Project AVATAR

Last mile innovation through urban highly autonomous & zero-emission inland waterway transport solutions

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QUICK FACTS (I)

- EU **innovation project** on **urban, highly autonomous & zero emission** water-bound cargo transport solutions for last mile distribution
- Funding scheme: **co-financed by the European Union** from the EU Interreg North Sea Region (European Regional Development Fund)
- Project period: May 2020 - June 2023
- Project budget: Total EUR 2,83 million, 50% of which EU (ERDF) funding
- https://northsearegion.eu/

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European Regional Development Fund
Sustainable urban freight transport with autonomous zero-emission vessels
EUROPEAN UNION

QUICK FACTS (II)

- **10 project partners from 4 countries** (Netherlands, Germany, Sweden, Belgium): *of which*: 3 universities, SME's & 2 cluster organisations / innovation agencies
- Providing combined economic and engineering expertise (multidisciplinary approach)
- **A**utonomous **V**essels, cost-effective tr**A**nshipmen**T**, w**A**ste **R**eturn

POM Oost-Vlaanderen
Logistics Initiative Hamburg
KU LEUVEN
Carl von Ossietzky universität Oldenburg
HOUT & BOUW Opleidingscentrum
www.vanwingen.be
TU Delft
SEAFAR
SSPA Your Maritime Solution Partner
URBAN WATERWAY LOGISTICS

WHY URBAN IWT?

MOTIVATION

- Many European cities have a large & branched waterway network (< CEMT I) that was built for and originally used for cargo transport
- Today: Predominantly recreational navigation / use, waterways generally not economically viable for freight distribution → underutilised
- At the same time: road congestion, increasing competition for urban space and need for sustainability in urban commercial transport
- AVATAR project **aims to tackle those challenges by developing, testing and assessing adequate technologies and business models for urban autonomous zero-emission IWT**


Ghent

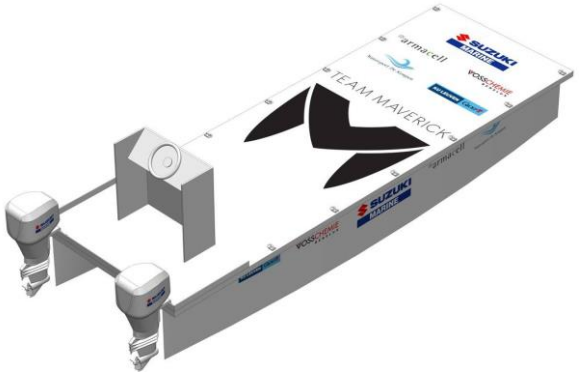

Amsterdam


Hamburg

DEVELOPMENT OF

AUTONOMOUS VESSELS (I)

Source: KU Leuven



- AVATAR develops 2 vessels for pilots in a 3-step approach
- In a **first step**, AVATAR is currently converting an existing 1 ton vessel (“MAVERICK”) and expanding the automation level (0 → 2 to 3) of this vessel in Leuven (Belgium)
- **The MAVERICK test catamaran** from KU Leuven is currently being equipped with perception sensors (LiDAR, stereo cameras, GNSS, IMU), fully electric drive system & onboard computer + PLC

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DEVELOPMENT OF

AUTONOMOUS VESSELS (II)

- In a **second step,** a newly built vessel with a capacity of approx. 20 tons is being developed
- Currently, the aluminum hull is being built in a Dutch shipyard, the fully electric drive system will be integrated in Ghent (Belgium) starting in Q3/2021
- Expected completion: Q2/2022
- For this vessel, the sensor technology and learnings from the Maverick will be scaled up and subsequently implemented onto the new vessel
- SEAFAR will implement their existing technology
- SSPA is experienced in logging and analyzing all movements of the vessel

The AVATAR vessel will be similar to the „Green Wave“ vessel from the #IWTS2.0 project

Source: #IWTS2.0 project

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DEVELOPMENT OF

AUTONOMOUS VESSELS (II)

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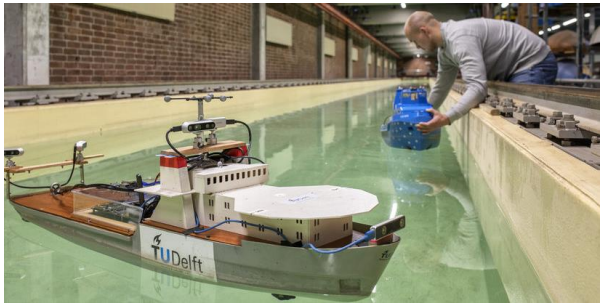
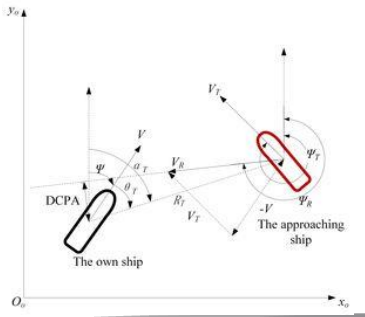
DEVELOPMENT OF

