

NOT FOR PUBLICATION UNTIL RELEASED BY
SENATE ARMED SERVICES COMMITTEE
SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

STATEMENT

OF

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BEFORE THE

SUBCOMMITTEE ON THE EMERGING THREATS AND CAPABILITIES

OF THE

SENATE ARMED SERVICES COMMITTEE

ON

STATUS AND HEALTH OF THE DEPARTMENT OF DEFENSE
SCIENCE AND TECHNOLOGY (S&T) LABORATORY ENTERPRISE

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Introduction

Madam Chairwoman, Senator Portman, members of the subcommittee, it is an honor to appear before you today to report on the overall health of the Department of Navy (DoN) Laboratories and Centers. The Department relies heavily on the people, facilities and capabilities in our Labs and Centers to sustain the Current Navy, to acquire the Next-Navy, and to develop the Navy-After-Next. I would like to thank the Committee not only for your interest but for your strong support of many of the initiatives, investments, and flexibilities that enable those scientists and engineers to provide new warfighting capabilities and to sustain the technology leadership our Sailors and Marines enjoy.

As was mentioned earlier, the Navy's principal Laboratory, the Naval Research Laboratory (NRL) was created by Congress in 1923. Over half of the work NRL performs is fundamental science and technology, nearly all in partnership or in collaboration with academia and researchers in other government laboratories and activities. The warfare and systems Centers, while being involved in basic science, play most strongly in technology and engineering, often in partnership with industry, and government program offices. They too have long histories, some dating back to the 1800s, and were generally created to respond to a specific threat or technological challenge of the day.

Today, the Department of the Navy has fifteen (15) activities that compose the In-house research and development capacity. It is comprised of the NRL and fourteen (14) Warfare and Systems Centers aligned to three Systems Commands: Naval Sea Systems Command (NAVSEA), Naval Air Systems Command (NAVAIR), and Space and Naval Warfare Systems Command (SPAWAR).

The NRL, under the leadership of the Office of Naval Research (ONR), operates as the Navy's full-spectrum corporate laboratory, conducting 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.

The Naval Air Warfare Center (NAWC) Divisions (Air and Weapons) are the Department of Navy's principal research, development, test, evaluation, engineering, and fleet support centers for air platforms, autonomous air vehicles, aircraft engines, free-fall and glide weapons, survivability systems, mission and planning support systems, electronic combat systems, and the acquisition and support of fleet training systems.

The Naval Surface Warfare Center operates Navy's research, development, test and evaluation, engineering, and fleet support activities for ship systems, surface ship combat and weapons systems, littoral warfare systems, force warfare systems and other offensive and defensive systems associated with surface warfare and related areas of joint, homeland and national defense systems.

The Naval Undersea Warfare Center operates the Navy's research, development, test and evaluation, engineering, and fleet support activities for submarines, autonomous underwater systems, and offensive and defensive weapons systems associated with undersea warfare and

related areas of homeland security and national defense.

The Space and Naval Warfare Systems Centers (SSCs) are the Navy's research, development, test, and evaluation, engineering, and fleet support activities for Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR), Information Operations (IO), Enterprise Information Services (EIS) and Space capabilities.

The Naval Laboratories and Warfare Centers maintain a diverse workforce of 44,000 employees with 23,000 scientists and engineers. Among the scientists and engineers, 1,716 hold doctorates in science, engineering, or mathematics. These are encouraging numbers but there remain challenges.

Since the end of World War II, the U.S. has enjoyed a global leadership role in economic power and technology development/exploitation. These conditions are now changing as other countries emerge on the world stage. We recognize that without strong Naval Labs and Warfare Center leadership in technology, future forces may not enjoy maritime dominance in all warfare areas as we have in the past. Over the last few years we have embarked on a number of efforts specifically aimed at ensuring we maintain that edge for the warfighter.

The Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN (RD&A)) has identified five strategic priorities for the Department of Navy. Each of these works in harmony with the others to meet current acquisition needs and future technology requirements of our Sailors and Marines. Within each of these priorities our Laboratories and Warfare Centers remain pivotal players in understanding the technological and programmatic ramifications. The five priorities are:

- Get the requirements right;
- Make every dollar count;
- Raise the Bar on Performance;
- Support the Industrial Base; and
- Rebuild the Acquisition Workforce.

