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**2021 Submarine Technology Symposium**  
***“Balancing Capability and Force Structure for High-End Combat”***

***Overall Theme***

Through the first decade of the 21<sup>st</sup> century, the Submarine Force focused on projecting power ashore while operating from uncontested littorals. For the second decade, advances in the capabilities of near-peer adversaries have led to a return of great power competition and the renewed importance of sea control. Current world events emphasize the need to maintain agility to allow successful operation in any environment. To maintain undersea superiority, each U.S. submarine must be equipped and prepared to engage across a spectrum of combat operations and, if so called upon, deliver lethal force. The increased capacity of our adversaries requires broadening the breadth and capacity of the Undersea Enterprise to integrate novel technologies into CONOPS and systems to ensure control of the undersea domain. The Navy is also facing tremendous internal challenges to balance maintaining the current Force with limited resources while fully funding future development. This tension requires the Submarine Force to balance the capability inherent in each submarine class with that of the overall force structure to ensure the Fleet can sustain a prolonged conflict. This symposium challenges the Submarine Community to develop and deliver the next technological innovations to strike this balance. With that in mind, we invite you to the 2021 Submarine Technology Symposium with the theme of “Balancing Capability and Force Structure for High-End Combat,” as covered in the following sessions:

**Session 1: Theater Anti-Submarine Warfare (ASW)**

Theater ASW commanders face a number of challenges in preparing the battlespace in their respective Areas of Responsibility (AOR) across the spectrum of conflict. These challenges range from determining which sensors to deploy at what time, to coordinating elimination of a threat. Each AOR faces a unique threat, with differing capabilities and capacity, yet the responsibility for execution of the Commander’s guidance rests on the same warfighters. To prepare the Submarine Force to operate in this dynamic and heavily coordinated environment, new technologies are needed to enable seamless operations between different ASW platforms and to standardize how Theater ASW is conducted across AORs. As our adversaries continue to improve their technologies, methods of countering threat ASW capabilities and potentially disrupting the ASW chain will enable Theater Commanders to protect the assets under their cognizance and achieve the goals of the Combatant Commander. Topics include, but are not limited to: Theater ASW Command and Control (C2) architecture, Theater ASW against multiple near-peer threats, technologies to enable seamless Theater ASW operations, management of waterspace in Theater ASW, and innovations to counter or disrupt threat ASW capabilities and rules of engagement.

**Session 2: Preparing for High-End Combat Against Near-Peer Competition**

Submarines provide a host of unique capabilities across the entire spectrum of conflict owing to their stealth, asymmetric capabilities, and unique access. The individual and collective capabilities and capacity of our adversaries requires the Submarine Force to improve its lethality and effectiveness to ensure undersea superiority. To prepare the Fleet for a high-end fight against near-peer threats, novel technologies, weapons, and kill chain concepts must become pervasive throughout the Submarine Force. Topics of interest include, but are not limited to: offensive mine warfare, lethality and capability of current and future weapons, reductions in payload volume without decreasing effectiveness,

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hypersonic weapons, non-kinetic weaponry, modular torpedoes and variants, next-generation heavyweight torpedo technology, novel targeting concepts, and torpedo defense.

### **Session 3: Extending the Submarine's Reach with Future Technologies – From the Seabed to Over the Horizon**

The Submarine Community has developed a host of impactful technologies that have been incorporated into the VIRGINIA Class and will be utilized by COLUMBIA-Class submarines. With the return to great power competition, the Submarine Force needs a paradigm-shifting approach for developing and deploying novel technologies. It is imperative to establish a vision for future technologies that will prepare the Fleet for high-end combat. In order to dominate the increasing capability and capacity of our adversaries, technologies will be needed from strategic and tactical exploitation of the seabed, to ASW cueing, to over-the-horizon targeting and weapons control. Topics of interest include, but are not limited to: technologies for subsea and seabed warfare; ASW cueing; over-the-horizon targeting; long-range firing; unmanned systems Command, Control, Communications, and Intelligence (C3I); and technologies for secure, high-bandwidth communications.

### **Session 4: Concept to Deployment – Fast-Tracking Technology Insertion**

The Submarine Force is no stranger to applying Technology Insertions to get new capability to the Fleet; however, the lessons learned from two decades of experience show that new technologies take time to mature and achieve full implementation. The Submarine Force benefits from the opportunity to test new technologies; the Force can leverage industry models for understanding and mitigating risk to fast-track the development and deployment of these technologies in a budget-constrained environment. Critical to risk mitigation is protection of systems from loss of availability by integrating cyber security into new development. As new systems are developed, the warfighters are faced with ever-increasing amounts of data and information, which must be turned into actionable knowledge. Even the best minds can be overwhelmed by the vast array of information flowing at a torrid pace. Successful implementations of data analytics, machine learning, and artificial intelligence into systems allow the warfighter to consider what to do rather than struggle to comprehend the available data. Topics of interest include, but are not limited to: fast-tracking technology insertion, cyber security as a critical component of modernization, Submarine Warfare Federated Tactical Systems (SWFTS) re-architecture; big data/artificial intelligence/data analytics, and cyber security across networks as key part of the high-end fight.

### **Session 5: Support and Sustain the Future Submarine Fleet**

The Submarine Force is building and designing the future fleet on multiple, simultaneous fronts – VIRGINIA-Class submarines are being constructed to replace LOS ANGELES-Class attack submarines, the COLUMBIA Class is under construction to replace the OHIO-Class SSBN Fleet, and the design of SSN(X) is underway. Additionally, the costs and issues with sustaining the existing Fleet are of paramount importance to ensure operational availability and readiness. The fiscal pressures on the Submarine Force are expected to become more stressing in the 2030s with competing national needs internal and external to the Navy. Innovations are required to sustain the existing Submarine Fleet within budget and to build future submarines with the required capability and capacity to win a prolonged, high-end fight. Topics of interest include, but are not limited to: building unmanned systems to complement the Submarine Fleet and ASW forces, enabling public and private shipyards to meet the demands on time

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and on budget, VIRGINIA Block VI, innovations and cost-saving measures for repair and maintenance, SSN(X) concepts, and re-invigorating the submarine tender fleet.

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