

TRAINING FOR THE MODERN MARINER

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THE MARITIME LAW ASSOCIATION (MLA) OF
THE UNITED STATES

COMMITTEE ON REGULATION OF VESSEL
OPERATIONS, SAFETY, SECURITY AND
NAVIGATION

Subcommittee on Maritime Autonomous Surface
Ships

November 4, 2021



AGENDA

Programs:

MTO/VOT/SVO

MEO/MET/MSE

Current training

Progress at Maine Maritime

Future training needs for Autonomous
Vessel Technology

PROGRAMS

Marine Transportation Operations
Vessel Technology Operations
Small Vessel Operations – 2yr

Marine Engine Operations
Marine Engineering Technology - ABET
Marine Systems Engineering – ABET
(4/5yr)

SMART VESSEL TECHNOLOGY

2021





MTO/VTO/SVO

Courses:

Terrestrial Navigation – Foundation

Electronic Navigation I – Radar, ARAP, AIS, GPS, Compasses, Depth sounder, Speed logs, Intro to ECDIS. RADAR Observer endorsement

Electronical Navigation II – ECDIS

Terrestrial Navigation II – Sailings (USCG)

Seamanship – Block & Tackle (USCG)

Celestial Navigation

Navigation Rules

Shiphandling

Meteorology

*Tanker Ops/Workboat Ops/



MEO/MET/MSE

- Fluid Power
- Diesel Power
- Steam Generators
- Thermodynamics
- Electrical Power
- Machine Tool/ Welding
- Power Equipment
- Steam Turbines
- Gas Turbines
- Marine refrigeration & AC
- Power Control Electronics
- Automation and Control

A photograph of a harbor scene. In the foreground, a blue and white boat named 'QUICKWATER' from 'CASTINE, ME' is docked at a wooden pier. The boat has a white cabin and a blue hull. A small white boat is docked behind it. In the background, several other sailboats are visible on the water, and a forested shoreline is in the distance. The text 'ONGOING WORK AT MAINE MARITIME ACADEMY' is overlaid on the left side of the image.

ONGOING WORK AT MAINE MARITIME ACADEMY



Autonomous
Vessel
Technology

Smart Vessel
Technology I

Cyber Security

MAINE MARITIME ACADEMY

Vessels at MMA

- Quickwater – outfitted with SM300 from Sea Machines & SailPlan monitoring equipment
- Addy Rae – Outfitted with SailPlan monitoring equipment

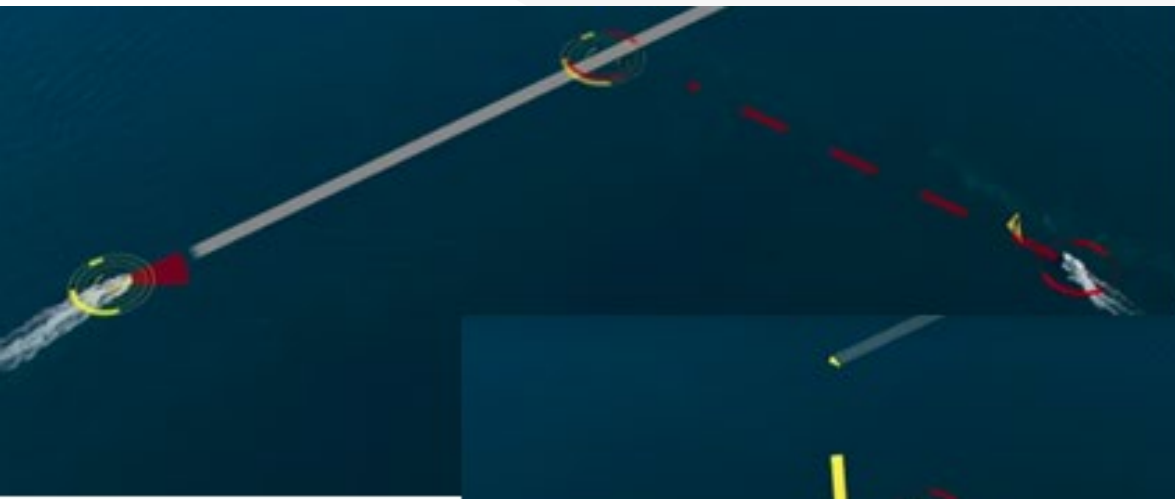
Vessel to be outfitted with SailPlan Monitoring

- Tug Penatgoet
- Susan B. Clark
- Bowdoin Schooner
- R/V Friendship

Plans for the Training ship to be outfitted.

