Ensuring the Navy's Present and Future Technological Edge

Dr. Delores M. Etter, Assistant Secretary of the Navy for Research, Development and Acquisition

Dr. Delores M. Etter was sworn in as assistant secretary of the Navy for research, development and acquisition in November 2005. As the Navy's senior acquisition executive, Etter is responsible for research, development, and acquisition directed at maintaining the Department of the Navy's technical advantage. In June, Etter talked with *Defense AT&L* about her vision for the Navy and Marine Corps. She stressed, among other issues, her concern for the decline in funding for science and technology programs; the need for more rigorous and consistent software reviews; and the reality of working with a Navy acquisition workforce that is half the size it was 18 years ago.

Q:
Dr. Etter, you've served for just over six months as the Navy's senior acquisition executive. As such, you have taken on a role of maintaining our technical advantage over all adversaries, developing affordable systems and platforms, and maintaining a viable technological and industrial base. What do you see are your most critical duties and roles?

A:
Everything we do, really, is pointed toward one vision, and that is to provide our Navy and Marine Corps men and women with weapons, systems, and platforms that support their missions and give them a technological edge over the enemy. To that end, I've established four goals to help us attain that vision.

First, we have to expedite our global war on terror programs as much as possible without compromising safety.

Photographs by Richard A. Mattox

Anything we can do to help our sailors and Marines who are in the field today is critical.

Second, we need to reduce volatility in our acquisition programs. I define volatility as tending to vary often or widely and it is this volatility that really affects our programs over the long term.

Third, we must develop an investment and transition strategy for science & technology to ensure our future technological edge. I'm concerned that S&T funding has declined over the years, while the demand for technology to meet requirements has increased dramatically.

And finally, I want to lead the acquisition enterprise component of the overall naval enterprise. We all need to be at the table to determine the best way to meet the requirements of the future Navy and Marine Corps.

Q:
You've been quoted as saying that "software is the new physical infrastructure of the information age." How is developing and acquiring software different from more traditional procurement of hardware? What changes do you see resulting from this shift in focus?

A:
I think procuring software is really one of our most important challenges, and I'm taking steps to improve the way we do business. Our program software is among the most complex in the world, and that has made it more difficult than ever to accurately measure progress. We must take the same disciplined approach we apply to developing hardware systems; and in addition, we must set achievable requirements, use spiral development where it makes sense, and use proven developmental techniques and practices.

Back in 2000, a Defense Science Board task force found that DoD software development needed more rigor, and it made several recommendations to re-establish disciplined execution in software procurement. I won't go into detail on all the recommendations, but I believe the DSB's approach will provide significant improvement in the performance of software-intensive programs. Therefore I recently initiated a Navy enterprise review of software acquisitions in my Software Process Improvement Initiative to implement a set of policies and procedures to improve software intensive systems. Parallel Navy efforts, such as the policy to incorporate software procurement requirements described under Public Law 107-314 Section 804 and the Navy open architecture initiative, will be consolidated under my program.

Q:
You've suggested adding software reviews to each of our major reviews on acquisition programs. Is that happening now? What kind of impact might that have on ensuring the success of programs?

Mobile, Ala., Jan. 19, 2006. Assistant Secretary of the Navy for Research, Development and Acquisition Delores M. Etter shakes hands with executive chairman of Austal Ltd., John Rothwell, after her initials were inscribed onto a piece of Littoral Combat Ship Two during the ship's keel laying ceremony. The Navy's second Littoral Combat Ship is scheduled for commissioning in 2008. U.S. Navy photograph.

A:
Software reviews take place now, but I want to improve the process. One of the goals of my software process improvement initiative is to establish a consistent, effective, and accountable means of review; and I have assigned a team of subject matter experts to help accomplish that.

Software reviews are a part of all of our major reviews on acquisition programs. We also monitor software metrics monthly. In addition, I am incorporating software "deep dives" into my visits to production facilities to understand the status and issues of software in key programs. For example, I have included these software discussions in recent visits to Boeing-Seattle (multi-mission aircraft), Lockheed Martin-Fort Worth (joint strike fighter), and Lockheed Martin-Owego (presidential helicopter).

Q:
An ongoing concern is the size and composition of the DoD acquisition workforce. A variety of factors have reduced the Navy acquisition workforce to half its size since 1989. What steps are being taken to address this problem?

