NSRP
NATIONAL SHIPBUILDING RESEARCH PROGRAM™
*Taking Shipbuilding and Repair to the Next Level*

# 2026 Research Announcement

# Ship Hull Mapping for Improved Docking Block Placement

SwRI®
SOUTHWEST RESEARCH INSTITUTE

DM Consulting

# Overview and Benefits

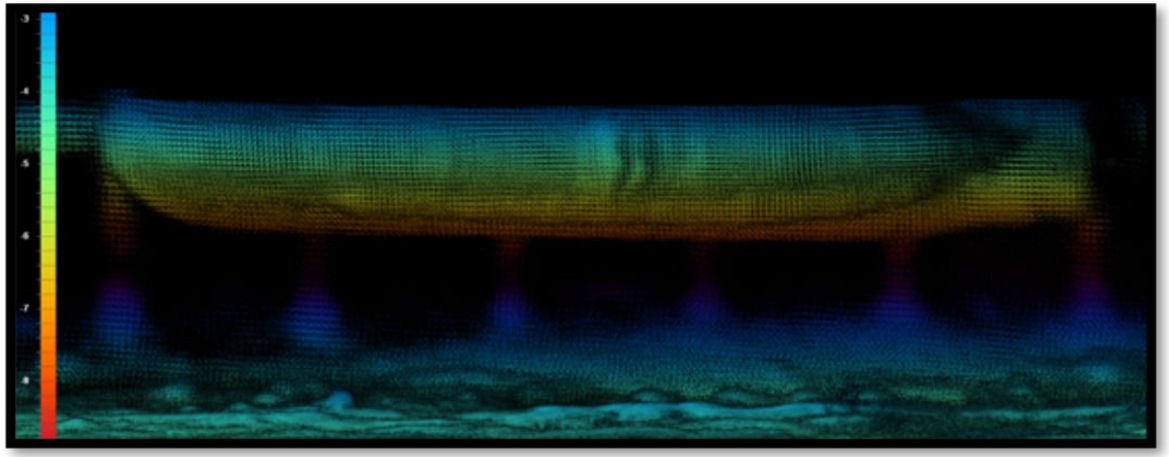
- Docking plans outline block requirements for a vessel, but they're not always correct. Common errors include:
  - Unidentified hog or sag
  - Incorrect or undocumented position/size of projections
  - Unknown hull damage

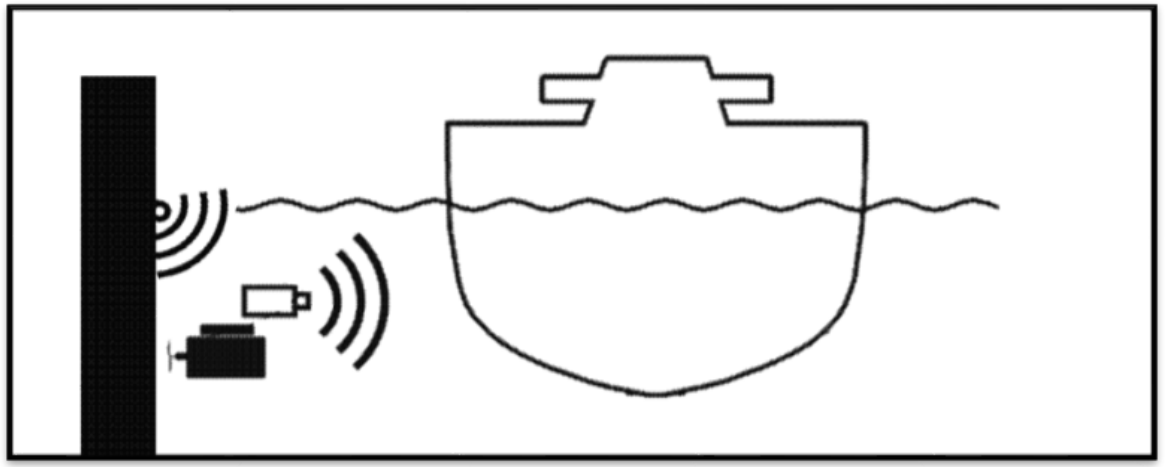
- Errors cause delay or damage to the ship, blocks, or dry dock.

