

STATEMENT OF

THE HONORABLE H. LEE BUCHANAN  
ASSISTANT SECRETARY OF THE NAVY  
(RESEARCH, DEVELOPMENT AND ACQUISITION)

BEFORE THE

SUBCOMMITTEE ON EMERGING THREATS AND CAPABILITIES

OF THE

SENATE ARMED SERVICES COMMITTEE

ON

FY 2001 SCIENCE AND TECHNOLOGY PROGRAMS  
IN THE DEPARTMENT OF THE NAVY

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Mr. Chairman and distinguished members of the Subcommittee, thank you for the opportunity to present the Department of the Navy's (DON) Fiscal Year 2001 Science and Technology (S&T) Program and our budget request.

This year's DON S&T budget request shows a real program growth of 1.5 percent over our budget request for the last Fiscal Year. Our DON S&T budget request is adequate in the context of constrained funds and fully supports our ability to maintain our current technological advantage. We appreciate your continuing support of DON S&T.

My testimony today differs from that of previous years. I would like to use this occasion to discuss the context of our Science and Technology program and its proper role as an important contributor to the DON Acquisition program. I hope to show how our situation is dramatically different than it may appear and discuss how we promote, pursue and incorporate S&T.

**The impact of global commercialization of militarily important technology**

In the 11 years since the Cold War ended with the fall of the Berlin wall, clear trends have emerged, giving us significant cause for concern. Particularly disquieting is the globalization of commercial technologies with potential military and para-military applications. The rate of expansion and the facile use of these technologies are such that state actors and non-

state actors with money and access to open markets may be able to achieve a local, asymmetric advantage. This threat is real and current.

Our acquisition system, of which S&T are a critical part, was created for the Cold War and has not sufficiently changed since the Cold War ended. In order to counter these threats, as well as optimize the dollars we spend on the warfighter, I believe that our entire acquisition process must emulate the best commercial practices and evolve as they do. Today, possession of new technology is considered to be merely a ticket to the game. The winners and losers are discriminated by the time it takes to convert that new technology into products on the market. We have taken steps to move in the right direction, but we have not made enough progress.

I have three objectives that will move us toward a 21<sup>st</sup> Century acquisition system fully supported by our S&T:

- First, we must gain and maintain dependable visibility into innovations and developments outside of DoD, particularly in the commercial sector;
- Second, we must build an S&T culture that is guided by frequent and informed “make-buy” decisions and focused on yield;
- Third, we must actively push the successes of our S&T activities into the systems and platforms that we acquire.

I believe that these objectives will ensure that new technology rapidly and efficiently moves into our acquisition programs, and enable us to maintain our military technological advantage.

### **Gaining dependable visibility into innovations in the commercial sector**

During the Cold War, dominance of the military in every technology was the core of our military strategy. During that time the military was responsible for most significant technological advancements and we necessarily maintained a very broad, in-house development effort to ensure all relevant areas were covered. In the eighties, however, commercial industry was winning its own competitive war and developing its own technological superiority. It did not take long for commercial industry to outpace developments in the military particularly in microelectronics and information technologies.

Today, where the military was once the leader in technological innovation, commercial industry has taken over and now drives most technological improvements. Now, with so much going on in the commercial sector, we can't hope to cover its breadth. Nor should we have to if we can create a good capability for “technological reconnaissance” and an efficient process for bringing technology in from the outside.

Unfortunately, there is a trend that many large industrial firms have followed for the last several years. Because technological innovation is so important to commercial product lines, they are closing or selling their defense Research and Development (R&D) divisions (IBM, DuPont, Intel, GE, and others). Other firms conducting R&D have numerous commercial

contracts and simply no motivation to deal with the Government, whose regulations and requirements they often consider stifling.

