PROJECT NEWSLETTER NO. 6

September 2023

Interreg North Sea Region AVATAR

European Regional Development Fund

EUROPEAN UNION

Sustainable urban freight transport with autonomous zero-emission vessels

Welcome to the AVATAR Newsletter No. 6 | AVATAR FINAL EVENT REVIEW

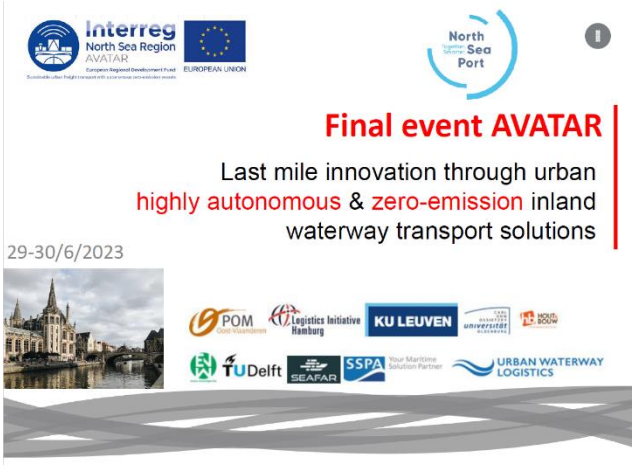
On our own account: AVATAR Newsletter No. 6 launched

Picture: AVATAR project

28.09.2023 –The AVATAR project consortium is publishing project newsletters at regular intervals, about three to four times a year, in which the main events, results, progresses made and general topics relating to the project are addressed. In this newsletter, an overview is given of the AVATAR final event.

Read more here: AVATAR website, LinkedIn

AVATAR FINAL EVENT - REVIEW



Picture: AVATAR

29-30.06.2023 – It's a wrap! After three intense and hard working years, the AVATAR Interreg North Sea Region project ended on 30/6/2023. A review of the final event in Ghent.

On 29/6/2023 and 30/6/2023 results of the AVATAR project were presented on (highly) autonomous sailing and city freight distribution. The event took place in the Visitor Center of North Sea Port.

More than 70 participants registered for the AVATAR final event, with participants from Belgium, The Netherlands, Germany and Sweden. Participants represented a nice mix of private and public stakeholders.

The event was organized in cooperation with North Sea Port.

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In the morning, presentations took take place from an industry point of view (29/6) and an academic point of view (30/6). Focus was on the interaction between engineering, economics and energy; showing the potential of green city freight distribution via water (e.g. Hamburg and Ghent).

In the afternoon of both days, demonstrations took place of the developed technologies in AVATAR (e.g. showing the new AVATAR 25 ton vessel steered from the SEAFAR remote control center, showing the KUL Maverick vessel controlled by the UOL mobile bridge, charging the AVATAR vessel with E. Van Wingen's ICE CHP on hydrogen, showing the TU Delft research vessels,...).

The full program is shown below, presentations are available here: day 1 and day 2.

Thursday 29 June 2023 Morning session: presentations from an industry point of view (lunch included)

8.30-9.00: Registration

9.00-9.10: Welcome (Peter Van Parys, COO, North Sea Port)

9.10-9.35: AVATAR project and overview agenda (Tom Pauwels, Project coordinator, POM Oost-Vlaanderen)

9.35-10.00: Green city freight distribution via waterways (André De Groote, FEMA/UWL)

10.00-10.30: Break

10.30-10.50: Greening of shipping (Tim Berckmoes, CEO, ABC Anglo Belgian Corporation)

10.50-11.10: Energy use case (Jean-Pierre Van Wingen, CEO, E. Van Wingen)

11.10-11.30: Automated sailing (Ghazaleh Kia, R&D Project Manager, SEAFAR)

11.30-11.50: Takeaways business, policy and legal framework (Thomas Brauner, Projectmanager, LIHH)

11.50-12.00: Q&A

12.00-13.30: Lunch

Thursday 29 June 2023 Afternoon session: demonstrations and pilots (reception included)

