



CMOROC

Appendix A - Glossary

Identification of Competences for MASS Operators in Remote Operation Centres

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Term	Definition	Source
accident	An unintended event involving fatality, injury, ship loss or damage, other property loss or damage, or environmental damage (IMO, 2018).	3 rd RBAT Report, DNV 2021
agent	Human or machine (computer) responsible for performing or supervising tasks.	D3CoS European Project, Reference Architecture for DCoS Operation, Del. 3.05
automatic	Process or equipment that, under specified conditions, can function without human control.	IEC 60050-351
automatic port facilities	A place, amenity, or piece of equipment providing automatic port services.	ISO/TS 23860
automatic offshore services	Fully or partly automatic services provided from an offshore facility or in the autonomous ship's operational area outside the port, that are defined as part of the autonomous ship system, but that are not located on the ship. Note 1 to entry: Automatic offshore services do not include local sensor systems or planned response services.	ISO/TS 23860
automatic port services	Fully or partly automatic services provided in a port area, that are defined as part of the autonomous ship system, but that are not located on the ship. Automatic port services do not include local sensor systems or planned response services.	ISO/TS 23860
automation	Implementation of processes by automatic means.	ISO/TR 11065
autonomous	Possessing the property of autonomy. Except when used in a general sense, e.g. autonomous ship system, the term "autonomous" on its own should be avoided.	ISO/TS 23860
autonomous onboard controller	Automation onboard the ship is used to control one or more of a ship system's processes or equipment, under certain conditions, without human assistance	ISO/TS 23860
autonomous remote controller	Automation in the remote-control centre hat is used to control one or more of a ship system's processes or equipment, under certain conditions, without human assistance	ISO/TS 23860
autonomous ship system	Elements that interact to ensure effective functioning of the autonomous and non-autonomous processes and equipment that are necessary to perform the ship's operation of voyage. The autonomous ship can depend on systems not located on the ship, e.g. communication systems, shore and port infrastructure, remote control centres etc. The autonomous ship system refers to a full system, including the ship. If the reference is made to the ship itself, the term "autonomous ship" or just "ship" can be used.	ISO/TS 23860
autonomy	Processes or equipment in a ship system which, under certain conditions, are designed and verified to be controlled by automation without human assistance. Autonomy is implemented by automation but emerges when automation is designed and verified to allow operation without human assistance. This definition qualifies autonomy by giving it a temporal (the period when conditions are satisfied) and a process (one or more processes or equipment) dimension. The term "autonomy" on its own should be avoided unless sufficiently qualified with respect to what processes, period, or conditions it refers to.	ISO/TS 23860

chief officer	The officer who holds a senior position on management level within the deck department of a ship. The chief officer, also known as the first officer or the chief mate, works under the command of the ship's master and assists in the overall management and operation of the vessel.	STCW
coastal state	A nation/state that has a coastline along a particular body of water, such as an ocean or sea. The coastal state exercises certain rights and jurisdiction over the waters adjacent to its coast, including the territorial sea, exclusive economic zone (EEZ), and continental shelf.	UNCLOS, Article 1
competence	ability to apply knowledge and skills with an attitude that supports achieving the intended and defined results	Certification scheme for ROC operators, DNV 2021
connectivity	Network facilities to maintain communication between the ship and other parts of the autonomous ship system	ISO/TS 23860
concept of operations (ConOps)	Document describing the characteristics of a proposed system from the viewpoint of an individual who will use that system (ISO/IEC/IEEE15288:2015).	ISO/IEC/IEEE15288:2015
control	Purposeful action on or in a process to meet specified objectives. The term control does not preclude that the action is only to monitor the process, e.g. to raise an alarm or to request intervention. Control can be exercised by a human or by automation.	IEC 60050-351
control action	Acquisition of information, analysis of information, decision-making, or implementation of physical actions performed as part of a control function.	3 rd RBAT Report, DNV 2021
degree of automation	The ISO differentiates between the level of human control on a process (C0 – C2) and the degree of automation itself (A0 – A2). For a full definition see Section 1.2 of the main document.	ISO
degree of autonomy	The IMO defines four degrees of automation, from crewed ships with automated processes and decision support to fully autonomous ships. For a full definition see Section 1.2 of the main document.	IMO
direct control	Operations to control a specific function or parameter. Direct control means, for example, that the operator changes a waypoint that would otherwise be decided by the autonomous ship systems directly, or that the operator selects and overrides the machinery standby configuration, such as changing of generator or pump standby status.	ISO/TS 23860
electro technical officer (ETO)	An officer responsible for the operation, maintenance, and troubleshooting of electrical and electronic systems on board a vessel. The ETO plays a critical role in ensuring the safe and efficient functioning of electrical equipment and systems, including power generation, distribution, automation, communication, and navigation systems.	STCW
engineer	An individual serving as an engineering officer on a ship. Engineering officers are responsible for the safe and efficient operation and maintenance of a vessel's propulsion, power generation, and other machinery systems.	STCW
failure	Loss of the ability of an item to perform the required (specified) function within the limits set for its intended use. This occurs when the margin (to failure) is negative (DNV, 2021b).	3 rd RBAT Report, DNV 2021