- Solutions:
  - Inspect the inside of the ship - not always feasible
  - Diver surveys - notoriously unreliable
  - Create a high-accuracy 3D map of the hull

# High-Accuracy 3D Hull Mapping

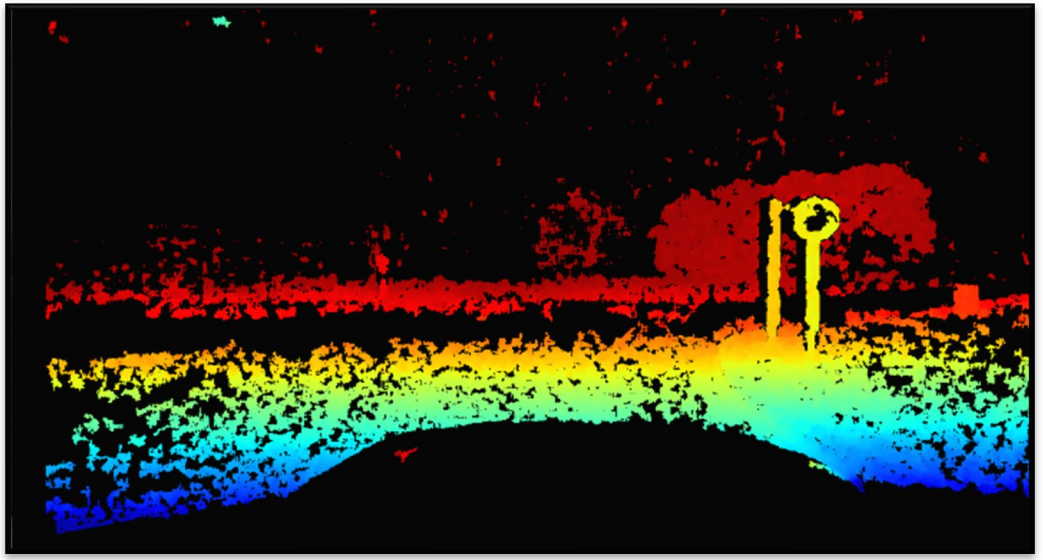
- Goal: in-water 3D hull map
  - Objective accuracy of ±1"
  - Ideal accuracy of ±¼"
- Challenges include:
  - Ship motion from waves/tide/wind
  - Turbid water
  - High accuracy required over large areas
- Overcome with:
  - Proven COTS robot and sensors
  - Camera and sonar fusion
  - Novel 3D mapping software





