

# Surf Zone Simulation for Autonomous Amphibious Vehicles



## Dynamic Dimension Technologies

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**SYSCOM:** Office of Naval Research (ONR)  
[www.onr.navy.mil](http://www.onr.navy.mil)

**Program Sponsor:** ONR Code 331  
Advanced Naval Platforms

### Other Potential Programs:

Future autonomous landing craft and amphibious vehicle programs for the Navy and USMC; water craft launch and recovery; unmanned systems launch and recovery; autonomy systems development for land, sea, and air systems; manned-unmanned teaming; littoral operations; interactive synthetic environments; Digital Twin, Smart Bases, and Smart Facilities

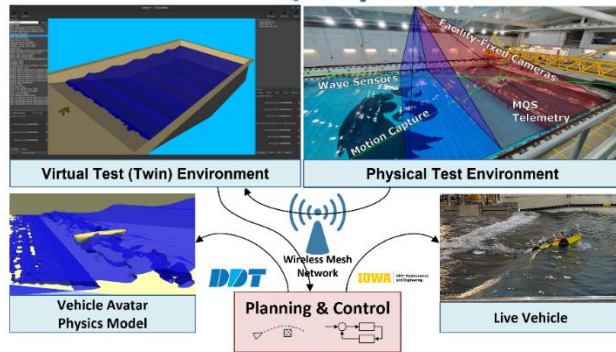
**Current TRL:** 5

**Projected TRL:** 6 / Q1 2023

### Keywords:

Autonomy; amphibious; surf; perception; simulation; Digital Twin; Interactive Synthetic Environment.

## VxSIM™ Virtual/Physical Sandbox



## THE CHALLENGE

A realistic simulation environment which provides appropriate sensor feedback and vehicles motions for software-in-the-loop testing. During Navy studies of landing craft and amphibious vehicle capabilities, it became evident that accurate surf zone simulations are needed to aid experimentation—operation from littoral through the surf zone.

## THE INNOVATION

VxSIM™ is an accurate, flexible, and scalable interactive simulation environment with Digital Twin technologies supporting the development, deployment, and acceptance of autonomous and robotic systems. The innovative surf-zone module accommodates accurate multi-domain systems simulation (launch, mission operations, and recovery) for amphibious vehicle risk-reduction, CONOPS development, and acquisition support.

Designed with a multitier software architecture, VxSIM™ supports many-on-many exercises for collaborative operations, formation maneuvers, swarming behaviors, and manned-unmanned teaming in complex multi-domain environments. The Digital Twin configuration integrates live sensor feeds with synthetic environment enabling network accessible physical/virtual sandbox for rapid testing of autonomous surface vessels and amphibious platforms. This enhances capability to benchmark new controllers for autonomous maneuvers.

## THE NAVY BENEFIT

The acquisition community can leverage VxSIM™ to support system development, system-level performance evaluations (e.g., Acquisition Milestone-A, -B and -C performance assessments) and CONOPS development efforts. The incorporation of modeling and simulation technologies early in the life cycle of system acquisition has proven significant cost savings and optimized designs enabling reduced manpower requirements with improved capabilities. With VxSIM™, the Navy gains an accurate, high-fidelity interactive simulation environment for the littoral domain for use with new systems development, testing and life cycle support of unmanned and autonomy enabled systems for land, air, sea, and undersea operations. The Warfighter benefits from more robust autonomy systems, improved search and surveillance effectiveness, and more accurate decision-making tools.

## THE FUTURE

Currently VxSIM™ licenses are provided to research labs and universities for evaluation, testing, and user feedback. Dynamic Dimension Technologies seeks both defense customer and prime contractor partners to demonstrate our innovative testing/analysis capabilities, Digital Twin technology applications, and innovative situational awareness solutions decision aid. DDT provides service support, testing and analysis, training, custom model development, and integration with hardware or software in the loop. We can also provide independent system testing for performance and behavior analysis to support system certification and safety requirements.

Innovation Center at 2022 Navy Gold Coast



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