THE STUDY

Duration from May 2022 to September 2023

PART 1 Developing generic MASS ROC models
for remotely controlled MASS with and without
crew on board

- process analysis on board of reference ships
  (short sea feeder ship, RoPax ferry, long-haul bulk carrier)
- definition of a generic process map
- definition of operational models for reference ship types
- development of Distributed Cooperative Human–
  Machine Systems (DCoS models)
- definition of generic MASS ROC models

PART 2 Identification and description of the
competences and capacities of MASS ROC operators

- derivation of structural ROC design
- definition of detailed process descriptions
- systematic derivation of competence demands
- comparison with STCW tables

PART 3 Development of competence–based curricula

- definition of qualification objectives for MASS operators
- setting-up of competence tables for MASS operators
- development of modules for teaching and learning
- definition of module catalogues for MASS operators
- description of optional training programs

ASSUMED OPERATIONAL MODELS

ROC – REMOTE OPERATION CENTRE

FUNCTIONS	TASKS
• Fleet Supervisor • Remote Navigators • Remote Engineers • Remote System Administrator	• Direct Control • Monitoring • Emergencies • Planning

WITH CREW ON BOARD   WITHOUT CREW

- MASS with and without crew will be controlled
  by the ROC
- the crew will only take over dedicated tasks
  according to the specific level of autonomy

**EMSA CMOROC / PROJECT SUMMARY
MASS – MARITIME AUTONOMOUS SURFACE SHIPS**

WANT TO FIND OUT MORE?

**The study can be
downloaded at:**

emsa.europa.eu/publications/reports

CONTRACTING AUTHORITY

EMSA European Maritime Safety Agency
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STUDY TEAM

**Hochschule Bremen
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HSB
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HUMATECTS
THE HUMAN-MACHINE ARCHITECTS

German Aerospace Centre (DLR)
Oldenburg, Germany
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DLR Deutsches Zentrum
für Luft- und Raumfahrt

IDENTIFICATION
OF COMPETENCES
FOR MASS OPERATORS
IN REMOTE OPERATION
# CENTRES (CMOROC)

EMSA

PROPOSED COMPETENCE-BASED CURRICULUM
MODULES & CORE COMPETENCES

MASS Operators – Basic Program

FOR ALL OPERATORS
(NAVIGATORS / ENGINEERS / SYSTEM ADMINISTRATORS)

Module	Fields of Competences (Levels 3-4)
MASS Operation 1	Understand MASS system. Operate and interpret the performance.
MASS Safety & Security 1	Contribute to the specific safety and security demands of a MASS system.
MASS Management & Administration 1	Work as MASS operator within legal requirements.
Practical Training 1	Understand the equipment and operations in ROC and on board of a MASS.

FOR NAVIGATORS

MASS Navigation	Take responsibility on navigation of a MASS.
MASS Monitoring	Conduct a safe monitoring watch for a fleet of MASS.
MASS Cargo & Mission Operations 1	Monitor cargo and mission operations and seaworthiness of MASS.

FOR ENGINEERS / SYSTEM ADMINISTRATORS

MASS Engineering Operations 1	Operate all technical systems and remote maintenance.
MASS Automation and Control	Operate all automation and autonomy systems and remote maintenance.
MASS Operations Monitoring	Monitor the operations of a fleet of MASS.
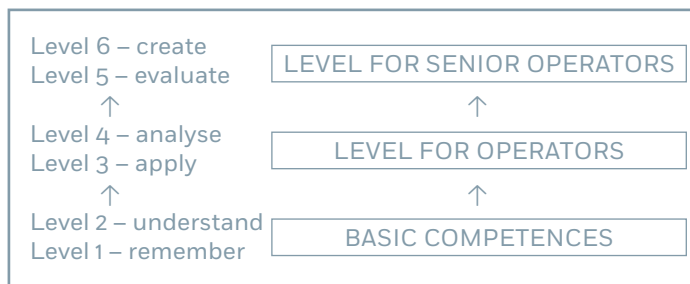
MASS Senior Operators – Advanced Program

FOR ALL SENIOR OPERATORS
(SENIOR NAVIGATORS / SENIOR ENGINEERS)

Module	Fields of Competences (Levels 4-5)
MASS Operation 2	Manage a MASS system. Optimize MASS performance.
MASS Safety & Security 2	Develop safety and security systems. Maintain safe and secure operations of a MASS system.
MASS Management & Administration 2	Develop and improve the entire MASS system within legal and economic demands.
Practical Training 2	Evaluate performance and critical conditions in a ROC and on board of a MASS.

FOR SENIOR NAVIGATORS

MASS Navigation & Control	Manage MASS voyages. Take direct control under any condition.
MASS Cargo & Mission Operations 2	Plan and manage operations with cargo, passengers or on missions. Control seaworthiness of MASS.

FOR SENIOR ENGINEERS

MASS Engineering Operations 2	Manage all technical systems and automation. Improve reliability, availability, performance and resilience.
MASS Operations Control	Manage a fleet of MASS. Take direct control on demand.

COMPETENCE LEVEL INDEX

Level 6 – create Level 5 – evaluate	LEVEL FOR SENIOR OPERATORS
↑	↑
Level 4 – analyse Level 3 – apply	LEVEL FOR OPERATORS
↑	↑
Level 2 – understand Level 1 – remember	BASIC COMPETENCES

This COMPETENCE-BASED CURRICULUM is a proposal. It is intended as a basis for further developement.

PROPOSED OPERATORS' ROLES
BASIS FOR FURTHER DEVELOPMENT

MASS Operators on operational level will take over the monitoring of a MASS system. A MASS system comprises one or a fleet of MASS and the Remote Operation Centre.

NAVIGATORS
Plans and monitors the navigation of a fleet of MASS and intervene in case of deviations, working in the ROC and partly also on board.

ENGINEERS
Monitors the technical operations of a fleet of MASS and intervene in case of deviations, working in the ROC and partly also on board.

SYSTEM ADMINISTRATORS
Monitors the automation and autonomous systems of a fleet of MASS and intervene in case of deviations, working in the ROC.

MASS Senior Operators on management level will take over the management and direct control of a MASS system.

SENIOR NAVIGATORS
Manages a fleet of MASS as Fleet Supervisor or controls MASS as Senior Navigator in a ROC. In the event of deviations and emergencies, they take over the direct remote control of a MASS.

SENIOR ENGINEERS
Manages the operational performance of a fleet of MASS in a ROC. In the event of deviations and emergencies, they take over the direct remote control of the technical MASS systems.

REQUIREMENTS

As an entry requirement for training as a Remote Navigator or Remote Engineer, a nautical or technical Certificate of Competence according to STCW is required. For Remote System Administrators, other equivalent and previous trainings are acceptable.

FUTURE

The technical innovation will be the pacemaker for the introduction of MASS. This transition period contains many opportunities for the industry. The demand for highly qualified operators will increase continuously to operate MASS in international shipping in Remote Operation Centres ashore and, initially, also on-board of MASS.