While each of these priorities is relevant to the labs and centers, it is in the last that the labs and centers play quite prominently as they make up over half the department's acquisition workforce. Over the last few years we have reversed over a decade of downsizing this part of our workforce: our professional corps had been stretched too thin and we had outsourced core competencies.

Section 852

Section 852 of the FY 2008 NDAA provides a mechanism to achieve the Secretary of Defense's goal of strategically sizing and rebalancing the Acquisition Workforce and ensure the Department's workforce has the capacity, in both personnel and skills, to perform its mission, provide appropriate oversight of contractor performance, and ensure the Department receives the best value for the expenditure of public resources. The Naval Labs and Warfare Centers make up more than half of the Department of the Navy's Acquisition Workforce. The Department of the Navy plan is to systematically and strategically hire 1,590 new professionals through FY 2015 in areas deemed essential to meet long-term needs.

Today, the Navy is executing to the plan. Many of these professionals are either permanently placed or rotated through our laboratory enterprise to increase their understanding of our programs and accelerate their professional development.

Section 852 has been invaluable to the Warfare and Systems Centers to fill key technical positions. It has enabled Warfare and Systems Centers to avoid losing highly coveted scientists and engineers.

The demand for scientists and engineers is as strong as it has ever been; if not stronger. While our colleges and universities see the numbers of American students pursuing technical degrees holding steady, or increasing, the number of graduates that are US citizens and eligible for employment in our workforce is not growing and our need for them remains great.

Direct Hiring Authority

Section 1108 of the NDAA for FY2009 provides that the Secretary of Defense may appoint qualified candidates possessing an advanced degree to scientific and engineering positions within any Laboratory.

Since FY2009, the Naval Laboratories and Warfare Centers have hired more than 6,800 scientists and engineers in their effort to reinvigorate the technical workforce. Of these hires, 729 were brought on using the Direct Hiring authority. This authority allows us to compete for the best minds graduating from our colleges and universities today, and while we've enjoyed relatively good recruiting results in the last few years largely due to the economy, the situation is again becoming more competitive.

And I would be remiss if I didn't thank-you for your strong support of the various other personnel flexibilities you have given us over the years, from the "China Lake" demo back in the 80's, to expansion of those authorities and eligible activities over the last few decades. The flexibilities in hiring, compensation, and personnel movement have greatly benefitted our workforce and activities. Every organization in the Naval Laboratory Enterprise has a version of a personnel system other than the General Schedule that is tailored to their needs. We are continuously evaluating the effectiveness of these systems and porting best practices from one system to another.

Section 219

The DoN has historically made deliberate and measured investments to ensure stability within the organic workforce. During this period of refreshing our workforce, Section 219 of the FY 2009 NDAA has proven very beneficial to the health of the Navy Labs, Warfare and Systems Centers. ASN (RD&A) continues to promote and execute Section 219 to:

- Maintain the scientific and technical vitality of in-house laboratories and centers;
- Increase the rate of recruitment and retention of laboratory and center personnel in critical skill areas of science and engineering;
- Foster creativity and stimulate exploration of cutting edge science and technology;
- Serve as a proving ground for new concepts in research and development;

- Support high-value, potentially high-risk research and development;
- Provide for maturation and transition of technologies beneficial to the Navy, Marine Corps, and the military forces of the other Services; and
- Enhance the laboratories' ability to address future military and DoN and Department of Defense (DoD) missions.

Current projections indicate the Naval Laboratories and Warfare Centers will invest approximately \$90M in Section 219 projects. Furthermore, this program has sparked a great deal of enthusiasm within the laboratory community. Each of the Labs and Centers has seen an increase in 'new ideas' from their scientists and engineers. A secondary benefit has been increased communication between the Laboratories and Warfare Centers and their customers regarding future technical challenges. For example, the Marine Corps Systems Command provided Labs and Warfare Centers with a written list of their priorities for technology focus areas.