13.30-13.45: Welcome to demonstrations and pilots (An Vervliet, deputy Province of East Flanders)

13.45-14.00: Sami Souguir (Alderman City of Ghent - Culture, city development and spatial planning)

14.00-16.00: Demonstrations and pilots

16.00-17.00: Network reception

Friday 30 June 2023 Morning session: presentations from an academic point of view (lunch included)

8.30-9.00: Registration

9.00-9.20: Welcome - Overview AVATAR (Tom Pauwels, Project coordinator, POM Oost-Vlaanderen)

9.20-9.40: KUL - Results AVATAR (Peter Slaets/Senne Van Baelen)

9.40-10.00: SSPA/RISE - Results AVATAR - Realtime tracking of ships via AIS (Axel Hörteborn)

10.00-10.30: Break

10.30-10.50: TUD - Results AVATAR (Vittorio Garofano) - "Towards fleet coordination control for autonomous ship system and the application of Computer Vision technology to enhance safety in autonomous navigation"

10.50-11.10: UOL - Results AVATAR RCC (Janusz Piotrowski)

11.10-11.30: R&D trending topics in automated vessel navigation (Ghazaleh Kia, R&D Project Manager, SEAFAR)

11.30-11.50: POM - Economic assessment use case Ghent and general concusions AVATAR (Tom Pauwels)

11.50-12.10: Research gaps in autonomous sailing (Rudy Negenborn, TUD)

12.10-13.30: Lunch

Friday 30 June 2023 Afternoon session: demonstrations and pilots (reception included)

13.30-13.45: Welcome to demonstrations and pilots (Tom Pauwels, Project coordinator, POM Oost-Vlaanderen)

13.45-15.00: Demonstrations and pilots

15.00-16.00: Network reception

Presentations 29/6/2023: overview

The final event started with an introduction of Peter Van Parys (COO North Sea Port), with focus on the strategic plan "Connect 2025". One of the themes is "investing in energy", including the role of hydrogen, electrification and exchange of heat.

Tom Pauwels (POM Oost-Vlaanderen) gave a general overview of the AVATAR project, including the status of the developed technologies, pilots, demonstrations, market review and use cases.

André De Groote (FEMA/UWL) gave more details about the role of green city freight distribution via waterways (presentation available here).

Reference has also been made to the project Distribouw and the role of cityhubs around the City of Ghent. Special focus was on the development of the new 25 ton AVATAR vessel, see also here. Restrictions of urban road freight transport are needed to implement alternatives via the waterways.

Tim Berckmoes (CEO Anglo Belgian Corporation) gave insights about future fuels for zero-emission combustion engines, including the role of hydrogen. Presentation is available here.

The AVATAR energy use case has been elaborated by Jean-Pierre Van Wingen (CEO E. Van Wingen). The energy use case in AVATAR Interreg North Sea Region is focused on city freight distribution vessels sailing during daytime and charging the batteries at night (using a ICE CHP running on hydrogen). While the ICE CHP is charging the vessels, heat is released. In the AVATAR approach, this heat will be stored in a buffer tank that is part of a central heating installation. More info is available here, here and here. Special attention goes to the capacity of the electricity grid, local energy production and stress on the basics of the public grid. The role of energy efficient appplications has been underlined. The presentation is available here.

Ghazaleh Kia (SEAFAR) showcased the primary goals and the multitude of benefits associated with remote vessel operation. A dive into the advancements and possibilities that this cutting-edge technology brings to the maritime industry. See presentation here.

Takeaways of the business, policy and legal framework were presented by Thomas Brauner (LIHH). Key project achievements include the AVATAR market review on city freight distribution using inland waterways, building and testing of the AVATAR vessel, creating energy and transport use cases (Hamburg and Ghent), economic assessment and environmental benefits. Reference has also been made to the AVATAR policy position paper (top 8 key issues governance actors need to address in particular to advance city freight distribution via waterways and autonomous inland navigation) and the decision tree (allowing for a (relatively) easy first check towards the potential of a use case). Important to note is also the achievement of follow-up projects where AVATAR-based pilots will be continued (INNOWATR 2.0 and Decarbomile). Presentation is available here.