This trend makes it especially important that we gain and maintain dependable visibility into innovations and developments outside of DoD, particularly in the commercial sector. With that in mind, we are restructuring our laboratories to stay attuned to advances in the commercial sector and to continuously search that sector for potential military applications of its technology. But desire and awareness are not enough. We must reinvent the whole culture of acquisition.

### **Building an S&T culture**

It would be very difficult to cover the great breadth of relevant, new technology using the old acquisition process even if the budget was not a constraint. Perhaps the main reason that we conduct R&D is to make the Department of the Navy a smart buyer in acquisition. So, the question is not upon which technologies do we focus and which can do we without, but instead, which ones *must* we do in-house because we cannot find them on the outside.

Certainly, there are technologies that fit this bill. Underwater acoustics, advanced explosives, exotic sensors are all areas that need continuous Navy involvement. But framing the issue in this way allows an interesting new perspective to emerge. There are some technologies that are simply *too important* to risk developing them in-house because it would take too long and ultimately lead in the wrong direction. I put microelectronics and most information technologies in this category. These technologies are moving too fast for the Navy to expect to remain competitive.

So, how do we stay current? In the past—and based in a large part on necessity—we were ingrained to look within our own organization for technological advances. I believe we must develop within the Navy a new culture. We must first search the commercial sector for answers to our acquisition issues. We must break out of the habit of looking inward and look first outside DoD, and establish what will soon be or even, already is, available. Only with this view can we hope to make good “make/buy” decisions.

But when we find that S&T must be performed in-house or we identify potential military capabilities which have little link to commercial industry, our efforts must be very specifically directed toward an identifiable Naval benefit. The scientific areas for which DON provides funding must focus on those with potential to improve warfighting, to counter future threat capabilities, or to increase the affordability of Navy and Marine Corps operations and systems.

### **Future Naval Capabilities (FNC)**

One way that the Navy is trying to focus its R&D investments is through the Future Naval Capabilities (FNC) process to ensure that the technologies that our Navy and Marine Corps Team needs for tomorrow’s capabilities will be there. ONR has dedicated about half of its budget (~\$700 million) to 12 capabilities which were selected and approved by uniformed program sponsors. These future capabilities are Organic Mine Countermeasures, Littoral Anti-Submarine Warfare, Time Critical Strike, Autonomous Operations, Decision Support System,

Total Ownership Cost Reduction, Missile Defense, Platform Protection, Information Distribution, Expeditionary Logistics, Warfighter Protection, and Capable Manpower. ONR is at work building responsive S&T programs in each capability area to yield the earliest results. The thrust of this effort is to provide focus in order to deliver more capabilities at the right time.

The FNC effort at ONR is completely in-line with my third objective, the smooth flow of new technology into acquisition. Our S&T system generates excellent technology, but it is wasted unless it moves swiftly into an acquisition program that delivers its product to the Fleet. ONR and its S&T program are doing excellent work—high quality S&T. We simply must move their results more quickly into front-line acquisition programs. Remember that the discriminator is not so much new technology as it is the time needed to convert new technology into a product. The current pathway that leads us from scientific discovery to new technology to naval acquisition programs to naval capability at sea must be shortened, straightened, paved, and furnished with nothing but green lights and widened to eight lanes.

### **Examples of Research and Development Success**

In addition to our FNC effort, our DON S&T structure is productive and prosperous and bearing the fruit of past investment. The superior technology we enjoy today rests on a foundation of basic research laid years ago. The capabilities that make today's formidable and extremely effective Navy and Marine Corps Team second to none are the result of our programs in S&T. Our programs continue to integrate performance, discovery, and invention; combining the intellectual power of U.S. academia with the entrepreneurial spirit of American industry. Here are four items that are clear evidence of a thriving S&T program.