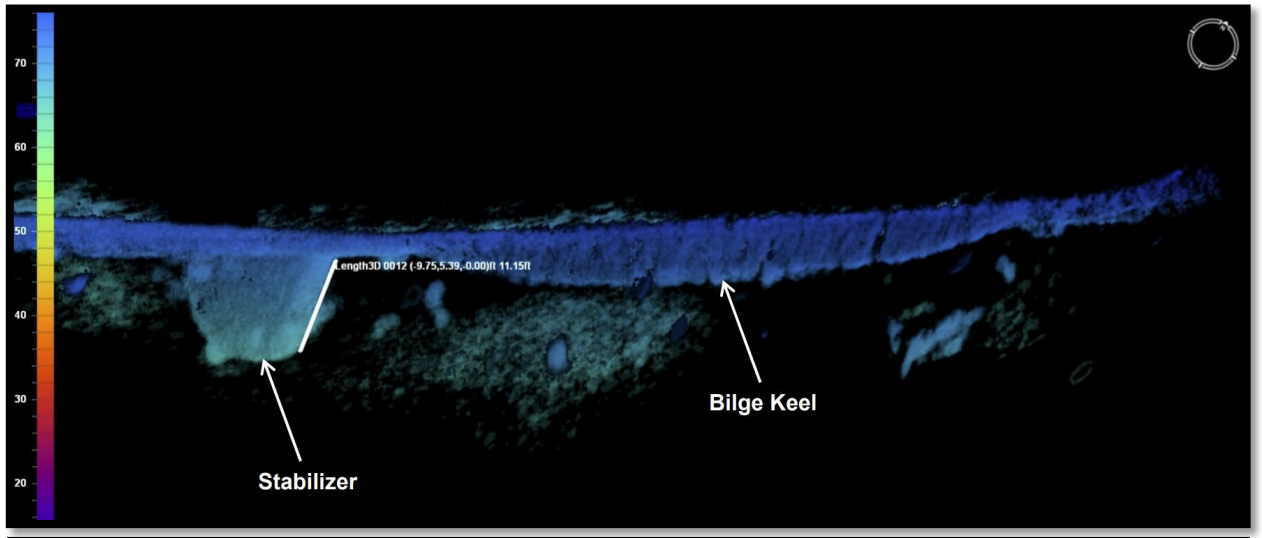
# Background IP

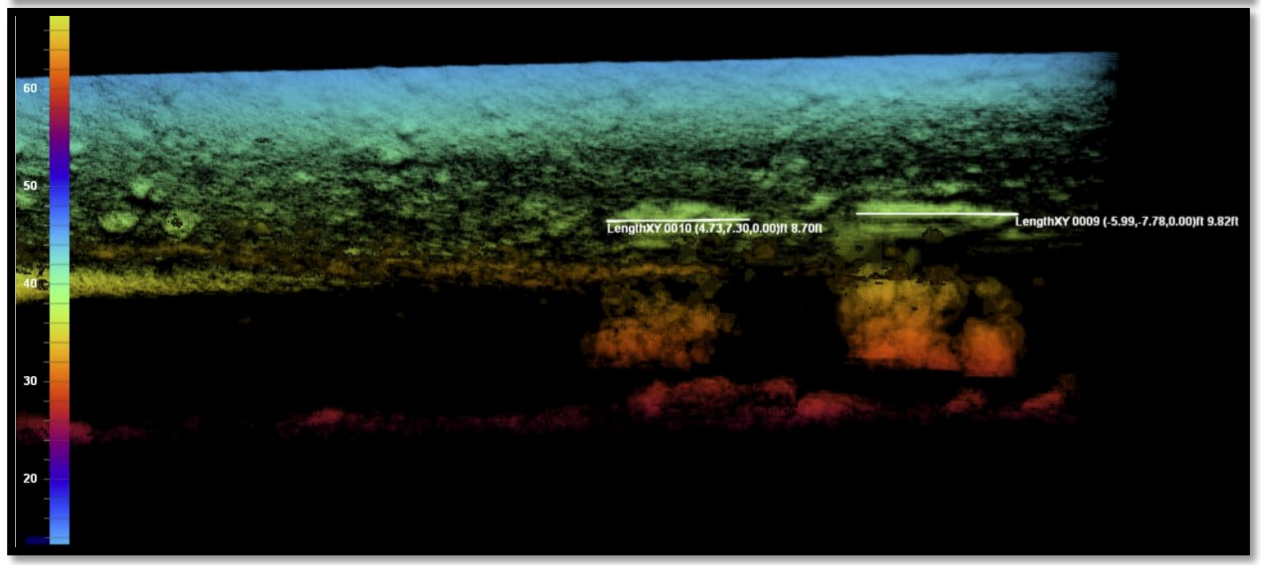
- SwRI has extensively researched 3D mapping
  - 15+ years of projects
  - Air, ground, and underwater
- SwRI is providing relevant 3D mapping software as BIP
- This project plans to use the BIP as a starting point



