and Unmanned Systems

- Robotics
- Machine Learning
- Perception
- Human Machine Interface



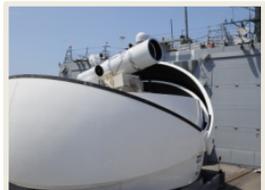
Expeditionary and Irregular Warfare

- Situational Awareness
- Decision Making
- Mobility / Logistics
- Soldier Protection



Information Dominance / Cyber

- Communications / Information Technology
- Computer Science
- Mathematics / Data Analytics



Power Projection and Integrated Defense

- Directed Energy
- Energetic Materials



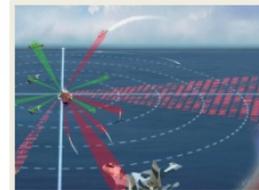
Platform Design and Survivability

- Air/Surface/Subsurface Vehicles
- Materials
- Corrosion / Biofouling
- Manufacturing Technologies



Power and Energy

- Renewable Energy
- Propulsion
- Power Control
- Thermal Management



Electromagnetic Maneuver Warfare

- EM Propagation & Waveforms
- Sensors and Electronics
- Optical Systems



Warfighter Performance

- Biomedical / Bioengineering
- Cognitive / Neural Sciences
- Training Technologies
- Health Protection



Organization



Director of Research (03R)

*Discovery & Invention,
SwampWorks, and STEM*

The nine S&T Focus Areas cut across all departments



Basic & Applied Research

Director of Transition (03T)

