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SUBJECT: Questions and Answers with RADM Barry Brunner

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Q&A With Rear Adm. Barry Bruner
Director of Undersea Warfare Division Speaks to Number of Topics

Undersea Warfare Magazine, Aug. 21

Question: When you heard you were coming to Washington to head OPNAV's Undersea Warfare Division, did you expect to be focusing so much on the future of payloads?

Answer: Frankly, it didn't surprise me. I was weapons officer on Pollack, the first ship I served in, and later ops officer in Mariano Vallejo's Gold crew, so I saw firsthand that bringing weapons to bear on an enemy is the ultimate measure of any warship. Since then our understanding of payloads has gotten more complex. They're not just weapons anymore. While the Navy continues to value the traditional submarine combat prowess, there's been a growing recognition of the submarine's intelligence-gathering capabilities and the role it can play in shaping the landscape prior to war. The Submarine Force stands ready to fight and win our nation's wars, but if we can provide national decision-makers with the information or options necessary to prevent war, all the better. While submarines still often operate "alone and unafraid," we're moving into a future where we need to expand each submarine's range of influence. We'll need to share data with off-hull sensors and platforms to build the "big picture" prior to combat and then provide effective command and control for longer-range weapons.

Q: So what's your first priority?

A: My first priority is an integrated plan for the future. Because of the time involved in building each submarine and their 30- to 40-plus-year lifespan, we're now feeling the effects of decisions made decades ago. The timing of these effects, along with fiscal constraints, means that we need to attack multiple problems at one time. So the Submarine Force has developed an Integrated Undersea Future Strategy designed to shape the future of platforms, payloads, payload volume, people, and force posture. It's a comprehensive strategy to make us successful in tomorrow's operations and — if necessary — tomorrow's warfighting.

Q: What does that mean for payloads?

A: We could develop the fastest, most lethal, most accurate missile in the world, but if we can't deploy it in sufficient quantity to have the desired effect, it would be a poor investment indeed. So there must be a balance between the payload, its integration with shipboard systems, and its cost. Our nearest need is for more heavyweight torpedoes. For years we've bought upgrade kits, constantly modernizing our torpedo inventory, but from the fleets, the request is clear: "We need more torpedoes!" Beyond that, we're beginning to expand beyond the "tyranny of the 21-inch tube." Until recently, with the conversion of the four oldest Ohios into SSGNs, our payloads were limited to the dimensions of our 21-inch torpedo tubes and vertical launch cells. While ADCAP and TLAM prove we can do a lot in a 21-inch form factor, the laws of physics do limit what we can do. The Seawolf class has 28-inch torpedo tubes, but with only three submarines in the class, this does not provide an effective path for larger payloads. The large diameter of the SSGN payload tubes finally opened the aperture on what submarines can host. Building on this payload flexibility, we made the decision to replace the twelve 21-inch vertical launch cells with two SSGN-like large-diameter Virginia Payload Tubes. The first SSN with these tubes will deliver in 2014 and will provide an enduring platform for large-diameter payloads beyond the SSGN retirement in the late 2020s.

Beyond the SSGNs, we're looking at the potential for additional large-diameter tubes through a concept called the Virginia Payload Module. While there's still much work to be done on the design, the concept would add four additional tubes to future Virginia SSNs, making them capable of carrying 40 Tomahawk missiles. These additional tubes would also provide additional flexibility over the forward tubes, since they're inside the pressure hull and would allow manned access while underway.

Q: We've heard that the Block V Virginia, with VPM, will start construction in 2019. With the SSGNs scheduled to begin retiring in 2026, won't that leave a gap in payload capacity until a sufficient number of VPM Virginias can be built to fill it?

A: We're just beginning the true pencil-to-paper engineering for VPM. While we have Navy and DoD funding support to bring the design to maturity in time for Block V, the decision to begin VPM production will be made through a standard DoD procurement process. We've looked at the options, and we believe VPM is clearly the way ahead. With the SSGN retirement occurring at the same time as the pending SSN shortfall, and then the need to build the next-generation SSBN, building new SSGNs is simply not in the cards. If approached with the rigor that is the hallmark of submariners, designing and delivering VPM can be done so as to maintain the necessary undersea payload volume.