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Presentations 30/6/2023: overview

The second day of the AVATAR final event started with an introduction of Tom Pauwels (POM Oost-Vlaanderen), giving the general overview of the AVATAR project, including the status of the developed technologies, pilots, demonstrations, market review and use cases. Presentation is available here.

Peter Slaets (KU Leuven) gave more details about the development of the 1 ton Maverick vessel. In the Avatar project, the Intelligent Mobile Platform (IMP) group at KU Leuven developed a zero-emission 1 Tonne research vessel known as Maverick, with the primary objective of enhancing automation in inland waterway transport. The vessel is equipped with two fully-electric 360 degree rotating propellers. The Maverick can carry a load of one tonne, and is moreover equipped with multiple balancing tanks. The vessel can be controlled manually, remotely (from a remote control centre), and by means of an onboard computer using control software that can automate various navigation tasks of the Maverick. The vessel has limited hard-integrated onboard sensors, and instead seemingly integrates with an external sensor box that combines advanced sensors such as LiDAR, cameras, GNSS, and IMU. As such, the Maverick's main intelligence component is this external sensor box that can communicate with the actuation system of the vessel. See also here and here. Presentation is available here.

Realtime tracking of ships via AIS was the focus of the presentation of Axel Hörteborn (SSPA/RISE). AIS architecture at RISE has been shown, and also world coverage and pros and cons of AIS. How this can be used for the AVATAR vessel has been elaborated (see also avatar.sspa.se). Presentation is available here.

TUD focused on high-level automation and coordination of multiple autonomous ship systems, as well as the enhanced sailing safety through the implementation of Artificial Intelligence and computer vision. Ir. Vittorio Garofano delivered a presentation titled "Towards fleet coordination control for autonomous ship system and the application of Computer Vision technology to enhance safety in autonomous navigation" to showcase the major results of TUD over the three-year duration of the AVATAR project. This presentation provided also a summary of the work carried out by Ir. Matt Hepworth and Ir. Bart Boogmans under the supervision of Dr. Ir. Yusong Pang. Presentation is available here.

Janusz Piotrowski (UOL) focused on shore based control for teleoperation of highly automated inland waterway vessels. An overview of the requirements and concept for a shore-based control center has been given, taking into account the heterogeneity of inland waterway vessels

(situational awareness, remote control). The UOL shore based control center has been succesfully used in the AVATAR project to control 4 different vessels (2 test carriers of eMIR, TUD RAS model ships and the KUL Maverick). Presentation is available here.

On the second day, Ghazaleh Kia (SEAFAR) presented "R&D Trending Topics in Automated Vessel Navigation." This session provided an exploration of the latest research and developments in the field. Presentation is available here.

Tom Pauwels (POM Oost-Vlaanderen) presented the status of the economic assessment study for Ghent. Following topics were highlighted: the AVATAR market review on city freight distribution using inland waterways, the Ghent market study (approach, facts and figures, operational challenges), cost calculation tool (goal, overview capex, opex, constraints), policy position paper. General conclusions of the AVATAR project were also shared and follow-up projects were presented (e.g. INNOWATR 2.0). Presentation is available here.

In conclusion, Professor Rudy Negenborn gave a presentation to discuss the research gaps in autonomous sailing. Research gaps in six key areas were described: (i) understanding the challenges at different levels of autonomy; (ii) defining the role of humans; (iii) assuring safety and security; (iv) rethinking ports; (v) embedding autonomy in legal and regulatory frameworks; (vi) setting out the case for autonomous ships. Presentation is available here.

Demonstrations and pilots (29-30/6/2023)

An Vervliet (Deputy of the Province of East Flanders and chairwoman of the POM East Flanders) welcomed the participants of the afternoon session of 29/6/2023. The provincial government wants to be climate neutral by 2050. A transition towards a sustainable, circular and inclusive economy is necessary to achieve this. Within the framework of Innovation Playground the Province of East Flanders, together with POM East Flanders, connect, inspire and support companies, governments and knowledge institutions. Exactly what has been achieved in the AVATAR-project!