*Technology Maturation
Portfolio; Leap-Aheads;
Quick Reaction S&T*

The two Directorates manage cross-cutting programs

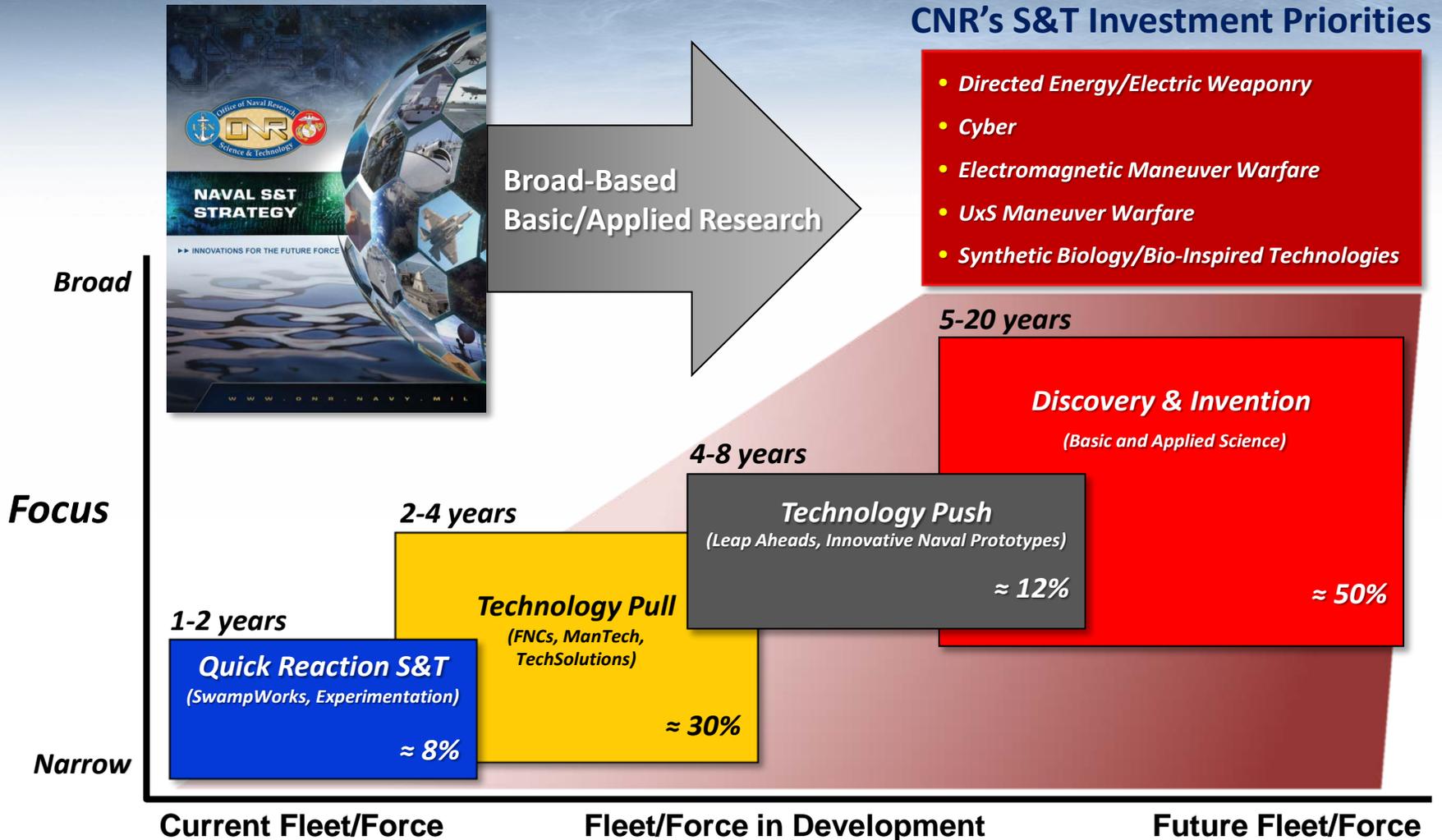


Future Naval Capabilities
Quick Reaction
Disruptive Technologies





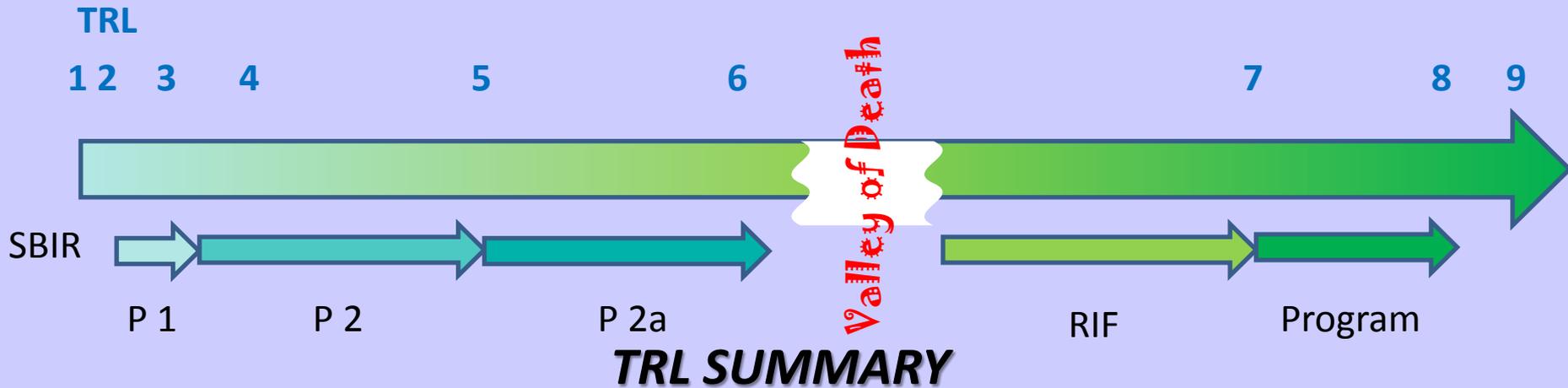
Warfighting Capabilities Enabled by S&T Investments



Portfolio is balanced across near, mid and long term S&T investments



Technology Readiness Level



- 1. Basic principles observed and reported**
- 2. Technology concept and/or application formulated**
- 3. Proof of concept**
- 4. Component and/or breadboard validation in laboratory environment**
- 5. Component and/or breadboard validation in relevant environment**
- 6. System/subsystem model or prototype demonstration in a relevant environment**
- 7. System prototype demonstration in an operational environment.**
- 8. Actual system completed and qualified through test and demonstration.**
- 9. Actual system proven through successful mission operations.**

TRL is subject to some interpretation.....