Q: You've mentioned the flexibility of the VPM's accessible, large-diameter tubes. What sort of payloads do you have in mind for the VPM?

A: I'm not limiting myself to payloads for a specific platform or launching system. The beauty of large-diameter tubes — whether we're talking SSGN, Virginia Payload Tube, or VPM — is that sheer volume and large ocean interface create additional possibilities. To store the energy needed for an AUV to conduct multi-day, independent operation requires that additional space. That kind of space is only available today on an SSGN or maybe a Dry Deck Shelter-equipped SSN. Conversely, for smaller payloads, we can create multi-payload canisters like those used for TLAM.

Q: Are you thinking primarily about land attack for VPM?

A: TLAM capacity is the primary driver right now for VPM, but we're also looking at other options for land attack as well as other missions.

At some point the Navy will have to move beyond TLAM. It's a highly capable weapon, but it does have some limitations. A subsonic missile only travels so fast, and this presents long-term challenges in defeating advanced air defense networks or engaging high-value mobile targets.

Another potential weapon would be a next generation anti-ship missile. Extending the reach of anti-ship weapons is a goal across the Navy. For submarines, this could take the form of an anti-ship missile or an extended-range torpedo.

Q: Are any defensive weapons being considered for the VPM?

A: A submarine's first line of defense is its stealth. If you can't be found, you don't need to give up limited space for defensive-only systems. Compare that to a surface combatant, where a large number of the vertical launch cells are dedicated to anti-air missiles, limiting the number of cells available for offensive payloads like TLAM. Since payload space is limited, and the fleet demand for offensive power is high, adding new weapons to the submarine mix likely will not happen if it comes at the expense of our current offensive capabilities. Beyond that, while not done with VPM in mind, we've previously demonstrated the ability to launch an AIM-9 anti-air missile from underwater. Consider the mindset change for a helicopter pilot if they knew that the first indication of a nearby submarine was an inbound missile. Again, we have to balance that against the striking power the Navy needs from its submarines.

Q: What about payloads that are not "kinetic"?

A: Non-kinetic payloads are a major future growth area where the flexibility and accessibility of the large-diameter tubes can pay big dividends. As mobile sensors advance, we can relieve our submarines from some high-risk or lower-payoff tasking. This will allow us to more efficiently use our submarines for the missions they're best suited for. Conversely, a submarine acting as the "mother ship" for a group of UUVs would give that submarine greatly extended eyes and ears. To bring this to fruition will require enhanced tactical communications and power systems. For submarine, surface-ship, and independent use, the Navy is developing a system called the Large-Displacement Unmanned Underwater Vehicle. The goal is for LDUUV to serve as a common "bus" that can carry various payload capabilities and operate independently for weeks on end. The Office of Naval Research is working on the navigation and autonomy needed for independent operations. ONR is already developing the energy storage needed to sustain onboard systems and propel the vehicle for weeks on end. Unmanned aircraft, ground vehicles and surface vessels can all take advantage of the efficiency humans have wrung out of air-breathing engines. Operating underwater, air-breathing engines don't work so well. This limitation is why the U.S. Submarine Force runs on nuclear power!

Q: Isn't that endurance goal ambitious?

A: Yes, but the endurance issue is one more reason why submarine support for LDUUV is important. Operating underwater creates incredible engineering challenges — challenges we have worked through for over a century in submarines. But the payoff from undersea systems is the stealth. Satellites, radars, and a Sailor's eye all have the same general limitation when it comes to seeing underwater. So how do you maintain the LDUUV's ability to covertly patrol an area if it doesn't have the legs for a long transit? You launch and recover by submarine. Now launch and recovery from a submarine creates additional challenges, but we're investing in the technology to make it happen. We're building a prototype Universal Launch and Recovery Module that will extend from an SSGN tube and provide a horizontal platform. Further work will be necessary to shrink the design for tactical use in the shorter Virginia tubes. The goal is to leave as much of the tube volume available for the payload as possible. This concept may also open up new possibilities for supporting special operating forces in the future. Maybe we host the SEAL Delivery Vehicle in a vertical tube and operate without a Dry Deck Shelter.

Q: How soon do you expect that to happen?

