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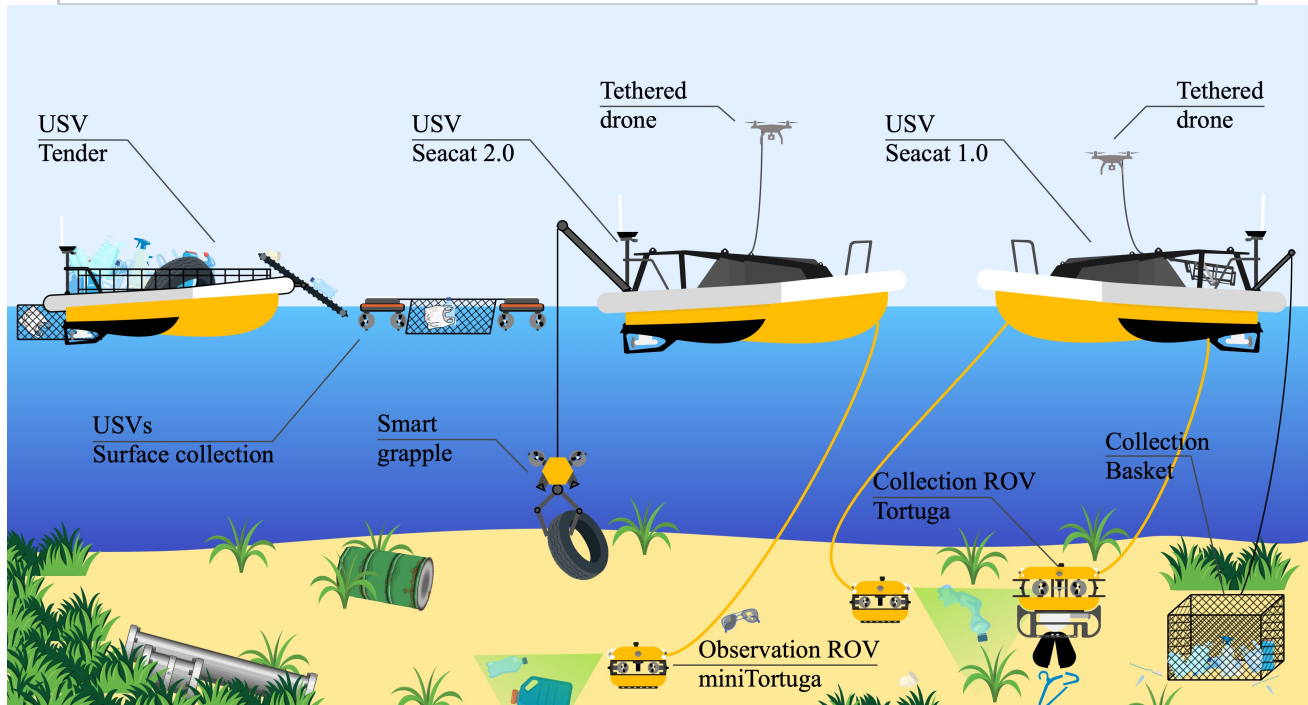Contact | Website | View Online

Innovating the Maritime Sector.

Hamburg, December 2022

After the success of the first autonomous robotic system designed to search for, identify, and collect seafloor litter, a consortium of European researchers will develop a team of robots to collect litter from the surface and deeper regions of the Mediterranean. The teams responsible for the Horizon 2020 SeaClear project have announced that they have expanded their consortium and received funding to begin follow-up work to further develop the robotic system and holistically address the issue of marine litter through the project: SeaClear2.0 – Scalable Full-cycle Marine Litter Remediation in the Mediterranean: Robotic and Participatory Solutions. SeaClear2.0 will go beyond technological innovation, integrating cutting-edge technologies into a comprehensive approach that engages communities in finding solutions to marine litter pollution, increases waste value, and contributes to science-based policy making.

SeaClear 2.0, like its predecessor, attempts to use robots to combat one of the world's most serious environmental issues: marine litter. Cleaning it up using divers poses danger to human lives and is economically overwhelming.

The new EU-funded initiative will deploy a fleet of smart robots to identify and remove marine debris, building on the success of SeaClear 1.0. The system employs a combination of aerial drones, underwater rovers, autonomous surface ships, and custom-built robotic grippers to do this. Using artificial intelligence, robots can autonomously identify, locate, and collect litter on their own. The team is aiming to significantly expand the capabilities of the SeaClear 1.0 system (shown on the right of the concept figure), which is already passing tests with flying colours.

The technological core of SeaClear2.0 is a heavily upgraded robotic system for automated litter collection, which can go deeper, lift heavier litter, and tackle surface litter (see the concept figure, left and centre). The project starts by improving sensing with high-resolution sonar, as well as other types of sensors like microplastic and electromagnetic sensors. A smart, manoeuvrable grapple will be developed that can pick-up larger litter, such as tires, bicycles, or pipes. To carry the bulkier, heavier

litter, the scientists will design a new tender with flexible partitioning chambers for different litter fractions, similar to adjustable drawer dividers. Surface litter will be collected via an autonomous mobile team that can work in confined and shallow areas. This new system will be able to work in tandem with the SeaClear1.0 version.

With nearly half a billion tonnes of plastics entering European seas every year, technological solutions to identify and remove litter must be coupled with social interventions to prevent and reduce the production and release of litter by citizens. SeaClear2.0 will empower and activate citizens through engagement activities including geographical storytelling, a gamified litter-reporting app., clean-ups, exhibitions, competitions, and artistic installations. The team will also propose better sorting and recycling solutions to increase the value of the litter collected, and will work with local communities to develop novel policy recommendations to address policy gaps.

The new, improved system will be demonstrated in 3 full-scale demonstrations and 3 pilot tests throughout the Mediterranean. In addition, the project will fund 5 subprojects to validate parts of the system and approach in other regions of the Mediterranean basin.

The SeaClear2.0 project will start on January 1st 2023, and will run for four years. The kick-off meeting has already been planned to take place in Delft, the Netherlands on the 14th of February, 2023. This project receives funding from the European Union's Horizon Europe programme under grant agreement No. 101093822. The total budget of the project is €9,086,305.00, out of which €7,971,863.50 is funded by the EU. The consortium consists of 13 partners from 9 countries, with a blend of expertise in public engagement, policy-making, robotic perception and control, artificial intelligence, marine, and diving technology and operations, and litter sorting and recycling: Delft University of Technology (Netherlands, project coordinator), Regional Agency Dunea (Croatia), Fraunhofer (Germany); Hamburg Port Authority (Germany), Isotech (Cyprus), M.Danchor (Israel), Subsea Tech (France), Técnicas y Obras Subacuáticas (TECNOSUB) (Spain), Technische Universitaet Muenchen (Germany), University of Dubrovnik (Croatia), Technical University of Cluj-Napoca (Romania), Veolia (France), and Venice Lagoon Plastic Free (Italy).

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Fraunhofer CML was founded in 2010 as part of the Fraunhofer Institute for Material Flow and

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