Sami Souguir (Alderman City of Ghent) welcomed the participants on behalf of the City of Ghent.

Project partners Urban Waterway Logistics, Opleidingscentrum Hout en Bouw, E. Van Wingen NV and SEAFAR cooperated in the development of a new urban test vessel with a capacity of 25 ton, zero-emission and highly automated. This vessel is part of a fleet of urban vessels that is being used for test sailings of city freight distribution. The project partners demonstrated the possibilities of remotely operating

the AVATAR vessel in the dock in Ghent from the advanced Remote Operation Center in Antwerp. To show this, a live video connection has been established. On top of this, project partner RISE is monitoring the vessel performance data that will be shown on a dashboard.

The Intelligent Mobile Platform group at KU Leuven developped a zero-emission 1 tonne research vessel known as Maverick. The autonomy level of the Maverick has been demonstrated in the dock. First, Maverick automatically followed a voyage that is pre-defined by a series of waypoints. Secondly, Maverick independently moved towards a designated destination. Lastly, the Maverick was operated by project partner University of Oldenburg by using a remote control center.

TU Delft Mechanical Engineering focused on high-level automation and coordination of multiple autonomous ship systems, as well as the enhanced sailing safety through the implementation of Artificial Intelligence and Computer Vision. TUD demonstrated the RAS research vessels. The communication between a RAS vessel and the mobile bridge of the University of Oldenburg has been tested onshore. Meanwhile, the vision Sensorbox, developed by TUDelft, has been installed on the AVATAR vessel and tested in real life sailing. Results were shown on a monitor.

For almost a decade, E. Van Wingen has been committed to sustainability and high level innovation. The energy use case by E. Van Wingen focusee on city freight distribution vessels sailing during daytime and charging the batteries at night. An ICE CHP running on hydrogen is being used, and was also demonstrated on the quay.

Important to note is also that the performance indicators of the different technologies developed, have been used as input for the economic assessment exercise performed by the project partners Logistics Initiative Hamburg, POM East Flanders, E. Van Wingen and Opleidingscentrum Hout en Bouw.

Summarizing, this event shows the added value of the AVATAR Interreg North Sea Region project, bringing together expertise of project partners from different countries and combining economic, engineering and energy expertise.