10 USC §2805

The authority for unspecified minor construction up to \$4M, under 10 USC § 2805, continues to hold significant potential for the revitalization of Naval laboratories and warfare centers. We have not utilized the \$4M under this authority to date. As our program begins to gain strength, we anticipate it becoming a valuable resource.

Over the last decade, the Military Construction (MILCON) investments at NRL and the Warfare Centers have averaged approximately three percent of the total DoN MILCON budget (based on 2010 Naval Laboratory/Center Coordinating Group (NLCCG) Report). Approximately one-third of these were funded through Congressional-adds and another third via BRAC. BRAC MILCONs are complete and Congressional-adds will no longer be considered. In the likelihood that MILCON funds will decrease within the Laboratories and Warfare Centers, the minor construction authority granted under Section 2805 becomes even more important to the revitalization of our technical infrastructure. We recommend considering the elimination of a sunset clause and making this a permanent authorization.

As was noted in the 2010 Naval Research Advisory Committee report on the Status and Future of the Naval R&D Establishment, the scientific and technical workforce is the engine that drives our ability to maintain technological superiority. Technical capabilities once lost, may take decades to re-establish. We will maintain a constant state of "re-invention." Our Labs and Warfare Centers are maintaining pace with the rapid rate of change within science and technology to fully understand the technical/cost trade-space for next generation systems and platforms. Scientists and engineers require hands-on experience; "If you don't do it, you don't know it." Hands-on experience is essential to provide informed decision-making when setting requirements and overseeing contractor performance. The Department needs to always have the ability to: understand military problems in technical terms, know who has the potential to solve those problems, and verify a correct solution technically when it is offered.

Today's most pressing challenge in Acquisition is delivering the capability needed by our Sailors and Marines --- more affordably. To do so requires a significant technical understanding of the

complex systems the Department is acquiring. DoN Scientists and Engineers are instrumental to providing that understanding. ONR, Laboratories, Systems Commands, Warfare and Systems Centers are the principal sources of in-house technical knowledge.

During this time of strategic and budget refocus, the Department is focused to maximize its return on the investment of in-house technical capability and facilities. Consequently, ASN (RD&A) has directed Program Executive Officers (PEOs) and their Program Managers to look, first, to in-house Naval Laboratories, Warfare and Systems Centers for Pre-Milestone B technical work that would improve the Department's technical product, and cost knowledge. It is especially important that DoN Scientists and Engineers perform or participate significantly in these functions in the early stages of research and development (R&D). Examples include: engineering work in support of Analyses of Alternatives, in-house prototyping, experimentation, scale-model testing, and reducing program risk via subsystem development and testing. These tasks serve to emphasize hands-on work rather than administrative or oversight functions.

As the Deputy Assistant Secretary of the Navy for Research, Development, Test, and Evaluation I have oversight responsibility to the ASN(RD&A) for all RDT&E accounts, systems engineering and overall stewardship responsibilities for the Naval Laboratories and Warfare Centers. Since assuming my responsibilities in June of 2011, I have re-chartered the Navy Laboratory and Centers Coordinating Group (NLCCG). The NLCCG was first stood up with the establishment of the Warfare Centers in 1992 and is comprised of the civilian and military leadership of NRL and Warfare and Systems Centers. They are responsible to:

- Provide stewardship of the mission, technical capabilities, workforce and facilities of the Naval Laboratory and Warfare/Systems Centers;
- Advocate for the sustainment and enhancement of technical capabilities and competencies of NLCCG activities;
- Develop and implement a Naval Science and Engineering Strategic Plan;
- Increase operational effectiveness and efficiency of the Naval Laboratory and Warfare/Systems Centers and promote long term fiscal health of NLCCG activities; and
- Promote communication, cooperation and collaboration among all organizations.

I have tasked this group to create an overarching strategy, to define needed core technical capabilities, and to determine how to optimally integrate all these capabilities to meet the affordability challenges of today's platform and systems acquisition while planning integrating and delivering transformational technologies for the Navy-After-Next.