#### **ALE-50 Decoy**

The ALE-50 decoy increases an individual aircraft's probability of survival. Technological development for the ALE-50 (V), employed by the USAF for Kosovo operations, started under an Office of Naval Research (ONR) base program in 1975 when the Navy Research Laboratory demonstrated a single tube ultra-wide band 3-18GHz Traveling Wave Tube. Raytheon Systems, Inc. is on contract for the production version of the ALE-50, and its basic ALE-50 system consists of a launcher, a launcher controller and the towed decoy. Reports from both F-16 and B-1 pilots have indicated that the system operated effectively.

#### **MJU27B Infrared (IR) Flare**

This 6-inch expendable flare uses special IR materials that optimize its IR signature against the seekers of IR surface-to-air missiles. This flare, which burns and emits in the IR frequency spectrum, is effective in leading IR seeking surface-to-air missiles away from targeted aircraft. Both Navy and Air Force aircraft use the MJU27B.

#### **Laser Line Scan**

The Laser Line Scan System (LLSS), based on laser technology that is integrated with a side scan sonar and precision navigation equipment, has been developed for use in mine

countermeasures. It produces detailed video images over 10 to 200 foot-wide swaths of the sea floor and depending on visibility, can see details of objects less than one-half-inch in size. The LLSS has been used successfully for wreckage recovery efforts in the Swiss Air crash off the coast of Nova Scotia. An earlier version of the system was used to investigate the crash of TWA Flight 800 off Long Island, NY.

#### Tactical Weather Radar

The Navy's SPY-1 phased-array Aegis tactical radar has recently demonstrated a weather radar function. Special signal processing technology will deliver at-sea weather information superior to current National Weather Service radar systems, while simultaneously improving tactical radar performance by removing weather-related clutter.

#### **Getting S&T successes into the weapons systems**

These four programs are just a small representation of the vitality of our own S&T program. But getting technologies to the warfighter, whether they are derived from private industry, academia, or even in-house organizations, is an arduous process. Today, there is often a "technology gap" that exists between these S&T organizations, the producers of technology, and our acquisition programs, the consumers of technology. The gap exists between two adjacent stages of technology development. At the lower stage, scientists have shown that a prototype can work in a relevant environment. But acquisition officers recognize that more development is needed to assure that integration of the new technology poses less risk to their deadline and funding driven programs.

In order to bridge this technology gap, I have established the position of Chief Technology Officer of the Navy (CTO). The CTO is now the one person most concerned with getting new technologies out of the lab, whether they be commercial or DoD, and into fielded weapon systems. His job is to understand the universe of technologies that apply to the Navy and Marine Corps, grasp the opportunities in acquisition programs to transition new technology, mediate the agreements necessary and monitor the transition to production.

The CTO finds individual and viable ways to bridge the gap. The CTO pursues, along with technology providers and program managers, disciplined development of promising advanced technology to meet definite performance criteria, conducts detailed negotiations on transition methods and dates and articulates funding provided by both for technology transition, all specified in written agreements. The CTO has my full support and charter to bridge these communities early and often.

We can also learn much from commercial industry in terms of transitioning our own S&T successes into products. According to a recent survey performed by the Massachusetts Institute of Technology, 34 percent of the world's largest companies doing R&D (those spending more than \$100 million on R&D each year) report 50 percent or greater reduction in time to market. It is common for companies to measure their return on R&D investment from products brought to the market less than one, two or three years from the research laboratory. The CTO will learn their transition methods and use them to shorten our current, decade-long, acquisition process.

## **Summary**

In order to provide the equipment our Naval Forces need, for today as well as tomorrow, our acquisition process must establish and foster a reliable visibility into innovations and developments where ever they may be, but particularly in the commercial sector. We must evolve an S&T culture guided by frequent and informed “make-buy” decisions, one that focuses on yield. Finally, we must actively push the successes of our S&T activities into the systems and platforms that we acquire. These are new concepts to Navy acquisition and we have made progress toward accomplishing these goals. We still have much to do.

We appreciate this Committee's commitment to the health and stability of S&T and your continued help in building a strong, balanced Navy-Marine Corps Team that will protect our nation's interests today, tomorrow and for decades to come.