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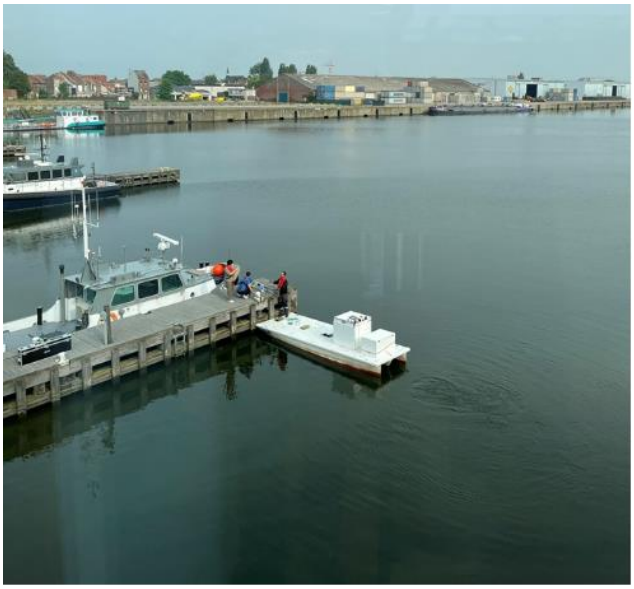
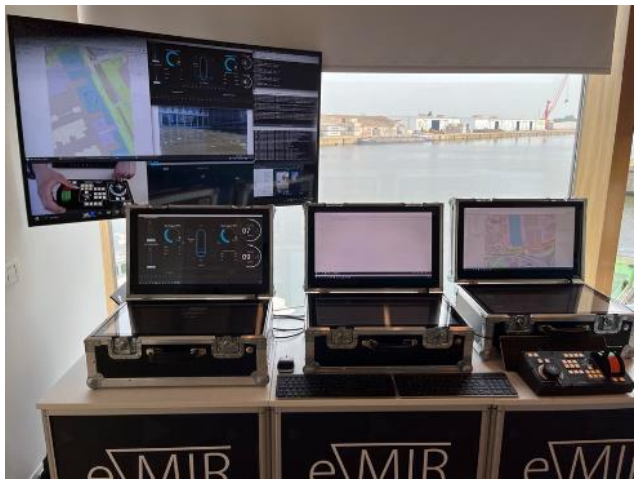
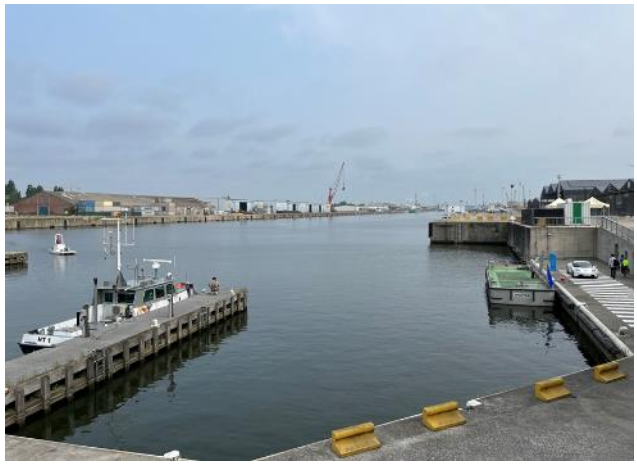
Some impressions (c) POM Oost-Vlaanderen







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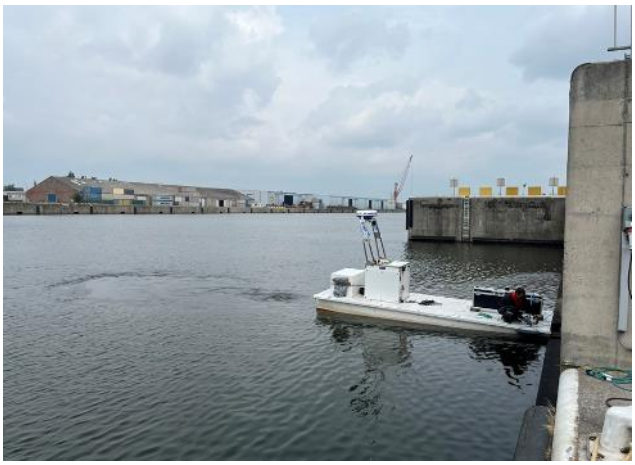