flag state	Refers to the country under whose flag a vessel is registered or licensed. The flag state is responsible for ensuring that the vessel complies with applicable laws and regulations, including safety standards, crew qualifications, and environmental requirements.	SOLAS, Article 94
function	A specific activity or action that needs to be performed within a system to accomplish a particular goal or objective. Functions are typically individual units of work that are part of a larger process or workflow. In the report sometimes the terms functions and tasks are used interchangeably, whereas tasks refer more to activities or actions performed by humans.	„Systems Analysis and Design“ by A. Dennis, B. H. Wixom, R. M. Roth
human-automation interaction	The way a human is affected by, controls and receives information from automation while performing a task.	Sheridan and Parasuraman, 2006
human-machine-interface (HMI)	refers to the study and design of interfaces and interactions between humans and machines, typically in the context of computer systems or technology. It focuses on how users interact with machines and aims to create intuitive, efficient, and user-friendly interfaces that enhance the user's experience and productivity.	“The Encyclopedia of Human-Computer Interaction” edited by Soegaard, M. and Dam, R. F
local sensor systems	Environment sensors and data processing systems located in the ship's local operating area, but off the ship, that provide additional data and/or information to the autonomous ship system's environment assessment functions. This can be used, for example, to remove radar shadows, improve positioning accuracy and otherwise assist in complex operations, such as in high density traffic or during berthing.	ISO/TS 23860
management level	A term introduced by the STCW Convention (in contrast to operational level) to reflect the changing needs of the shipping industry. The management level is meant for seafarers who have higher levels of responsibility	STCW
MASS	Stands for Maritime Autonomous Surface Ship, refers to a ship which, to a varying degree, can operate independent of human interaction.	IMO, MSC 100/20/Add.1 Annex 2
MASS subsystems	Refers to a distinct and specialized component or module within a MASS system or autonomous ship system that performs specific functions or operations. It represents a smaller, self-contained unit of the overall autonomous ship system and is responsible for carrying out specific tasks or providing specific capabilities. For example, an autonomous ship system may have several subsystems such as a perception subsystem for environmental sensing, a navigation subsystem for route planning and collision avoidance, a communication subsystem for data exchange, and a control subsystem for autonomous maneuvering and operation.	ISO/TS 23860
MASS system	See Autonomous Ship System	
master	The officer who holds the highest authority and responsibility on board a ship. The master is in command of the vessel and is responsible for the safe and efficient operation of the ship, the safety of the crew, passengers, and cargo, and the protection of the marine environment.	STCW

