



SUCCESS STORY

TOPIC NUMBER:
N151-036

SBIR INVESTMENT:
\$1,579,959

PHASE III FUNDING:
\$10,138,940



NEXT GENERATION ELECTRONIC WARFARE HUMAN MACHINE INTERFACE (HMI) FOR SUBMARINES

SEACORP, LLC developed a human machine interface (HMI) to facilitate workload sharing, collaboration and interoperability of tools and displays for the AN/BLQ-10 submarine electronic warfare support system.

**SEACORP, LLC, a KAPCO
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THE CHALLENGE

The Navy sought an innovative approach to improve machine-to-operator interfaces in both traditional and innovative displays for operator interaction with data and system functions. The design of this human machine interface (HMI) system needed to be intuitive, responsive and open, providing comprehensive and intuitive controls and displays for operator use. The system needed to be modular and easily extensible to allow for future growth as the AN/BLQ-10 submarine electronic warfare support system adds or improves functionality and data sources. Additionally, this system needed to easily integrate with new applications and features to increase operator functionality without increasing the operator/system interaction.

THE TECHNOLOGY

SEACORP designed and delivered HMI concepts to facilitate workload sharing, collaboration and tool and display interoperability for the AN/BLQ-10 submarine electronic warfare support system. The design provides customizable displays focused on simplicity and efficiency, reducing button-clicks, eliminating unnecessary windows, and simplified controls that are more intuitive for operators. The improved HMI follows the Submarine Warfare Tactical Systems (SWFTS) style guidelines, ensuring a consistent look and feel with other SWFTS subsystems.

THE TRANSITION

SEACORP developed the HMI concepts under SBIR topic N151-036, "Next Generation Electronic Warfare Human Machine Interface (HMI) for Submarines." During SBIR Phase I, SEACORP presented solutions for enhancing the operator experience for next generation electronic warfare displays and controls. In Phase II, the company produced a fully functioning prototype.

SEACORP was awarded a five-year, \$36 million contract (N66604-21-D-K000) from the Undersea Warfare Electromagnetic Systems Department (Code 34) of the Naval Undersea Warfare Center Division (NUWC) Newport in 2021. During this Phase III project, SEACORP researched and developed the next generation electronic warfare HMI, introducing new capabilities to the warfighter. Under this contract, SEACORP's work included systems engineering, software engineering and development, prototyping, integration, test and evaluation, production, installation, program management, and configuration management. In 2023, the General Services Administration (GSA) awarded a second contract (47QFCA-23-C-0003) derived from the initial contract to further support SEACORP's HMI technology. NAVSEA is the primary buying organization for the services provided by the GSA contract.

THE NAVAL BENEFIT

As the current submarine operational environment becomes increasingly complex and dense, the submarine electronic warfare operator needs to be capable of providing accurate and timely information to the control room decision-makers for improved situational awareness. SEACORP's HMI allows increased operator efficiency and decision-making for submarine operators. The customizable and interoperable displays allow the operator to intuitively interact with the environment, resulting in improved collaboration among operators, improved identification and classification of emitters, improved situational awareness, audio analysis, and reduced operator workload.

THE FUTURE

In 2024, the Navy began upgrading the AN/BLQ-10 system. The upgraded hardware and software will be inserted in the systems on board the Los Angeles-class, Ohio-class, Seawolf-class, Virginia-class and future Columbia-class nuclear-powered submarines.