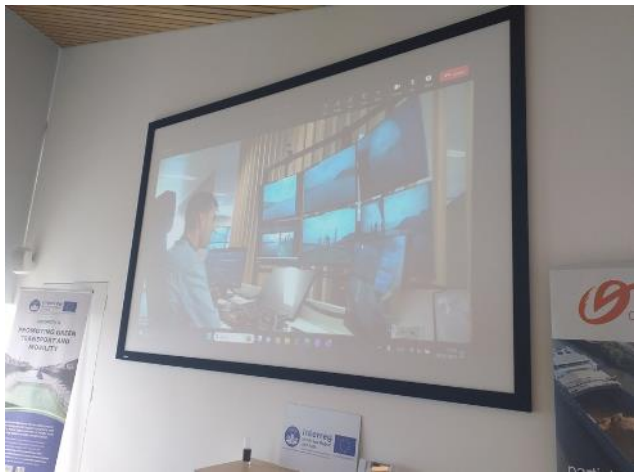

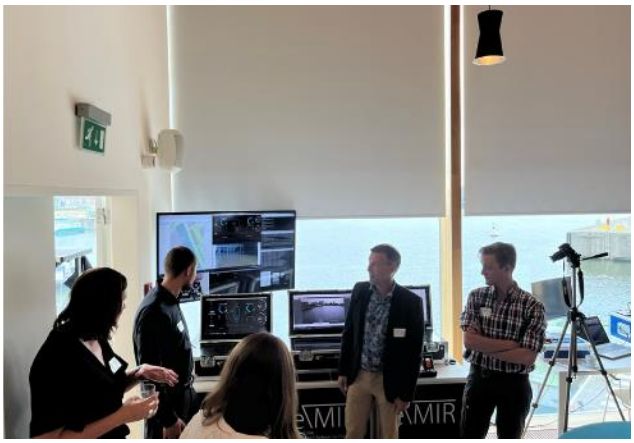

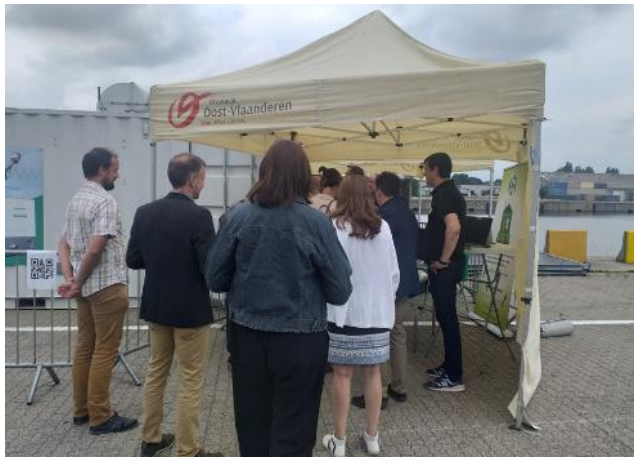

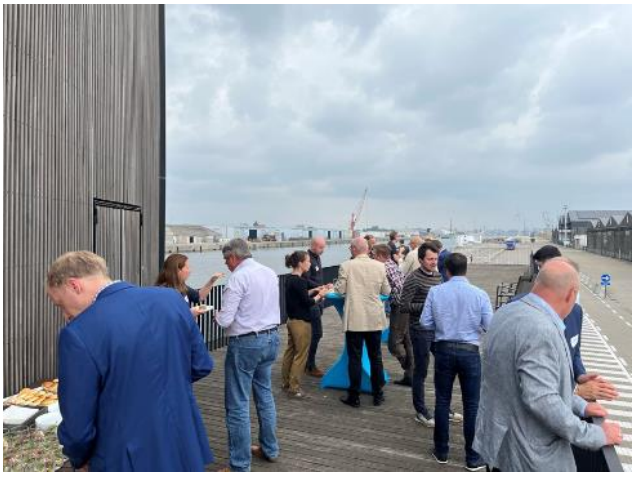

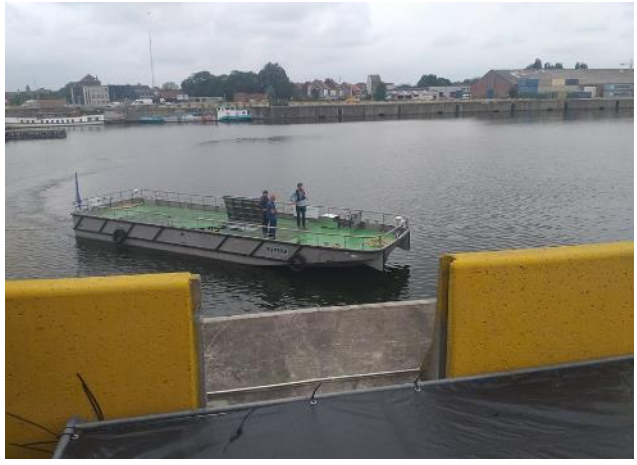

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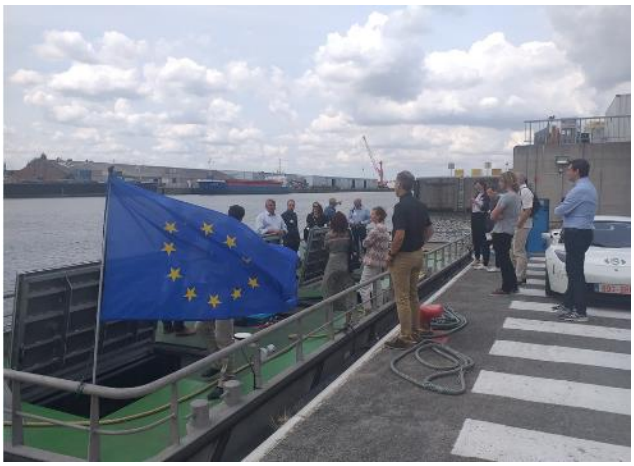