Shore Control
Operations

Copyright: Rolls-Royce plc

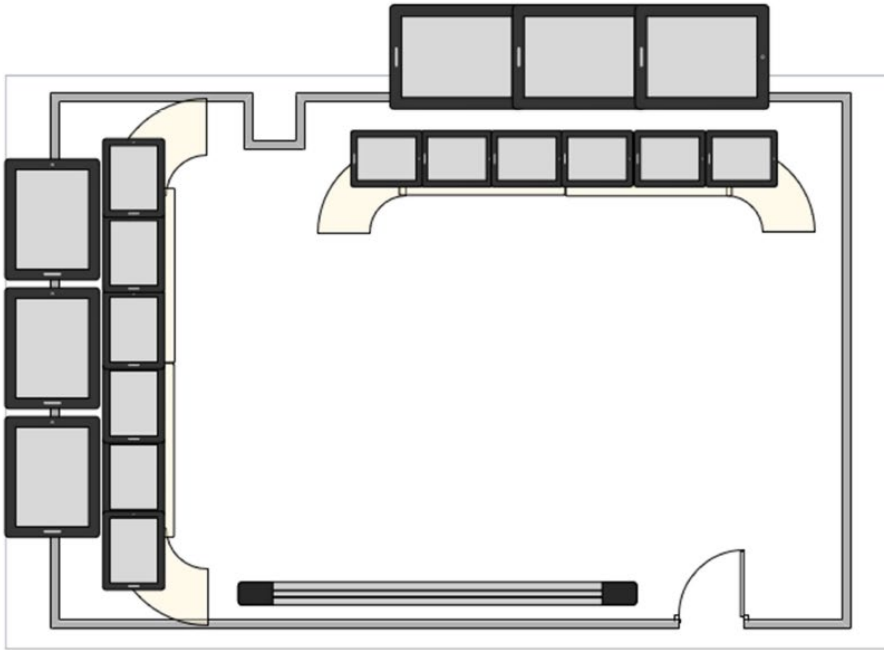


OPPORTUNITIES

COLLISION
AVOIDANCE



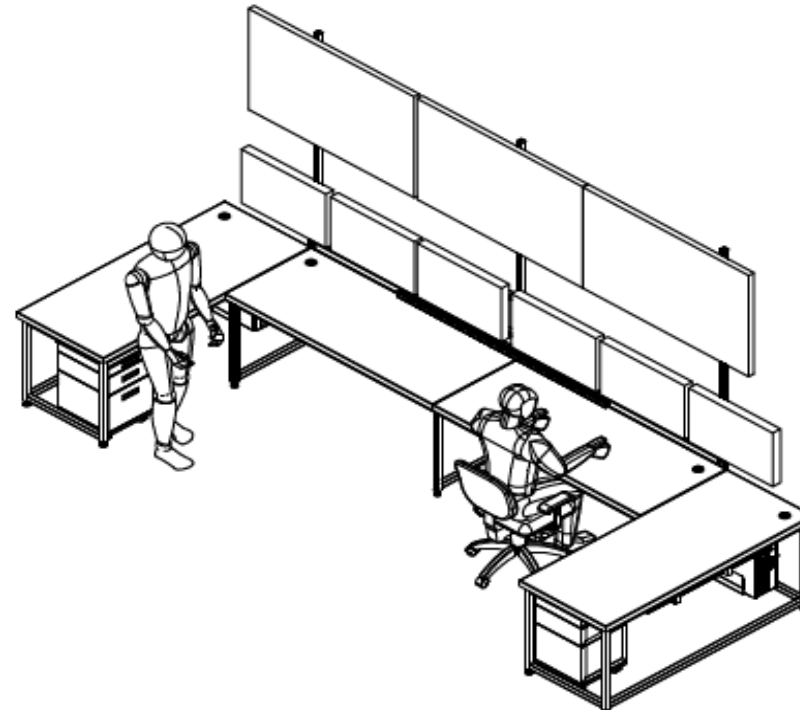
SHORE CONTROL CENTER



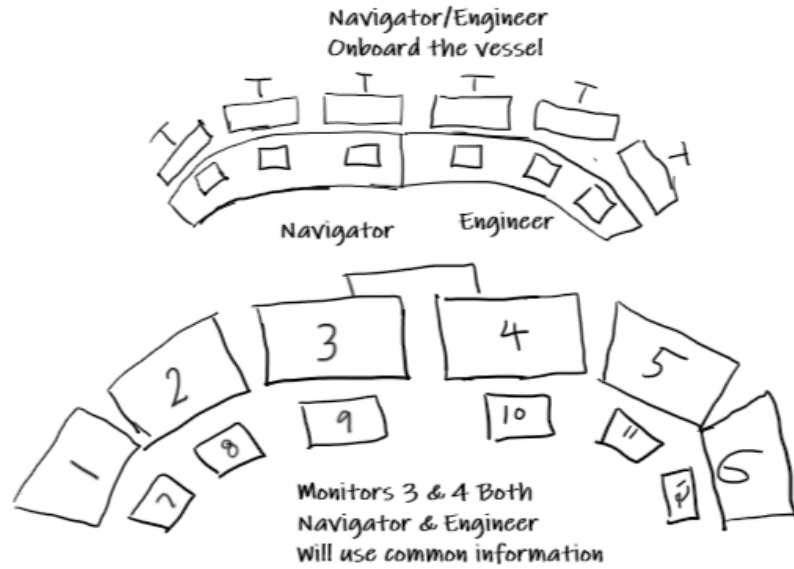
Training the Modern Mariner

Shore Control Operations:

You need to know what your vessels have done, what they are doing and what they will do



SHORE CONTROL CENTER



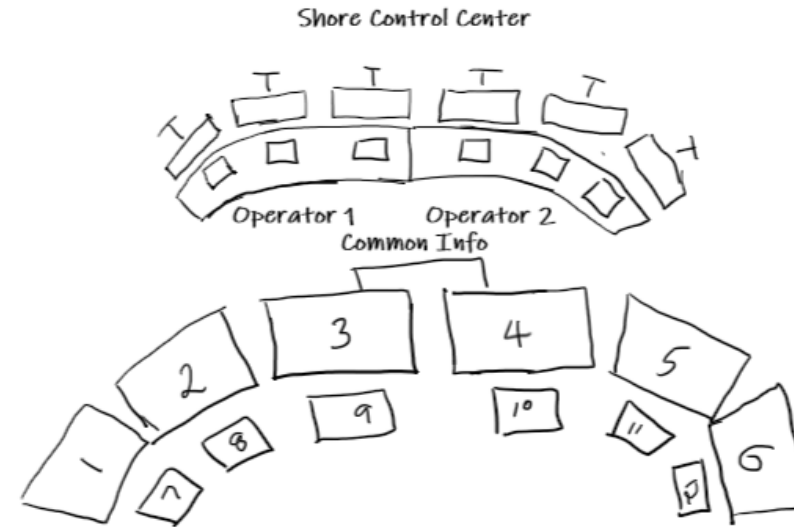
Navigator controls monitors:
1, 2, 7, 8, 9 and has common
control with 3 & 4

Engineer controls monitors:
1, 2, 7, 8, 9 and has common
control with 3 & 4

*Note 1: For training purposes, RADAR, ECDIS
and AIS should be displayed to simulate
available information as though onboard.

*Note 2: For training purposes, Vessel
Management, Standard monitoring needed in the
control room

The Shore Control Center will be used to train
shore based management initially. The displays
will reflect the fleet, world map and vessel
locations, Vessel status, Navigation routes, ETA
and cargo status



The Shore Control Center will be used to train both the mariners and the shore based management. Initially this work will be for vessels that are still manned, while developing the understanding of the Shore Control Center for unmanned vessels.