A: LDUUV is still in the prototyping stages, but operational units will be available by the end of the decade. We don't want to wait until LDUUV is ready to smooth out all the expected kinks in manning, CONOPs, launch and recovery, or command and control. We're going to move forward on the submarine interfaces and mission development now. The commercial industry already has UUVs available. These systems generally don't have the desired level of endurance or autonomy but will allow us to build on the database of knowledge. By approaching the payload and payload interface in a modular fashion, we follow the pace of innovation at a much lower overall cost.

Q: You said before that your near-term priority is restarting torpedo construction. Why is this necessary?

A: As you look around the world, the potential adversary navies are growing in size and sophistication. This presents the fleet with more potential targets, and targets that are best not attacked "head on." Submarines provide an asymmetric way of attacking surface ships and are still the most potent anti-submarine weapon in the arsenal. The message from the fleets is loud and clear: "We need more torpedoes!" We've had tremendous success over the years upgrading the ADCAP performance. Current torpedo design, though, does impose some limitations. As we move forward, we're going to expand on

some of the concepts in the UUV realm, primarily modularity. Modularity is already baked into how we build Virginia submarines and update our combat and sonar systems. A more modular design for the torpedo would create a "bus" that would allow much more rapid upgrade to propulsion, energy storage, guidance and control, and/or payload. Yes, I know I'm now talking about interchangeable payloads on a payload. This will allow us to leverage new technologies as they become available. For example, we could enhance the weapon's navigation abilities now, and learn the lessons now, while waiting for long-endurance technologies to bear fruit. Or maybe the endurance comes first — a modular design allows us more decision space.

Q: What about defenses against torpedoes?

A: Adversary torpedoes are getting more effective, and we're taking that into account. Again, for a submarine, our primary defense is our stealth. Beyond that, we need to make sure our active countermeasures continue to pace torpedo development. Getting back to submarine stealth, the future may contain decoys that can spoof a variety of sensors. We normally think of stealth as lowering our signature, and this could be acoustic, hydrodynamic, electromagnetic, etc. But that is only half the equation. With sonar, we talk about signal-to-noise ratio. For some scenarios the payoff may be better if we raise ambient "noise." For example, why not make a hostile helicopter spend time and fuel prosecuting a decoy periscope instead of prosecuting one of our submarines?

Q: At the Naval Submarine League Symposium, you mentioned a new way to conduct prompt long-range strike against time-critical, high-priority targets. Could you tell us more about that?

A: The idea of promptly striking high-value targets anywhere in the world is not new. What is new are the advances in technology that would make it possible to do so. Today, the United States has the ability to promptly strike anywhere in the world, but only with nuclear weapons. The challenge, then, is: Can you build a system that is easily distinguished from our nuclear systems? We should try. A maritime system is still at the concept stage, but it opens up many new options for national decision-makers. The long ranges possible would prevent an adversary from retaining a safe haven deep inland. The short flight times would allow engaging mobile targets that may not be possible today. The far-forward nature of submarine operations also means that a submarine missile does not need nearly the same maximum range as a missile based in the continental United States. People typically underestimate the vast size of the Pacific Ocean. Moving the missile thousands of miles closer greatly reduces the technological jump required for success. What I want to make clear is that this is not envisioned to be used on our SSBNs — that would lead to an unacceptable level of ambiguity to countries like Russia or China. In the past, people have floated the idea of replacing the nuclear weapons on a few Trident missiles with conventional bodies. While this is technically feasible, the potential for misinterpretation by other countries makes this untenable. The next question is how many missiles would you need to field day-to-day for conventional deterrence, and how many for surge at the start of the fight. Those are questions that still require study, and the answers will depend in large part on exactly what performance is possible.

Q: Before you have to get on to other business, is there any last thought you'd like to leave with our readers?

A: Over the last few years, senior leaders both in the Navy and the Department of Defense have used some submarine acquisition programs as examples of success — specifically, the Virginia-class program and the Acoustic Rapid COTS Insertion Program. Much of the success is due to their modular concepts. We do not have the luxury going forward of pursuing exotic one-of-a-kind systems. Systems made of common, interchangeable parts are the way of the future. This allows for rapid, incremental changes that pace the advances of commercial technology.

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