



AutoMated Vessels and Supply Chain Optimisation for Sustainable Short SEa Shipping

D2.4: Specifications and requirements for MOSES innovations

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List of Acronyms

Acronym	Description	Acronym	Description
3D	Three-dimensional	LoLo	Lift-on/Lift-off
3G	Third Generation	LPS	Local Port Service
4G	Fourth Generation	LSP	Logistics Service Provider
5G	Fifth Generation	LTE	Long-Term Evolution
A2C	Advantage Actor Critic	MARPOL	International Convention for the Prevention of Pollution from Ships
AI	Artificial Intelligence	MAS	Maritime Assistance Services
AIS	Automatic Identification System	MASS	Maritime Autonomous Surface Ships
AL	Autonomy Level	ML	Machine Learning
AMS	Alarm Monitoring System	MLP	Matchmaking Logistics Platform
AO	Automatic Operation	MoS	Motorways of the sea
API	Application Programming Interface	MRCC	Maritime Rescue Coordination Centre
ARC	Active Rotation Control	MRC	Minimum Risk Condition
AS	Automatic Support	MSC	Maritime Safety Committee
ASC	Autonomous Ship Code	MSI	Maritime Safety Information
ASD	Azimuth Stern Drive	MSP	Maritime Service Portfolio
BAM	Bridge Alert Management	NAS	Navigation Assistance Service
BC	Business Case	NB-IoT	Narrowband Internet of Things
BF	Beaufort	NOx	Oxides of Nitrogen
BHP	Brake Horse Power	OCIMF	Oil Companies International Marine Forum
BRM	Bridge Resource Management	OH&S	Occupational Health and Safety
BS	British Standards	OPEX	Operating Expenditure
BWTS	Ballast Water Treatment System	OS	Operating System

Acronym	Description
CAM	Central Alert Management
CAPEX	Capital Expenditure
CCU	Crane Control Unit
CE	Conformité Européenne
CII	Cost Inflation Index
CMI	Comitee Maritime International
CO2	Carbon dioxide
COLREG	Convention on the International Regulations for Preventing Collisions at Sea
ConOps	Concept of Operations
CPA	Closest Point of Approach
CPU	Central Processing Unit
D2.1	The first deliverable of the second work package
D2.2	The second deliverable of the second work package
D2.3	The third deliverable of the second work package
DP	Dynamic Positioning
DQN	Deep Queue Networks
DSS	Deep Sea Shipping
DTLF	Digital Transport and Logistics Forum
DWT	Deadweight
EC	European Commission
ECA	Emission Control Area
EEA	European Economic Area

Acronym	Description
OTA	Over-The-Air
PCB	Printed Circuit Board
PEMA	Port Equipment Manufacturers Association
PC	Personal Computer
PIANC	World Association for Waterborne Transport Infrastructure
PLC	Programmable Logic Controller
PPO	Proximal Policy Optimisation
QoS	Quality of Service
RCC	Remote Control Centre
RCHS	Robotic Container Handling System
RGB	Red-Green-Blue
RMS	Root Mean Square
RL	Reinforced Learning
RoPax	Roll-on/Roll-off passenger
RoRo	Roll-on/Roll-off
S2S	Ship-to-Shore
SAC	Soft Actor Critics
SAR	Search And Rescue
SCADA	Supervisory Control And Data Acquisition
SCC	Shore Control Centre
SCM	Screw Shaft Monitoring
SCR	Selective Catalytic Reduction

Acronym	Description	Acronym	Description
EEDI	Energy Efficiency Design Index	SCS	Shore Control Station
EEOI	Energy Efficiency Operational Indicator	SGISC	Second Generation Intact Stability Criteria
EEXI	Energy Efficiency Existing Ship Index	SOLAS	International Convention for the Safety Of Life At Sea
EFTA	European Free Trade Association	SOX	Oxides of Sulphur
EFTI	Electronic Freight Transport Information	SRS	Ship Reporting System
EGR	Exhaust Gas Recirculation	SSS	Short Sea Shipping
ENC	Electronic Navigational Charts	STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
ERM	Engine Resource Management	SUA	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation
ESSN	Emergency Social Safety Net	SW	Software
EU	European Union	TCP	Transmission Control Protocol
FAL	Facilitation of Maritime Traffic Convention	TCPA	Time to Closest Point of Approach
GDPR	General Data Protect Regulation	TEU	Twenty-foot Equivalent Unit
GGT	Girting, Girding or Tripping	TMAS	Telemedical Maritime Assistance Service
GHG	Green-House Gas	TMS	Transport Management System
GPRS	General Packet Radio Service	TRL	Technology Readiness Level
GPS	Global Positioning System	TSS	Traffic Separation Scheme
HFO	Heavy Fuel Oil	UN	United Nations
HPU	Hydraulic Power Unit	UNCLOS	UN Convention on the Law of the Sea
HR	Human Resources	UPS	Uninterruptible Power Supply

Acronym	Description	Acronym	Description
HSQE	Health Safety Quality and Environment	USB	Universal Serial Bus
HVAC	Heating, ventilation and air conditioning	UV	Ultraviolet
HW	Hardware	VDR	Voyage Data Recorder
ICT	Information and Communication Technology	VHF	Very High Frequency
IMO	International Maritime Organization	VSP	Voith-Schneider Propellers
IMU	Inertial Measurement Unit	VTMIS	Vessel Traffic Monitoring and Information System
IOSS	Intelligent Operator Support System	VTS	Vessel Traffic Service
ISO	International Standards Organisation	WiFi	Wireless Fidelity
IWG	International Working Group	WP	Work Package
JTAG	Joint Test Action Group		
KM	Height of Metacentre from the keel		
KPI	Key Performance Indicator		
LIDAR	Light Detection and Ranging		
LNG	Liquified Natural Gas		
LOA	Length Overall		

Executive Summary

This report will make use of the defined user needs, the detailed MOSES use cases, and the market opportunities to provide the specifications and requirements for the MOSES innovations. Initially, the Concept of Operations is defined for each of the MOSES innovations: the innovative feeder vessels, the autonomous tugboats, the automated mooring system, and the matchmaking logistics platform. Subsequently, the user requirements from D2.1 are transformed into system specifications after being refined based on information from D2.2 and D2.3 and described with a formal representation. The specifications address architectural, functional, and operational characteristics. Key performance indicators and the corresponding verification tests are described. This report provides the framework for the development activities that will take place in the context of WP3, WP4, WP5, and WP6.

This document collects and analyses all the characteristics and components of each of the MOSES innovations to specify the systems' requirements based on the interpretation of user needs. The systems under development are described conceptually, starting from existing systems and processes and the justification of the envisaged improvements. Each innovation is described thoroughly by decomposing it to features, characteristics, interfaces, data requirements, and other elements that are critical for the development of their components and their implementation and operation.

All these elements are formally presented in the form of tables that include system requirements, key performance indicators, and verification procedures. The present deliverable finishes with a concluding section where a summary of the significant elements of the aforementioned process is provided for each innovation, together with the main quantitative outcome in terms of the identified system specifications, KPIs, and test cases.