International Science Program Grants

Collaborative Science Program (CSP):

Support non-US workshops and conferences of Naval interest.



Visiting Scientist Program (VSP):

Support travel of non-US scientists to US to socialize new S&T ideas or findings with the Naval Research Enterprise.



Naval International Cooperative Opportunities in Science Program (NICOP):

Support insertion of innovative, international S&T into core ONR, NRE, & DoD S&T Programs.



Seedling Funding for Innovative Research



Domestic Science Programs / Interactions

Multidisciplinary University Research Initiative (MURI): Teams of researchers investigating high priority topics and opportunities 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 into naval applications.



Technology Interchange Meetings (TIM): and “Industry Days” allow DoD and industry/academia to cooperate on R&E technology challenges.



Seedling Funding for Innovative Research



Small Business Opportunities

Small Business Innovative Research (SBIR): Highly competitive three-phase award system which provides qualified small business concerns with opportunities to propose innovative ideas that meet the specific research and development needs of the Federal Government.

Small Business Tech Transfer (STTR): Requires the small business to have a research partner consisting of a University, Federally Funded Research and Development Center (FFRDC), or a qualified non-profit research institution.



<http://www.navysbir.com/>



Naval and Industry Innovative Research Partnerships



A new vehicle to advance cutting edge technology more rapidly (at very low cost)



What's in it for the Navy / Marine Corps?

- Speed to fleet
- Reduced re-engineering costs
- Reduced duplicative efforts
- (Potentially) Shared IP



What's in it for Industry?

- Low cost vehicle to augment early stage Internal R&D (IRAD) projects
 - Through informal ad hoc partnerships
 - Cooperative Research and Development Agreement (CRADA)
- Access to DoD facilities and personnel
 - NPS faculty
 - Cleared research teams and facilities
 - Potential opportunities for experimentation / proof of concept demonstrations in representative environments



What's in it for Industry?

- Improved early alignment with DoD requirements
- Primary researchers become subject matter experts at key decision making commands



How does it work?

- Define a win-win-win basic/applied research objective for NPS and industry partner/s that supports [ONR requirements](#)
- Develop an Ad hoc partnership statement, or more formal Cooperative Research and Development Agreement (CRADA)
- Collaborate on supporting thesis / dissertation projects
- Share completed work (and associated intellectual property)
- Transition into ONR projects and/or continued industry IR&D



Technology Transfer Programs

Patent Licensing Agreements (PLA)

- Research performed at Navy and Marine Corps labs frequently produces patented, innovative discoveries of commercial value. These patents are available for licensing to the private sector.
- PLAs may be non-exclusive, partially exclusive, or exclusive
- Are subject to irrevocable, royalty-free right of the government to use the licensed invention
- The licensee must have a plan for commercializing the invention
- Patent holders receive royalty payments for their leased inventions

PLA:

<http://www.nrl.navy.mil/techtransfer/for-inventors-and-industry/license-agreements>

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Partnerships

Cooperative Research and Development Agreements (CRADA)

Formed between one or more Federal laboratories and one or more non-Federal parties to perform cooperative and mutually beneficial research and development in any area that is consistent with the Federal laboratory's mission.

The Federal laboratory may provide personnel, services, facilities, and equipment, but no funds, to the joint R&D effort. On the other hand, the non-Federal party may provide funds, in addition to personnel, services, facilities, and equipment to the joint R&D effort.