Dr. Delores M. Etter

Assistant Secretary of the Navy for Research, Development and Acquisition

Dr. Delores M. Etter was nominated on Sept. 6, 2005 by President George W. Bush to serve as the assistant secretary of the Navy for research, development and acquisition. Etter was then sworn in on Nov. 7, 2005. As the Navy's senior acquisition executive, Etter is responsible for research, development, and acquisition within the Department of the Navy. From August 2001 to November 2005, Etter was a member of the electrical engineering faculty at the United States Naval Academy. She was also the first recipient of the Office of Naval Research Distinguished Chair in Science and Technology. Her academic interests were in digital signal processing and communications. Her research interests included biometric signal processing, with an emphasis on identification using iris recognition. She has also written several textbooks on computer languages and software engineering.

From June 1998 through July 2001, Etter served as the deputy under secretary of defense for science and technology. In that position, she was responsible for defense science and technology strategic planning, budget allocation, and program execution and evaluation for the DoD Science and Technology Program. Etter was the principal U.S. representative to the NATO Research and Technology Board. She was also responsible for the Defense Modeling and Simulation Organization, the High Performance Computing Modernization Office, and for technical oversight of the Software Engineering Institute. Etter was also the senior civilian in charge of the DoD high-energy laser research program.

From 1990 to 1998, Etter was a professor of electrical and computer engineering at the University of Colorado, Boulder. During 1979 through 1989, she was a faculty member in electrical and computer engineering at the University of New Mexico. She served as associate vice president for academic affairs in 1989. During the 1983-84 academic year, she was a National Science Foundation visiting professor in the Information Systems Laboratory in the electrical engineering department at Stanford University.

Etter is a member of the National Academy of Engineering. She is also a former member of the National Science Board and the Defense Science Board. She is a Fellow of the Institute of Electrical and Electronic Engineers (IEEE), the American Association for the Advancement of Science, and the American Society for Engineering Education. She served as president of the IEEE Acoustics, Speech, and Signal Processing Society from 1988 to 1989, and was editor-in-chief of the IEEE Transactions on Signal Processing from 1993 to 1995.

Etter was a member of the Naval Research Advisory Committee from 1991 to 1997 and chaired the committee from 1995 to 1997. She has received the Department of the Navy Distinguished Public Service Award, the Secretary of Defense Outstanding Public Service Medal, and the Department of Defense Distinguished Public Service Medal.

A:
As we look to the future, the Naval Acquisition Intern Program continues to recruit 250 to 300 interns a year for our three-year developmental acquisition program. We have over 700 interns on board who will be our future acquisition leaders. While the Department of the Navy intern program has always been among the best, we are working closely with the Office of Personnel Management and Department of the Navy Human Resources communities to use all available human resource flexibilities available to us to create a state-of-the-art intern program.

Q:
What are you doing to ensure that you are cultivating and maintaining an adequate supply of Navy and Marine Corps experts in critical disciplines in the Department's research and development commands?

A:
The Navy recognizes that a well-educated and skilled workforce is essential to the ability to conduct our naval mission to defend our citizens against foreign attack. The declining numbers of U.S. graduates with advanced degrees, as compared to other countries and past trends within this country, has created a challenging environment within which we recruit new talent to our naval research enterprise.

We have a cross-agency initiative with the National Science Foundation that links their academic talent pool with our civilian researchers within the Naval Research Enterprise, at the Naval Research Lab here in Washington, D.C., and with our Systems Command Warfare Centers. We also are taking advantage of some congressionally funded scholarship programs for students in technological fields that offer students full scholarships and an early career opportunity as a government scientist.

But you know, in the end, I think it is the challenges and opportunities the Navy provides that really attract students and new people to our organization. In my travels I get to meet a lot of our new hires and interns and when I ask them why they came to work for us, the challenge and importance of the job is almost always the determining factor in their career choice. They

get to take on significant responsibility at an early point in their careers, and this is very motivating to them.

Q:
How does your office manage and encourage innovative defense science in meeting Navy and Marine Corps missions?

A:
The president's fiscal year 2007 budget requests $1.599 billion for the Department of the Navy's S&T portfolio. Those funds are focused in 18 core areas that include counter IEDs [*improvised explosive devices*], anti-submarine warfare, battle space environments (particularly the ocean), expeditionary operations, force protection, sea and ground vehicles, marine life sciences, mine warfare and sensors, electronics and electronic warfare.

We execute our basic research, applied research, and advanced technology development funds as a continuum of S&T development, breaking them into three key areas: D&I [*discovery and invention*], INP [*innovative naval prototypes*], and FNC [*future naval capabilities*].

D&I is our basic research, and early applied research work focuses on areas in which we have unique naval needs or support capabilities that we consider to be essential to the naval mission. We believe that a strong investment in this area is necessary to ensure we maintain our technical advantages in the Navy after next.