AUTONOMOUS VESSELS (III)

RAS RESEARCHLAB AUTONOMOUS SHIPPING

- In parallel, as a **third pillar**, research on vessel-to-vessel communication & multiple vessel coordination is being carried out with small-scale research vessels developed and equipped at the TU Delft Research Lab for Autonomous Shipping (RAS)
- University of Oldenburg is researching and developing remote control systems (control center, vessel-to-shore communication & communication layer) for the project





Source: TU Delft, University of Oldenburg

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PILOTING AND TESTING THE

AUTONOMOUS VESSELS

- After finalizing the development of the 1 ton Maverick vessel as well as the 20 ton vessel, both **vessels are planned to be tested within several pilot demonstrations** in the project partner regions in 2022/23
- Testing locations for those demonstrations are either already available or are currently being defined in Ghent, Leuven, Delft and Hamburg
- At least 3 pilots will be carried out, depending on the findings of use case development and local interest

USE CASE & BUSINESS CASE DEVELOPMENT

MARKET REVIEW

- Some solutions already exist today, where barges are being used for city freight distribution
- AVATAR has published a market review (30+ cases) on this matter → available online https://northsearegion.eu/avatar/activities/results/
- Currently, AVATAR project partners are identifying and developing use cases for Ghent & Hamburg and assessing the benefits of highly autonomous vessels in terms of economic viability
- **AVATAR invites any stakeholder, public or private, interested in discussing potentials of such transport solutions to get in touch!**

Market review on city freight distribution using inland waterways

Within the framework of the Interreg NSR project AVATAR work package 4, activity 1

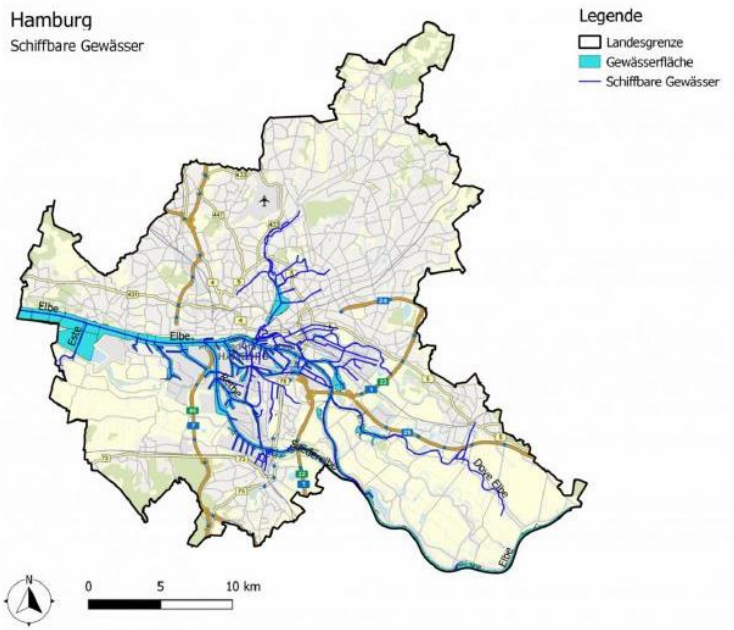
AVATAR is a project co-funded by the Interreg North Sea Region programme 2014-2020

STATUS

HAMBURG USE CASES

WaCaBa Water Cargo Barge

- Logistics Initiative Hamburg and City of Hamburg have partnered for the identification of use cases by creating the “**WaCaBa” concept**
- Currently, an in-depth feasibility study is carried out, results will be available in 12/2021
- Workshops & discussions with possible local users are currently ongoing (CEP service providers, retail food & non-food)



Source: City of Hamburg

STATUS

GHENT USE CASES

- Close alignment with City of Ghent - 2 year exemption permit for a testbed has been approved
- Energy use case: Business case development to **integrate hydrogen powered charging stations** in one or more cases, pilot in preparation for 2023
- Solution: ICE CHP (Internal combustion engine & combined heat and power) system running on H2
  - Opportunity: storing green electricity produced in Ghent during the day to charge electric vessel(s) at night
  - Use of waste heat e.g. in logistics buildings to increase (cost) efficiency

Source: E. van Wingen

OTHER TOPICS

DESK RESEARCH

- Innovative transhipment techniques
- Last mile distribution
- Open source vessel
- Artificial intelligence and computer vision
- Urban IWT alliance partnership

GET IN TOUCH

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