

Perspectives from the U.S.A.

INAS – Workshop on Test Strategies and Guidelines for Tests of Autonomous Ships

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U.S. Initiatives for Autonomous Ships

Vessel Development

- **Metal Shark/ASV Global (Louisiana)**
 - Sharktech autonomous vessels (5-91 meters).
- **Harbor Harvest (New York)**
 - Hybrid cargo vessels (4, 20 meter catamarans).
- **Pacific Maritime Institute (Washington)/Robert Allan Ltd.**
 - *RAmora* remotely operated tug.
- **ProMare (Connecticut)**
 - /Plymouth University/Whiskerstay Ltd/M Subs Ltd. (UK)
 - *Mayflower* autonomous ship (30 meters)
- **SpaceX (Florida)**
 - Autonomous Spaceport Drone Ships.
- **U.S. Navy**
 - ASW Continuous Trail Unmanned Vessel (Sea Hunter, 40 meters),
 - MUSV: Medium Unmanned Surface Vehicle (12-50 meters),
 - LUSV: Large Unmanned Surface Vehicle (55-91 meters).

U.S. Initiatives for Autonomous Ships

Autonomous Ship Technologies

- **Sea Machines (Massachusetts)**
 - Automated control of small to large vessels.
- **Shone (California)**
 - AI-based navigation and crew assistants.
- **Buffalo Automation (New York)**
 - AI-based navigation systems
- **Google (California)/Kongsberg/Rolls-Royce**
 - Machine Learning System to train situational awareness.
- **Nautilus Labs (New York)**
 - AI-based digitalization and fleet intelligence.
- **GMATEK (Maryland)**
 - 4D situational awareness, AI-based navigation systems.
- **American Bureau of Shipping (Texas)**
 - Five stage process towards autonomous qualification.

U.S. Initiatives for Autonomous Ships

Test Areas

- **Marine Autonomy Research Site (Great Lakes)**
 - Michigan Technological University (GLRC).
- **Boston, Massachusetts (Atlantic Ocean)**
 - Test area.
- **New York (Long Island Sound)**
 - Test area (planned)
- **Florida (Atlantic Ocean)**
 - Autonomous Spaceport Drone Ships (SpaceX).
- **DELMARVA Peninsula (Atlantic Ocean/Chesapeake Bay)**
 - GMATEK test area for IMO Degrees 2/4 autonomy.

Issues Pertaining to Testing Autonomous Ships

Scope of Test and Trial Guidelines

- Arrangements with U.S. Coast Guard, Captains of the Ports and local Marine Police.

Data Availability

- Local Notices to Mariners for test area dimensions and timing announcements.
- Test data availability: None (proprietary). No policies exist to share data at this time.

What is Presently Being Done?

- National Academies of Science (Transportation Research Board, Independent advisor to the President, Congress and Federal agencies)
- Workshop: Testbed Development for MASS (12 Jan 2020).
- Results will be published.
- All are welcome to attend.

2020 Transportation Research Board Annual Meeting

Workshop

Testbed Development for MASS Maritime Autonomous Surface Ships

**99th Annual Meeting, Washington D.C.
Sunday, January 12, 2020 1:30-4:30 PM**

Panelists:

- James Watson - American Bureau of Shipping
- Olivier Cadet - Kongsberg
- CAPT Robert Compher - Design & Engineering Standards, USCG HQ
- Paivi Haikkola - OneSea Autonomous Maritime Ecosystem

Roundtable Discussions

- Test Area Perspectives (usage, notifications, logistics)
- Regulatory Issues (test data reporting per IMO Guidelines, best practices)
- Human Factors (interaction with other vessels, when to take the hands off)
- Exception Handling (problems encountered, resolutions, lessons learned)
- Artificial Intelligence (confidence in decision making, validation of results)

Sponsored by: Committee on Maritime Safety and Human Factors (AW040)

Co-Sponsors: Committee on Artificial Intelligence (ABJ70) Committee on Ports and Channels (AW010)

Thank you!

Questions???

For further information...

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