# Improving Existing NAVSEA Work

- NAVSEA has been conducting research on 3D hull mapping since 2018
  - Position tracking to achieve ±6" accuracy along hull
- This project expects to achieve ±1" accuracy
  - Novel sonar and camera fusion
  - Novel 3D mapping software
- The results will be usable by NAVSEA



# NAVSEA Coordination Effort


- NAVSEA Dry-Docking Technical Warrant Holder - Mr. Jason Borman
  - "I can see the benefit [in this research]"
- Other NAVSEA staff
  - "would be an efficiency improvement"
  - "having accurate maps would be helpful"

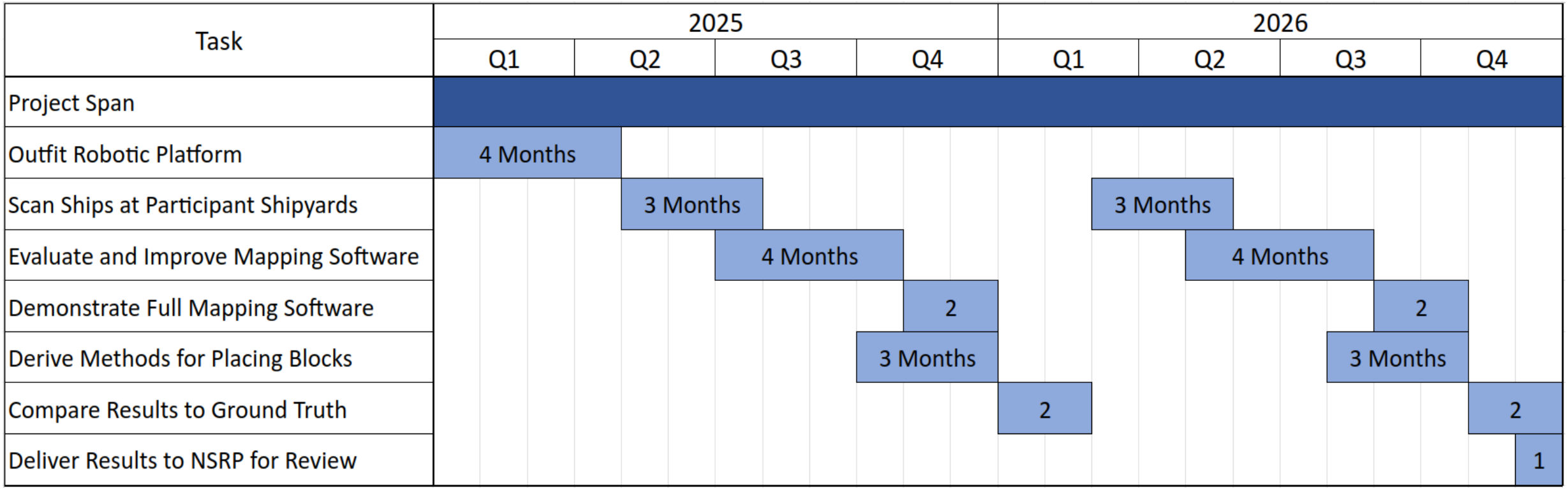
# Business Case

**Improved Accuracy & Safety**
3D hull maps enable precise block placement, eliminating damage from misplacement, reducing diver risk, and supporting predictive maintenance

**Significant Cost & Time Savings**
Robotic inspections cut inspection costs by 40% and reduce incidents avoiding **$10.75M in costs** over 10 years and improving docking efficiency

**Enhanced Maintenance Insights**
High-resolution maps provide a digital record for updating docking plans, tracking hull condition over time, and minimizing reactive maintenance.

# Project Plan



# Team Members

Southwest Research Institue

DM Consulting

BAE Jacksonville Repair Yard

Southwest Regional Maintenance Center

Gulf Copper Dry Dock & Rig Repair

# Non-project Participant Shipyards

Newport News Shipbuilding

Marisco

Mare Island Dry Dock

Everett Ship Repair