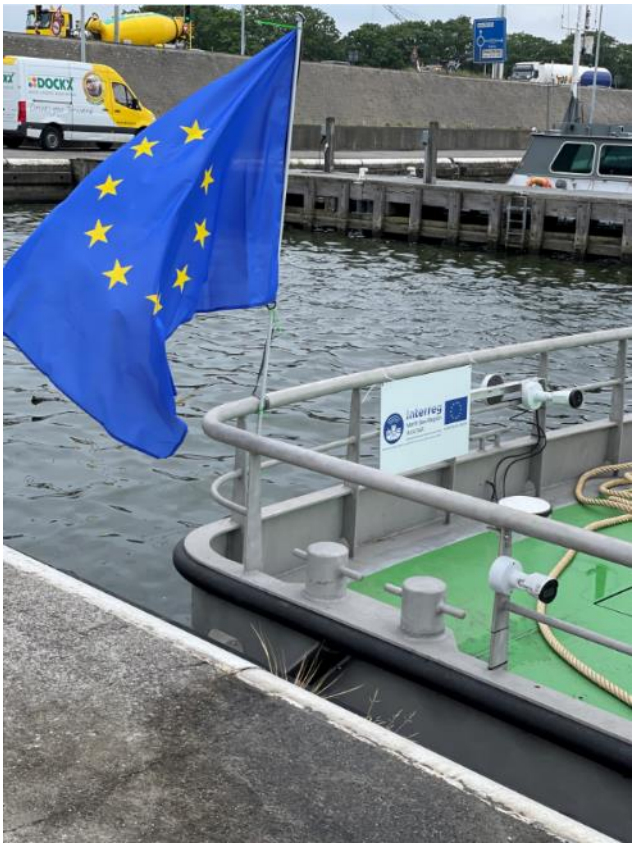

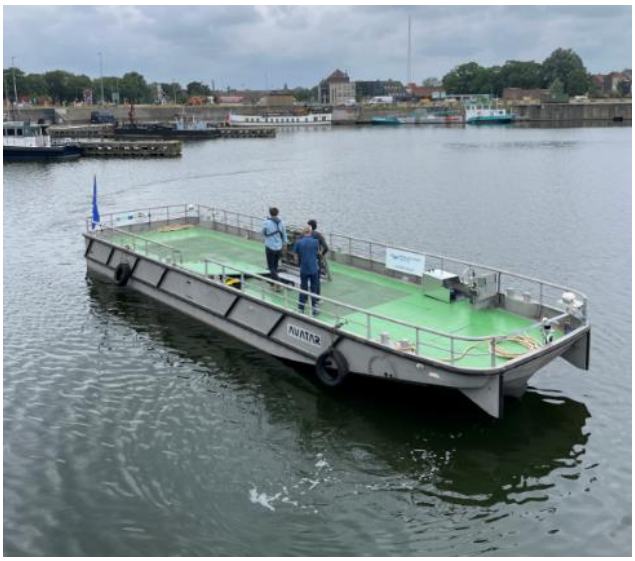

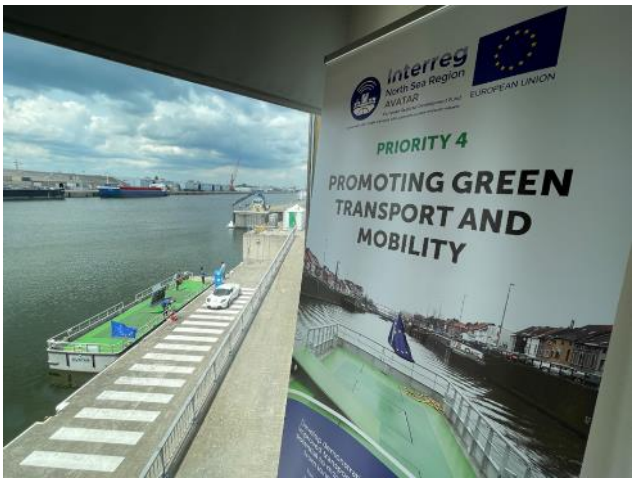

Read more here: AVATAR website, AVATAR Linkedin

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Get to know the project partners. UOL and SEAFAR

Picture: UOL

The University of Oldenburg (UOL) has set up the e-Maritime Integrated Reference Platform (eMIR) as a platform for the development, verification, validation and demonstration of new e-Navigation solutions and highly automated / autonomous maritime systems. Seamless integration of CPS into the testbed as well as the communication between maritime systems is a main part of UOL. Further, UOL works on the integration and development of services for the MCP as a platform for information exchange.

The University of Oldenburg expects the participation in the project to evaluate the eMIR infrastructure in the context of inland navigation (in the form of a Control Center). Furthermore, the application use of the MCP will be extended to inland navigation. Inland navigation offers great potential for supporting automated services (like e.g. registration of goods or arrivals, process automation, ..), and the proximity to the coastline means that these services can be handled via the 4G network.

Within the scope of the STM project, UOL participated actively in the development of an architecture for maritime information exchange. The MCP as one of the results in that project will be used to provide a service infrastructure in the AVATAR project. UOL realized a Ship to Shore Communication in a practical test with NAVTOR by remotely steering a vessel on the Jade. In the ACTRESS project UOL developed a mobile VTS unit which can also be optimized within AVATAR.

Read more here: UOL

Picture: SEAFAR

SEAFAR is an innovative independent ship management company, offering services to operate unmanned and crew-reduced vessels for shipowners and shipping companies. SEAFAR develops technology to remotely operate automated vessels for inland and coastal shipping. Via the Shore Control Centre, a captain can supervise more vessels at the same time. The technology is based on the Artificial Intelligence, Machine Learning and 4G/5G/SAT communication.