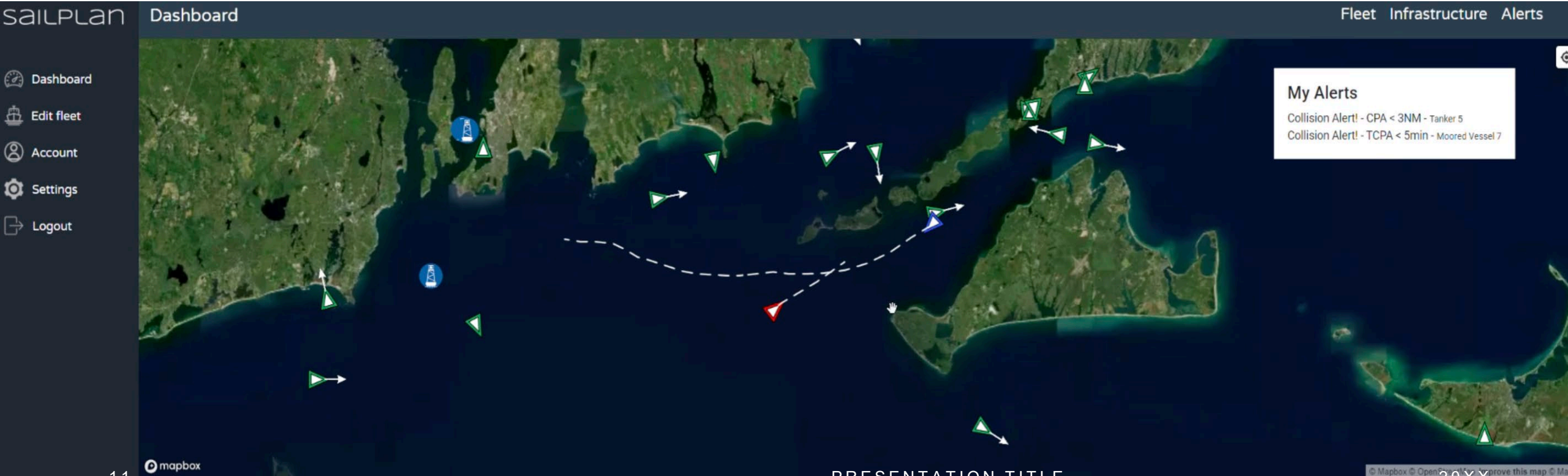
SAILPLAN & MMA

Vessel navigation

- Position
- SOG, COG/COG
- Roll, Pitch
- List
- Vessel System Health - TBD
- Local weather

Four additional vessels planed

- Tug Pentagoet
- Susan B. Clark
- Friendship
- Schooner Bowdoin





WHAT TRAINING IS NEEDED FOR BOTH DECK AND ENGINE

QUICKWATER
CASTINE, ME



TRAINING NEEDS

- Autonomy
- Human/Machine Interface
- Simulations
- SailPlan monitoring platform – interpreting the information
- Shore Control Operator training
- Condition monitoring of equipment
- Machine learning
- Other

Development of Smart Vessel Technology curriculum



Smart Vessel Technology I Course Development

Course Structure

Industry History – Technology Development
Introduction to Smart Vessel Technology
Different Levels of Autonomy

Ethics around Autonomous Vessel / Comparison to Self Driving Cars – Community Impact
Regulatory Response – Class
IMO / MARAD

Industry Trends: USA: Sea Machines, SailPlan, Buffalo Navigation, Harvest Navigation
Industry Trends: Europe: Kongsberg, Rolls Royce Marine, Wartsilia
Autonomous Vessel Operations in the US & International

What does the Navigator need? What does the Engineer need? What do both groups need?
What about Electronic Tech Officer? What about Cybersecurity? Who reports to who?
Ethical Questions around the operation including training, responsibility, reporting structure, Task saturation, Emotional IQ

Quickwater Intro to SM300 Control System: Remote Operations & Mission Planning (Autonomous)
Intro to SailPlan Interface
Safety Protocols

Intro to the MSEL (Medium Speed Engine Lab)
Role the MSEL will play in the SCC
Instrumentation and sensors

Course Structure

Quickwater/MSEL – Understanding the Displays, Information Dashboards, Sensor locations, Verifications
Intro to troubleshooting sensors, displays
Faults, Alarms, Root Failure Analysis, Reliability
Emergency Procedures

Time on the Quickwater
Time in the MSEL

Intro to Shore Control Center (MUNIN),
Control Tower Operations
NASA Control Center

Shore Control Center Organization
Members of the team
Responsibilities

Shore Control Center
Challenges & Opportunities

Course Structure

Shore Control Center
Optimization of Team
Leadership Structure

Shore Control Center
Ideal Condition
Risk Associated/Risk Assessment

Shore Control Center
Cybersecurity
Risk Associated/Risk Assessment
Qualifications

Shore Control Center
Debrief
Improvements, Challenges to overcome
Best Practices

Open Discussion on Training requirements, STCW, Qualifications, Team Members



BARRIERS

- Time & Resources
 - Developing programs
 - Availability of personnel
- Regulatory
 - USCG
 - Slow to change
 - Obsolete information still being tested
 - No resource to address
 - No laws implemented to address autonomous vessel

MAINE
MARITIME
ACADEMY



TRUE NORTH
GROUP LLC

INDUSTRY PARTNERS

Current Partners:

- Sea Machines - SM300
- MARAD - SM300 & Energy Efficiency in Smart mode vs traditional mode
- SailPlan, Inc. - Real time monitoring of vessel remotely - Shore Control monitoring development
- Crowley - Training of Modern Mariner, Offshore Wind & Marine

Anticipated Partners:

- ABS Group
- Splyc, Inc. - Logistics
- True North Group - Cybersecurity

An aerial photograph of a coastal town. In the foreground, a large white and blue ship with a helicopter landing pad is docked at a pier. The ship has "STATE OF MAINE" written on its side. Behind the ship, there are several smaller boats and a red tugboat. The town is built on a hillside, with many houses and buildings. A church with a tall steeple is visible. The water is calm, and the sky is clear.

THANK YOU

Captain Jennifer Norwood

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