

# SUCCESS STORY

**TOPIC NUMBER: N00-049**

**SBIR INVESTMENT: \$812,331**

**PHASE III FUNDING: \$68,206,012**



## INNOVATIVE SIGNAL PROCESSING CONCEPTS FOR ACTIVE EMISSIONS

*Progeny Systems Corporation, a General Dynamics Mission Company, integrated commercial-off-the-shelf technologies to develop innovative signal processing as part of sonar systems on submarines.*

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## THE CHALLENGE

Because commercial-off-the-shelf (COTS) systems are cost-efficient, the Navy utilizes these systems on submarines to advance technological capabilities, particularly in sonar. The combat system sensors on submarines can quickly detect and pinpoint active sound emissions. However, a challenge arises as the processing of these readings lags behind the sensors, causing delays. To bridge this gap, exploring innovative signal processing concepts aimed at detecting and localizing active emissions using current COTS sensor suites became essential. These concepts optimize sonar sensor usage, automate location and classification, and incorporate advanced visual techniques for quicker decision-making, ultimately enhancing a submarine's survivability.

## THE TECHNOLOGY

The active intercept and ranging system, based on COTS technology, effectively detects active sonar pulses from ships, submarines, and active homing torpedoes. Progeny employs advanced technologies such as lasers, single-crystal materials, and fiber optics in their active sonar systems to gather, interpret, and transmit underwater communications. The sonar signal processing involves capturing, analyzing, recording, and providing feedback on data. Progeny enhanced a system to optimize the use of COTS technology and common submarine COTS-based sonar system hardware and software components. As part of this improvement, Progeny introduced an archival media center, allowing the recording and storage of audio and environmental data without relying on traditional tape-recording media.

## THE TRANSITION

Originally developed for the Virginia-class program office, the signal processing system, developed under topic N00-049, transferred to PMS 401, the Submarine Acoustic Systems program office.

Progeny utilized research efforts from two Phase II SBIR topics, N98-122 and N96-274, related to submarine combat systems and cost-effective computer information processing environment capabilities as they developed out the technology. Additionally, Progeny leveraged research from a Phase III topic, N96-278, focusing on integrating COTS technology into embedded computer systems. NAVSEA awarded Progeny additional contracts for further development and integration of this system. In 2022, Progeny became part of General Dynamics Mission Systems through an acquisition.

## THE NAVAL BENEFIT

Sonar is a vital component in diverse defense systems, serving key roles like underwater communication, ice draft detection, maritime pattern of life collections, precise strike missions, and weapon tracking. Innovative signal processing brings direct benefits to the Navy's combat system modernization efforts for both surface and submarines. By employing innovative signal processing through COTS systems, active emission detection, classification and localization processing are improved. Additionally, leveraging COTS technology accelerates software development and facilitates smoother upgrades. The integration of COTS systems results in significant life cycle cost savings, risk mitigation, and reductions in platform space and weight.

## THE FUTURE

With the advancement of underwater systems, Progeny is actively developing technologies for applications across various submarine platforms. Their expertise in signal processing is integral to upcoming technology insertion initiatives.