Our near term focus is to:

- Align processes for the work we accept from customers;
- Establish common processes for measuring the technical health of our workforce;
- Establish Department of Navy wide definitions for core capabilities and competencies; and
- Ensure consistency and transparency in program costing practices to ensure we make every dollar count within the Navy Working Capital Fund model.

All these actions make the Navy Laboratories and Centers better partners and suppliers of

technical expertise and products in the DoD Lab Enterprise. We will continue efforts to collaborate across the Services and the Laboratory community to champion the needed workforce, facilities, and long-term strategic investments.

The military dominance of the United States and U.S. Naval Forces in particular, is closely coupled to technical superiority of our military equipment and systems. This superiority is evident in such diverse areas as naval nuclear propulsion, radar, electronic warfare, missile systems, and has a force multiplier effect throughout our systems and platforms.

Although the U.S. Government and U.S. companies continue to invest in research and development, the increasing strength of developing countries and their research and development investments means that research and development is increasingly a global enterprise. The Department of Navy technology position will be shaped by the increasingly global nature of Science and Technology (S&T). Even if the Department of Navy Research and Development budgets were to remain a constant fraction of U.S. GDP, they would be a declining fraction of global Science and Technology investment. Therefore, those research and development investments must achieve a greater effectiveness per dollar to maintain U.S. Naval technological superiority. Important attributes include:

- Operationally motivated S&T investments: S&T investments should be connected to the long term strategies and operational requirements shaping future Naval capabilities. A core competency of the Naval Labs and Warfare Centers must be maintaining a clear understanding of how new or emerging technical impacts might impact Naval capabilities. The goal should be to ensure technical innovation is coupled to equally innovative concept development.
- Self-refreshing: As previously stated, the scientific and technical workforce is the engine driving our Naval Laboratories and Warfare Centers. The dynamic nature of science and technology means the Naval Laboratories and Warfare Centers must be in a constant state of re-invention.
- Robust against disruptive innovation: The extremely dynamic nature of the global technology landscape - new markets can emerge and flourish in mere years - means the Naval Labs and Warfare Centers must have sufficient understanding of technology changes to protect the value of major acquisition programs.
- Agile adoption and differentiation of global innovation: When promising innovations in the global market are identified, the task of the Naval Labs and Warfare Centers is to influence the external community development directions to satisfy Naval needs and develop key elements that ensure an advantage to Naval capabilities. We rely heavily on the ONR international presence in places like London and Singapore to be our portals to the international technical community. ONR Global and their foreign-based science officers, provide outstanding value. But more is necessary. Globalization is a contact sport. The Naval Laboratories and Warfare Centers will not be effective without our continued commitment to accessing the global span of S&T. With the rate of growth of technology, and especially outside of DoD and the United States, the Naval Labs and Warfare Centers must increase the aperture of the technical

community.

Recent performance trends indicate the Laboratories and Warfare Centers are executing more S&T work in-house, more than sixty percent over the last two years. The S&T funding that goes out-of-house is used to reach out to universities, industry parties, and other Laboratories. Data over the last decade showed slightly less than fifty percent had been executed in-house. This slight adjustment is consistent with the Department of Navy's objective to strengthen in-house technical capabilities.

The RDT&E investment portfolio is balanced within a variety of programs and initiatives, using in-house resources and out-of-house to bring the best ideas and opportunities forward. These include ONR's Future Naval Capabilities, Advanced Technology Demonstrations (ATDS), Joint Capability Technology Demonstrations (JCTDs), Small Business Innovative Research (SBIR), Cooperative Research and Development Agreements, and now the Rapid Innovation Program.

To date, only a handful of contracts have been negotiated under the Rapid Innovation Program. We are complying with guidance to use the funds to primarily stimulate and accelerate the transition solutions from small business providers into the hands of our warfighters. The Labs stand ready to advise and help Service and small business program managers and technical staff alike on the most effective insertion methods and test products if needed. We are optimistic this program will result in effective capability for the warfighter and introduce players to the DoD acquisition family, but it is too early to declare success.