monitoring	Operations which monitor a situation but do not take any action to influence necessary processes. In monitoring mode, operators may adjust non-necessary processes or equipment to facilitate gathering of information. Monitoring can, for example, be to adjust a system for exclusively human use, such as external lights or cameras, or to inspect equipment or trends in performance parameters.	ISO/TS 23860
navigator	A deck officer responsible for the safe navigation of a ship. Navigators play a crucial role in determining and executing the ship's route, monitoring its position, and ensuring its safe passage through various waterways. They are responsible for planning and executing safe and efficient voyages, taking into account factors such as weather conditions, navigational hazards, traffic separation schemes, and international regulations.	STCW
operational envelope	Conditions and related operator control modes under which an autonomous ship system is designed to operate, including all tolerable events. The operational envelope should cover at least all relevant voyage or operation phases as well as all relevant autonomous ship system processes. The conditions should include geographic or fairway conditions, environmental conditions, own ship conditions, traffic conditions, division of responsibility between human and automatic control, as well as any other factors that have a significant impact on the operation of the autonomous ship system. The operational envelope (OE) is inspired by the operational design domain (ODD) as defined in SAE J3016. However, as the OE also includes operations under human control, and as the relationship between OE and fallbacks are somewhat different than for the ODD, it has been decided to not use the name ODD and rather call this operational envelope.	ISO/TS 23860
operational level	A term introduced by the STCW Convention (in contrast to management level) to reflect the changing needs of the shipping industry. The operational level is for seafarers who have more operational duties, such as watchkeeping.	STCW
operations	Activities performed as part of a mission phase in order to achieve the mission goal. Sub-operations are offspring (sub-goals) of higher level, parent operations.	3 rd RBAT Report, DNV 2021
operator	Human operator who is located in the remote-operation centre (ROC), responsible for the supervision, monitoring and control of either bridge/deck functions (Bridge Operator) or engine functions (Engine Operator). Also referred to as ROC Operator.	SAFEMASS Part 2, DNV 2019
control mode	Working mode, sometimes supported by technology or procedures, that represents the expected class of actions performed by the crew or remote-control centre operators. Modes can be changed during a voyage or operation and/or for specific functions.	ISO/TS 23860
passage planning	A subset of voyage planning that specifically focuses on the navigational aspects of a ship's passage between two points (from berth to berth).	
performance	The performance of a technology is its ability to provide its specified functions (DNV, 2021b). These functions contribute to safety/reliability as well as the output or value generated by the system, equipment, or component when in operation.	3 rd RBAT Report, DNV 2021
planned response services	Services provided by organizations with facilities not located onboard the ship, to assist in situations where the onboard systems are unable	ISO/TS 23860

	to handle the situation alone. This may include, for example, towage in case of critical sub-system failure on board or evacuation services for passengers on an uncrewed ship.	
port authorities	Refer to organizations or government entities that are responsible for the management, administration, and regulation of ports and harbors. Port authorities play a crucial role in ensuring the efficient and safe operation of ports, overseeing various activities such as vessel traffic management, cargo handling, infrastructure maintenance, and security.	“The Law of the Sea: Definition of Terms” by K.R. Simmonds.
port services	Refers to a wide range of activities and facilities provided within a port to support the safe and efficient handling of ships and passengers: e.g. linesmen, stevedores, pilotage, towage, ship repair and maintenance, bunkering, and vessel provisioning. They also encompass administrative services like port administration, port security, port regulations enforcement, and customs services. Compared to terminal services, port services are more concerned with the overall governance and administration of the port as a whole. Terminal services focus on handling of cargo and passengers.	“Port Management and Operations” by M. G. Burns
port state	refers to the country or jurisdiction where a vessel is currently located or seeking entry into a port; refers to the authority and control exercised by that country over the vessel, its crew, and its operations while it is within its jurisdictional waters or ports.	IMO
procedure	A specified set of documented activities or steps that are established to achieve a particular result. Procedures outline the required actions, sequences, and interactions necessary to carry out a specific process or operation consistently and effectively.	ISO 9000
process	Set of interrelated or interacting activities that transforms inputs into outputs.	ISO 9000
qualification	Demonstrated education, training and work experience.	Certification scheme for ROC operators, DNV 2021
RACI matrix	The RACI matrix supports the analysis and assignment of tasks to various roles. RACI is an acronym derived from the four key responsibilities most typically used: responsible, accountable, consulted, and informed.	“Business Process Mapping: Improving Customer Satisfaction” by M. Jacka, P. Keller
ROC State	Refers to the country or jurisdiction where a ROC is located.	
ROC Operator (ROCO)	Human working in an ROC and performing relevant tasks to operate a MASS.	
redundancy (of a system)	Having multiple capabilities for performing the same function, typically in parallel.	3 rd RBAT Report, DNV 2021
remote operation centre (RC OC)	Site remote from the ship that can control some or all of the autonomous ships system processes. A remote control centre may consist of more than one control room or stations that may be located at different physical locations. See ISO 11064-3 for a more extensive set of terminology for control rooms and centres. The terms shore control centre and remote operations centre are sometimes used to refer to remote control centres. When the abbreviated form of the	ISO/TS 23860