CRADA:

<http://www.defenseinnovationmarketplace.mil>

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Larger Programs

- Future Naval Capabilities
- Innovative Naval Prototypes
- Speed to Fleet → Rapid Prototyping, Experimentation, and Demonstration

***Each has it's own program manager, priorities
and submission guidelines***

Distribution Statement A: Approved for public release
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RIF Origin & Objectives

- Established by the FY11 National Defense Authorization Act (NDAA)
 - Indefinitely authorized by Congress
 - “A competitive, merit-based program”
 - “Accelerate fielding of innovative technologies into military systems”

Goal: Transition Small Business Technologies into Defense Acquisition Programs

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RIF Criteria & Rules

- Source selection:
 - Preference for small businesses
 - Two phases: 1. white paper, 2. full proposal
- TRL 6/7 at project inception
- Up to two year project duration
- Gov't has one year to integrate (DoN RIF)
- Up to \$3 million/project

See current year's BAA for more details

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DoN RIF Award Stats

	White Papers	Full Proposals	Contract Awards	Contract Awards (\$)	Small Biz Awards	Previous SBIR Relationship
FY11	858	60	53	\$106M	100% (53/53)	68% (36/53)
FY12	711	28	23	\$44M	96% (22/23)	61% (14/23)
FY13	640	28	24	\$51M	92% (22/24)	75% (18/24)
FY14	511	24	21	\$45M	76% (16/21)	67% (14/21)
FY15	629	31	28	\$59M	86% (24/28)	64% (18/28)
FY16	589	37	28*	\$62M*	89%* (25/28)*	N/A

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*Estimate. Awards still in progress.



Where Do I Begin?

- Defense Innovation Marketplace Portal:
 - Strategic Vision Documents / U.S. S&T Priorities
 - Communities of Interest (Autonomy is one of the 17 listed)
 - Human/Autonomous System Interaction and Collaboration (HASIC)
 - Machine Perception, Reasoning and Intelligence (MPRI)
 - Scalable Teaming of Autonomous Systems (STAS)
 - Test, Evaluation, Validation, and Verification (TEVV)
 - Business Opportunities (including some Broad Area Announcements)
- What is the Technology Readiness Level of my Product / Capability?
- Whom can I Engage to Initiate a Public / Private Partnership?

***Recommend Starting Point for DoD Engagement:
<http://www.defenseinnovationmarketplace.mil>***

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QUESTIONS!

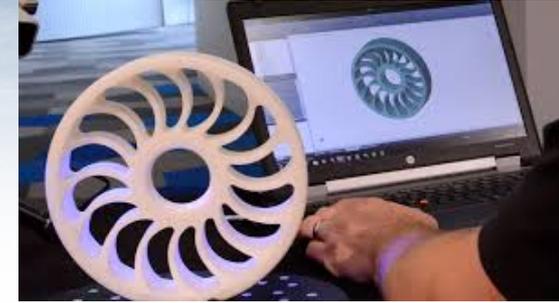




Specific Warfighter Needs

- **Logistics**

- **Distributed Manufacturing**
- **Next Generation Weapons Systems that “Deepen” our weapons magazine**
- **Task Force Energy**
 - **Power generation**
 - **Safe energy storage solutions**



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Specific Warfighter Needs

- **Autonomy and Unmanned Systems:**
 - **Human / Unmanned Systems Collaboration**
 - Natural modes of interaction
 - Dynamically change levels of autonomy
 - **Scalable & Robust Distributed Collaboration**
 - Swarm and counter swarm capabilities
 - Multiplatform sensor fusion
 - **Novel Platforms and Integration**
 - Bio-inspired systems
 - Microrobotics



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Specific Warfighter Needs

- **Cyber Capabilities:**
 - **Full Spectrum Cyber Operations**
 - Defend the network
 - Deliver warfighting effects
 - **Decision-Making Superiority**
 - Rapid & accurate in Big Data environments
 - **Communications and Network Services**
 - Redundant capabilities
 - Positioning Navigation and Timing



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