For Seafar the valorization strategy translates into offering a new solution for city distribution

(small vessels) next to the existing inter-city waterway transport (larger vessels). These two services cover all waterways throughout Flanders and offering a complete service (small and larger vessels) is required to implement the ambitious commercialization plan and growth of our fleet.

Deliver experience in autonomous sailing, be part of the thinktank concerning the setup of developping and testing the autonomous sailing in the urban environment of the testbed of Ghent. Deliver experience and knowhow in setting up the full equipment for autonomous sailing at the AVATAR vessel and connecting with de Command Center of Seafar. Cooperate with the mobile control center as developed by UOH. Cooperate with the soft- and hardware of the urban boat Green Wave.

Read more here: SEAFAR

About the Interreg AVATAR project

AVATAR – Autonomous vessels, cost-effective transhipment, waste return. AVATAR is a project co-funded by the INTERREG North Sea Region Programme 2014 - 2020.

The AVATAR project aims to tackle challenges of city freight distribution by developing, testing and assessing adequate technologies and business models for urban autonomous zero-emission IWT. Through this, the project unlocks the economic potential of urban vessels and corresponding waterways, increases available solutions for full-cycle automation and sets up a sustainable supply chain model for urban goods distribution and waste return.

Further information and project news can be found on the project website and LinkedIn

https://northsearegion.eu/avatar

https://www.linkedin.com/company/avatar-interreg-north-sea-region

A general status of the project is available via this *link*.

Contact for queries

To get in touch with AVATAR, please contact the lead beneficiary organisation.

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