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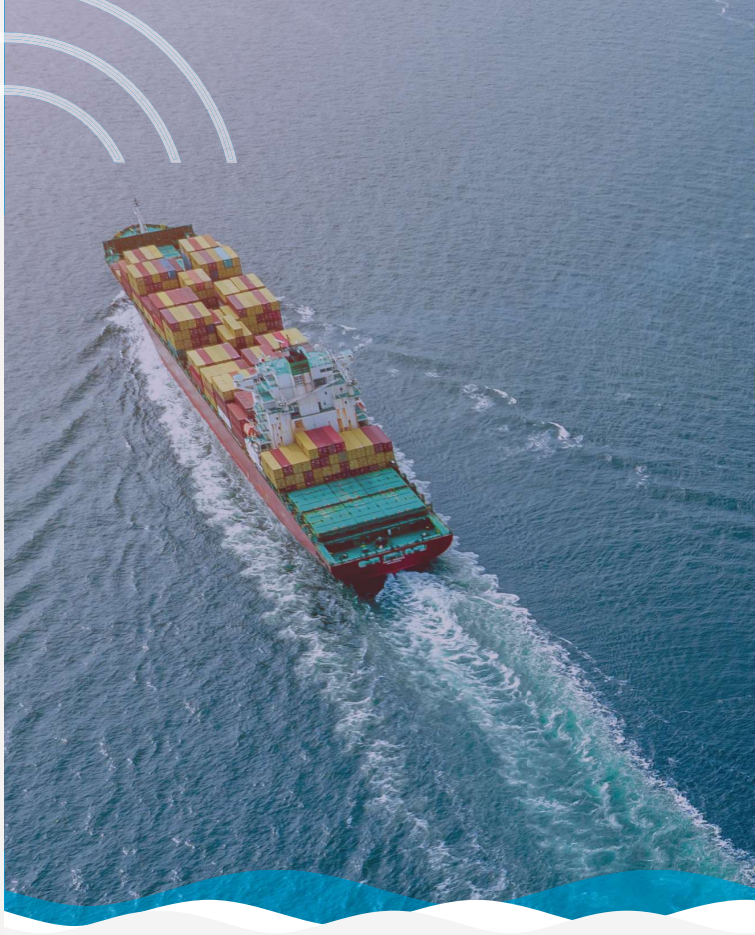

SEAMLESS

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

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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 PERCEIVED 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

PROGRESS AT A GLANCE

The SEAMLESS project continues to make significant progress in transforming Short Sea Shipping (SSS) and Inland Waterway Transport (IWT) through automation and digital innovation. Several key developments have been achieved, including the definition of the project's Demo & Transferability Use Cases and the establishment of SEAMLESS Building Blocks, which contribute to simplifying administrative processes for SSS and IWT. Additionally, the redesigned logistics chain integrating SEAMLESS innovations is now in place, and the project's Concept of Operations has been developed to bring together all core technologies.

Progress has also been made on the development of the SEAMLESS Building Blocks. Work has started on DockNLoad, with the development of the autonomous triple-joint cargo handling crane now underway. The required components for the autonomous mooring arm have been defined, and the first design drafts for integration on ZULU's X-Barge have been created.

The SEAMLESS Remote Operation Centre has outlined scenarios for multi-vessel monitoring and control which is set to revolutionize the autonomy navigation business case for SSS and IWT. Within the ModalNET framework, core functionalities have been established, including loop service scheduling, booking, transport order management, and real-time transport event tracking.

In addition to technological advancements, efforts have been made to refine the SEAMLESS business models. An online stakeholder survey has been launched to gather insights on the implementation of autonomous technologies in maritime logistics. Success stories relevant to automation in shipping have been identified, and interviews with key industry stakeholders are being conducted to better understand market needs and potential adoption strategies.

Get Involved!
Scan the QR code to participate in the SEAMLESS industry survey and help shape the future of autonomous shipping.