	term Remote Operation Centre is used, i.e. ROC, one should be careful to avoid confusion with a Rescue Coordination Centre.	
remote engineer	An individual holding the responsibilities and performing the tasks of an engineer on operational level from an ROC.	
remote senior engineer	An individual holding the responsibilities and performing the tasks of a senior engineer on management level from an ROC.	
riding crew	A group of individuals who are temporarily assigned or contracted to work on a specific vessel during a particular voyage or period. These individuals may be employed by third-party service providers or companies specializing in ship maintenance, repairs, or other specific tasks.	
role	a designated position within a task or system that defines the responsibilities, activities, and interactions necessary to accomplish specific objectives. Roles outline the expected behaviours, knowledge, and skills required to fulfil the role effectively and contribute to the overall task performance.	„Task Analysis Methods for Instructional Design“ by David H. Jonassen, Martin Tessmer.
scenario	Possible sequence of specified conditions under which the system, item or process functions are performed.	3 rd RBAT Report, DNV 2021
seafarer	Any person who is employed or engaged or works in any capacity onboard a ship; all individuals working in various capacities on board ships, including but not limited to deck officers, engineers, electro-technical officers, ratings, and catering staff.	STCW
senior engineer	A senior-ranking officer on management level within the engineering department on board a vessel.	
senior navigator	A senior-ranking officer on management level within the navigation department on board a vessel.	
service crew	Individuals who perform support and hospitality duties on board a ship. They are responsible for providing services and assistance to passengers, maintaining cleanliness and hygiene in passenger areas, and ensuring the comfort and satisfaction of guests on board.	
situational awareness (SA)	The perception of environmental elements and events with respect to time or space, the comprehension of their meaning, and the projection of their future status.	SAFEMASS Part 2, DNV 2019
strategic control	Operations to issue fleet-wide instructions that implement and, if appropriate, define specific functions to be used by the automatic decision-making units. Strategic control corresponds to a Master's standing orders on a conventional ship.	ISO/TS 23860
supervision	Periodically or continuously, overseeing the operation of a system and standing by to intervene in case the operation is deemed not to be safe or not according to operational goals or limitations.	SAFEMASS Part 2, DNV 2019
supervisor	An individual who holds a position of authority and responsibility for overseeing and managing specific tasks, operations, or personnel onboard a vessel. Supervisors are responsible for ensuring the safe and efficient performance of assigned duties and for maintaining compliance with relevant regulations and procedures.	STCW
system administrator	an IT professional responsible for managing, maintaining, and overseeing the operation of computer systems, networks, and servers within an organization. The role of a system administrator involves a	„The Practice of System and Network Administration“

	wide range of tasks related to the efficient and secure functioning of the organization's IT infrastructure.	by Thomas A. Limoncelli, Christina J. Hogan, and Strata R. Chalup
system control tasks	Process control tasks, implemented by automation and/or humans, that are required to sustainably operate the autonomous ship system within its operational envelope. A process control task is the control task or function related to a specific process. The task or function can be automatic or performed by a human.	ISO/TS 23860
tactical control	Operations to influence the conclusion made by the automatic decision-making units of the autonomous ship for a particular purpose. Tactical control includes, for example, changing the required minimum closest point of approach to other ships or the port of destination and letting the autonomous ship system afterwards construct the avoidance manoeuvre or route itself. It can also be adjustment of a technical alert level, based on prevailing conditions, for example, the time delay in actuation of the bilge alarm.	ISO/TS 23860
task	A specific activity or action that needs to be performed within a system to accomplish a particular goal or objective. Tasks are typically individual units of work that are part of a larger process or workflow. In the report sometimes the terms function and task are used interchangeably, whereas task refer more to activities or actions performed by humans.	„Systems Analysis and Design“ by A. Dennis, B. H. Wixom, R. M. Roth
terminal services	Refer to a range of activities, facilities, and operations provided at a port terminal to facilitate the efficient handling, storage, and movement of cargo or passengers. Terminal services encompass various functions that support the arrival, departure, and transit of vessels, as well as the loading, unloading, and temporary storage of goods or passengers at the terminal.	“Port Management and Operations“ by M. G. Burns
terminal staff	Refers to the individuals employed or assigned to work at a port terminal. Terminal staff members are responsible for various tasks and roles within the terminal operations, ensuring the smooth and efficient handling of cargo, passengers, and related services.	“Port Management and Operations“ by M. G. Burns
uncrewed	Ship with no crew onboard (does not include passengers, special purpose personnel etc.)	ISO/TS 23860
unmanned	Ship with no humans onboard.	ISO/TS 23860
voyage planning	Refers to the process of preparing a comprehensive plan for a ship's voyage from one port to one or more another ports. It involves analysing various factors and considerations to determine the safest and most efficient route, taking into account navigational challenges, weather conditions, traffic density, and regulatory requirements. It includes planning the operation of port stays and schedules, considering port information, terminals requirements, stevedores or lash gang operations and the arrangement of required automatic port facilities.	
watch officer	An officer who is assigned to stand watch and assumes responsibility for the safe navigation, operation, and maintenance of a vessel during a designated watchkeeping period.	STCW

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