INPs are disruptive technologies that, because of high risk or radical departure from established requirements and concepts of operation, are unlikely to survive without top leadership endorsement. INP programs invest in S&T projects intended to achieve a level of maturity suitable for transition to an acquisition program within four to eight years. INPs make significant investment in projects with high technological risks but that offer the prospect, if we are successful, of being revolutionary "game changers" in Navy and Marine Corps warfighting capabilities.

Our current INPs are the electronic railgun, persistent littoral undersea surveillance, enhanced capability for joint sea basing and ship-to-objective maneuver, and improving naval tactical use of space.

FNC focuses on requirements-driven, transition-oriented thrust areas. FNC objectives are to provide enabling capabilities to fill gaps in Naval Power 21 warfighting and enterprise capabilities identified by the chief of naval operations and the commandant of the Marine Corps. The FNC program provides technology solutions by developing S&T products that deliver measurable warfighting improvements to acquisition programs within a three- to five-year window. There are currently 142 FNC projects addressing 34 capability gaps.

One of the most difficult challenges of any research organization is to efficiently transition the most effective science and technology efforts from D&I into advanced development, through the acquisition process, and into the hands of the customers—in our case the fleet operators. One of our highest priorities is to open that spigot so that deployable S&T products transition more frequently, more rapidly, and with less risk.

Q:
You've expressed a concern that the Navy keep an adequate budget for basic research and long-term research—the kind of research for which results might not be tangible for 10 or more years. How can you support retaining the capability for this kind of research?

A:
Success in the global war on terrorism, naval transformation, and Navy and Marine Corps after next, depends on a balanced, long-term, stable, and sustained investment in science and technology, validated through a cycle of ongoing experimentation so we can transition new capability to the warfighter.

Q:
Cost analysts outside the Pentagon consistently forecast higher numbers than Navy estimates. For example, the Congressional Budget Office had a much higher estimate for new ship construction programs than the Navy. Why do you think there are such discrepancies between Navy and CBO estimates?

A:
CBO uses a traditional cost-per-ton metric as an accurate costing methodology; but cost per ton fails to address shipyard-specific impacts; doesn't take into account the electronic-intensive nature of Navy warships; doesn't address the effect of detail design being done in a 3D computer-aided design environment; does not take into account capital expenditures/process improvements at the shipyards; and doesn't address learning curves.

Q:
You've said that one of your top goals is to reduce volatility in acquisition programs. What are you doing to make sure you have manageable risks and realistic expectations?

A:
I've identified several characteristics of volatility that affect programs and are places we can look to help programs improve or avoid problems in the future.

These characteristics include program complexity, requirements fluctuation, budget instability, schedule demands, and contractor/program manager optimism. Any combination of these traits can result in overruns and de-

livery delays that cost us money and destroy our credibility with Congress regarding our ability to run these programs.

But it's important to note that I don't want to eliminate volatility entirely. If our programs have no risk and no volatility, then we're not meeting the needs of our customers. Making progress requires some risk. We need to balance risk and volatility to get new capabilities for our warfighters.

Q:
One of your research interests is biometric signal processing, with an emphasis on identification using iris recognition. Can you talk about how this technology might someday benefit the warfighter, or how DoD can employ it?

A:
The Navy is currently conducting several rapid technology transition efforts that include biometric signal processing. Some applications we are looking at include using biometric data to support maritime interdiction operations and roadside checkpoints. Another application could use fingerprints to facilitate access to Navy enterprise information systems instead of common access cards and passwords.

Q:
How can the Defense Acquisition University improve or enhance the curriculum to better support the AT&L workforce? What would you like to see added to the current curriculum to better prepare people for the realities of the workplace and the current tempo?

A:
The Department of the Navy acquisition workforce is lean and must be multi-functional to meet changing demands. Strong program management skills across the acquisition workforce are a must-have because the program executive offices depend on program managers, engineers, and logisticians to lead integrated product teams. DAU can play a vital role in preparing these future leaders by increasing access to program management Level 200 and 300 training. The PMT 250 [*Program Management Tools*] and PMT 352 [*Program Management Office*] courses provide PMs with tools and hone their critical thinking skills—key enablers for a high-performing, agile, and ethical workforce to meet changing requirements.

To address some of the software development concerns I cited earlier, we are working with DAU to improve courses in the areas of software development and management. As an example, we have developed a training module on open architecture that will be included in the DAU continuous learning section of the Acquisition Community Connection at <https://acc.dau.mil>. We expect this module to become operational by the July 1. We are also looking at education and training as part of the software process improvement initiative and intend to share what we discover with our DoD counterparts and DAU. I've asked that all ACAT I and II program managers with software-intensive systems take the SAM 101 [*Basic Software Acquisition Management*] course as well as a course on capability maturity modeling.

Q:
Dr. Etter, thank you for your time and for sharing your vision with the Defense AT&L *readership.*