The Naval Laboratories and Warfare Centers have the unique position and capabilities enabling them to: (a) fully understand the technical complexity of an emerging challenge, (b) quickly reach out all stakeholders and centers of excellence (other labs/centers, industry, academia, and other services) with no conflict of interest, (c) develop ideas against the backdrop of the acquisition process, and (d) deliver cost effective solutions. The hands-on work these scientists and engineers perform helps them fully comprehend the technical intricacies of evolving challenges.

The future technological challenges facing the Department of Navy are dynamic and constantly in flux. However, there are four areas, unique to the maritime environment, where the Navy must develop or maintain the technical competencies for leadership in the future.

- Integrated C4ISR. Whether systems are airborne, on the ocean surface, undersea or in expeditionary air/ground operations the use of wireless dynamic networks of manned and unmanned platforms offers significant operational advantage. Combined with timely intelligence, it can assist the operational commanders in achieving 'information dominance'. A major technical challenge exists for these heterogeneous systems in maritime command and control in that communications connectivity cannot be guaranteed and as a result, unmanned nodes must be able to operate with intermittent connectivity. Our Naval Labs and Centers are participants in defining the technical issues and in developing the necessary capabilities to solve the problems, build the systems, and maintain them into the future.

- Massive Data Transport. We are seeing the emergence of new sensors systems, such as Multi-mission Maritime Aircraft (P-8) and Broad Area Maritime Surveillance (BAMS) platform

capable of generating petabytes (that's 10 to the 15th power) of data that will well exceed new military satellite communications throughput capabilities. This is further exacerbated by the challenges of the maritime environment where the available bandwidth can often be degraded. The Naval Labs and Warfare Centers will play a major role in defining the issues and finding solutions. The Naval Labs and Warfare Centers are planning to grow their technical competency to support and lead this transformation using both commercial and Navy-specific technologies.

- Electronic Warfare. The Navy has a compelling expertise, dating back to our early radar experiments right on the Potomac, in Electronic Warfare. The challenge is to ensure the integration and interoperability of legacy and new systems across multiple platforms, integrating new capabilities into *planned* C4ISR systems and *future* platforms. The Naval Laboratory Enterprise already collaborates informally at the working level in this area, we are planning to review this approach to ensure it is sufficient to provide the projected capacity and interaction in this important area.

- Counter Anti-Access and Area Denial (A2/AD) and High End Asymmetric Threat (HE/AT). Given the global proliferation of A2/AD systems and capabilities and growing HE/AT that attempt to challenge the ability of U.S. maritime forces to operate freely, the Warfare Centers have and will continue to grow the technical competencies and provide technical leadership to in: Cyber warfare, Air- and surface-launched weapons vs. next generation ships and aircraft, Sea-based unmanned vehicles with munitions and ISR sensors, Concealment and Deception, Ballistic Missile Defense, Communications in non-satellite environment, Anti-Submarine Warfare, Sea Base systems and technologies, Indications & Warning, Precision Targeting, and Mine warfare and mine countermeasures.

Within the Naval Warfare Centers and Systems Centers, scientists and engineers are addressing the total life-cycle of technical issues for the Current Navy, the Next Navy, and the Navy-After-Next. Our scientists and engineers who have supported the immediate needs of our Marines and Sailors in Iraq and Afghanistan have accumulated invaluable knowledge of the real-life challenges and anticipated threats we may face in the future. It is critical that the DoN not miss the opportunity to re-invest this knowledge back into our future technical capabilities.

Summary

The Naval Laboratories and Warfare Centers are critical components of Today's Navy, the Next-Navy, and the Navy-After-Next. Authorities such as Section 852, Direct Hiring Authority, Section 219, and Section 2805 enable the Laboratories to strengthen their intellectual and infrastructure capacity and capabilities. There is no shortage of technical challenges. By increasing the hands-on work performed by scientists and engineers, the Navy has energized and excited the workforce. Having grown up professionally and technically in the Navy Laboratory and Center community, it has been a delight to return to the community in a leadership position where I can influence their continued success. I greatly appreciate your continued support to our Naval Laboratories and Warfare Centers, and I assure you I will do my best to ensure they are postured to meet today's and tomorrow's challenges.