

WHO

SYSCOM: ONR

Sponsoring Program: ONR Code 331 Advanced Naval Platforms

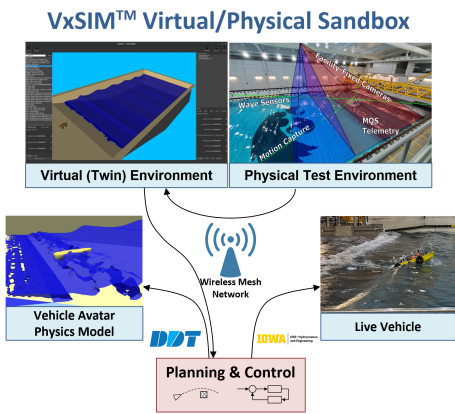
Transition Target: Future autonomous landing craft and amphibious vehicle programs for the Navy and USMC

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Other Transition Opportunities:

- Multi-Domain systems development and integration
- Expeditionary boats design, launch and recovery
- Unmanned systems launch and recovery
- Manned-Unmanned Teaming (MUM-T)
- Fast-paced experimentation and concept refinement
- Development of new tactics, techniques, and procedures (TTPs)
- Interactive Synthetic Environments Decision Aids and Situational Awareness
- Digital Twin, Smart Bases and Smart Facilities, manufacturing and warehouses

Notes:  
**VxSIM™** multitier software architecture integrated with autonomy software, provides an accurate, scalable and flexible interactive simulation environment for new technology risk mitigation, CONOPS development and acquisition support. **VxSIM™** supports many on many and multi-agent scenarios for collaborative operations, formation maneuvers, swarming behaviors and manned-unmanned teaming in complex environments such as surf zones, off-road and urban regions. The image depicts the novel **VxSIM™** exercise architecture that permits studies utilizing both real and virtual obstacles, a true mixed reality environment.



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WHAT

Operational Need and Improvement:

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. A realistic simulation environment which provides appropriate sensor feedback and vehicles motions for software-in-the-loop testing is needed.

Specifications Required:

The simulation environment must:

- Represent the sea surface, breaking waves, bathymetry and beach/landing zone characteristics
- Characterize sensor performance in visual, thermal, and radar bands
- Describe underwater features such as bottom types and depth in the acoustic and visual spectrum
- Incorporate static and moving obstacles on the surface and submerged
- Incorporate realistic vehicle response model for wave, surf, and bottom interactions
- Allow for modular autonomy components such as sensors, fusion, path planning, obstacle avoidance, and low-level vehicle controls to be incorporated and executed by the vehicle under simulation

Technology Developed:

**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.

Warfighter Value:

The Acquisition community can leverage **VxSIM™** to support system development, system-level performance evaluations (e.g., Acquisition Milestone), and CONOPS development. 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.

WHEN

Contract Number: N68335-22-C-0187

Ending on: Jan 31, 2024

Milestone	Risk Level	Measure of Success	Ending TRL	Date
ROS-2 integration	Low	Demo ROS-2 with VxSIM and robot	5	3rd QTR FY22
Autonomy in loop	Low	Demonstrated autonomy software driving physics-based amphibious vehicle model in VxSIM	5	3rd QTR FY22
Physical/Virtual	Low	Demonstrate robot avoiding both real and virtul obstacles	5	4th QTR FY22
Amphibious Vehicle	Low	Demo UIA's amphibious vehicle integrated with VxSIM	5	2nd QTR FY23
Amphibious Physical/Virtual Sandbox	Low	Demonstrate amphibious vehicle avoiding both real and virtul obstacles	6	2nd QTR FY23

HOW

**Projected Business Model:** Currently **VxSIM™** licenses are provided to Industry, Research Labs and Universities for evaluation, testing and user feedback.

We are seeking both defense customer and prime contractor partners to demonstrate our innovative testing/analysis capabilities and digital twin technology applications for innovative situational awareness, decision aid solutions. We provide service support, testing and analysis, training, custom model development, and integration with hardware or software in the loop. We will also provide independent system testing for performance and behavior analysis to support system certification and safety requirements.

**Company Objectives:** Dynamic Dimension Technologies was founded with a vision of applying innovative research and development technologies to benefit the community. Our objective is to leverage our research in the field of digitally connected, interactive synthetic environments and digital twins, to improve emergency response, increase safety, reduce environmental impact, reduce costs for maintenance, planning, logistics, and much more.

Potential Commercial Applications:

- Automotive autonomous vehicles
  - Off-shore oil and gas
  - Digital Twin and Smart Cities
  - Connected Automated and Autonomous Vehicle infrastructure
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