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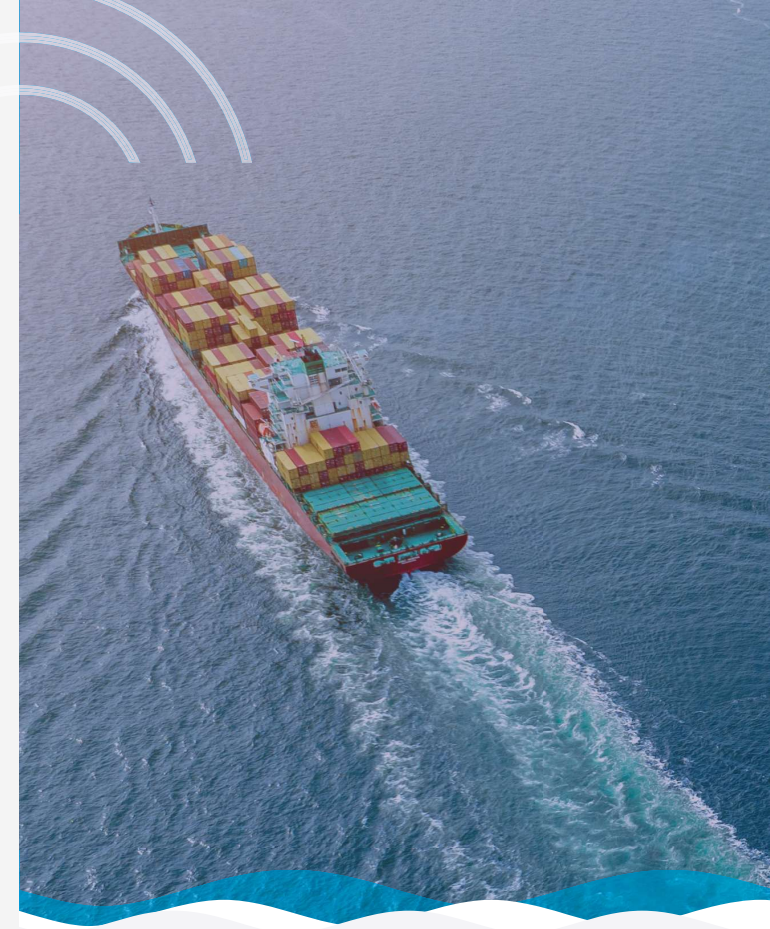
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SEAMLESS

SAFE, EFFICIENT AND AUTONOMOUS: MULTIMODAL LIBRARY OF EUROPEAN SHORTSEA AND INLAND SOLUTIONS

THE PROJECT

SEAMLESS will develop and adapt missing technology building blocks and key enabling technologies into a fully automated, economically viable, cost-effective, and resilient waterborne freight feeder loop service for Short Sea Shipping (SSS) and/or Inland Waterways Transport (IWT).

Autonomous systems will be integrated to ensure safe, resilient, efficient, and environmentally friendly operations to shift road freight movements to hinterland waterways while enhancing the performance of the TEN-T network. The service will operate 24/7 with a fleet of autonomous cargo shuttles and human supervision in Remote Operation Centres (ROC).

A redesigned logistics system will enable seamless freight flows and real-time information exploitation for optimisation. A digital bird's-eye view of the supply chain allows the exploitation of real-time information to support resilient logistics and digitalised administrative procedures.

The building blocks will be validated in real-world scenarios and evaluated for sustainability criteria. Transferability will be fully demonstrated in selected use cases that cover a wide range of transport applications and geographical regions throughout Europe.

Novel business models will be developed to minimise investment risk, and regulatory gaps and challenges related to autonomous vessel operation will be identified, with recommendations for policymakers.

OBJECTIVES

SEAMLESS aims to create an automated waterborne freight feeder loop service for Short Sea Shipping and Inland Waterways Transport by developing and adapting necessary building blocks and enablers. The project will integrate autonomous systems to ensure safe, efficient, and environmentally friendly operation, ultimately shifting road freight movements towards waterways.

BUILDING BLOCKS

B1: Automated Port Interface (DockNLoad)
B2: Modular vessel and operations concepts
SEAMLESS services will be delivered by tailored autonomous cargo shuttles, which will operate 24/7 with humans-in-the-loop located in remote control centres. The autonomous vessels will efficiently cooperate with automated and autonomous shore-side infrastructure (incl. docking and cargo handling at port) and safely interact with conventional, manned systems in the supply chain.

B3: Integrated supply chain support (ModalNET)
SEAMLESS services will be based on a redesigned logistics system that will facilitate seamless freight flows through the supply chain by minimising delays in intermodal nodes (i.e., where waterborne and land-based transport modes are connected). This includes a SEAMLESS digital "bird's-eye" view of the supply chain, that allows the exploitation of real-time information (incl. from SEAMLESS physical assets), for planning optimisation and reconfiguration to support resilient logistics.

ENABLERS

E1: Impact & Sustainability analysis
E2: Simplified approval
SEAMLESS will verify and validate the building blocks involved in the feeder service by conducting full-scale demonstrations in selected real-world scenarios, by combining physical and digital assets developed in the project with assets provided by the Consortium. SEAMLESS will also demonstrate transferability in selected use cases that cover a wide range of transport applications and geographical regions with different requirements throughout Europe. Based on a structured methodological framework that will evaluate sustainability criteria (local and wider levels), they will act as guidance for the replication of the project results beyond the project scope and time-span.

E3: Roadmap to close gaps
SEAMLESS will develop novel business models that will provide a framework and pathways for practically implementing the SEAMLESS service with the goal to minimise of minimizing investment risk for first movers. SEAMLESS will also identify gaps and challenges in the current regulatory framework related to autonomous vessel operation and provide recommendations for policymakers to allow the smooth and safe deployment of fully automated services.

REAL AND PERECEVEID OBSTACLES

- Q1. Technological readiness
- Q2. Operation unknows
- Q3. Regulatory complexity
- Q4. Additional cost
- Q5. Stakeholder readiness

SEAMLESS BUILDING BLOCKS

- B1. Automated port interface
- B2. Modular vessel and operation
- B3. Integrated suplly chain support

SEAMLESS ENABLERS

- E1. Impact & Sustainability analysis
- E2. Simplified approval
- E3. Roadmap to close gaps

IMPACT

Increased and early deployment of climate neutral fuels and significant electrification of shipping, in particular and foremost in intra-European transport connections.

Increased overall energy efficiency and drastically lower fuel consumption of vessels.

Enable innovative port infrastructure to achieve zero-emission waterborne transport (inland, maritime).

Enable clean, climate-neutral, and climate-resilient inland waterway vessels before 2030 helping a significant market take-up and a comprehensive green fleet renewal which will also help modal shift.

Strong technological and operational momentum towards achieving climate neutrality and the elimination of all harmful pollution to air and water.

Achieve the smart, efficient, secure and safe integration of maritime and inland shipping into logistic chains, facilitated by full digitalisation and automation.

Enable fully automated shipping (maritime and inland) and efficient connectivity.

Competitive waterborne industries, including the globally active European maritime technology sector, providing the advanced green and digital technologies which will support jobs and growth in Europe.