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TUBERS



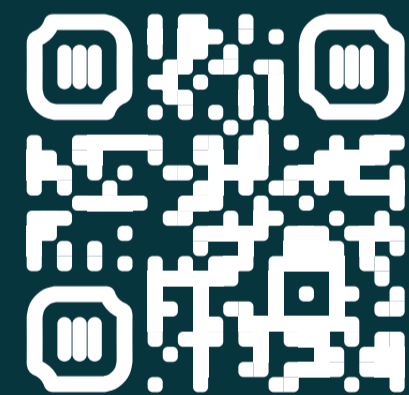
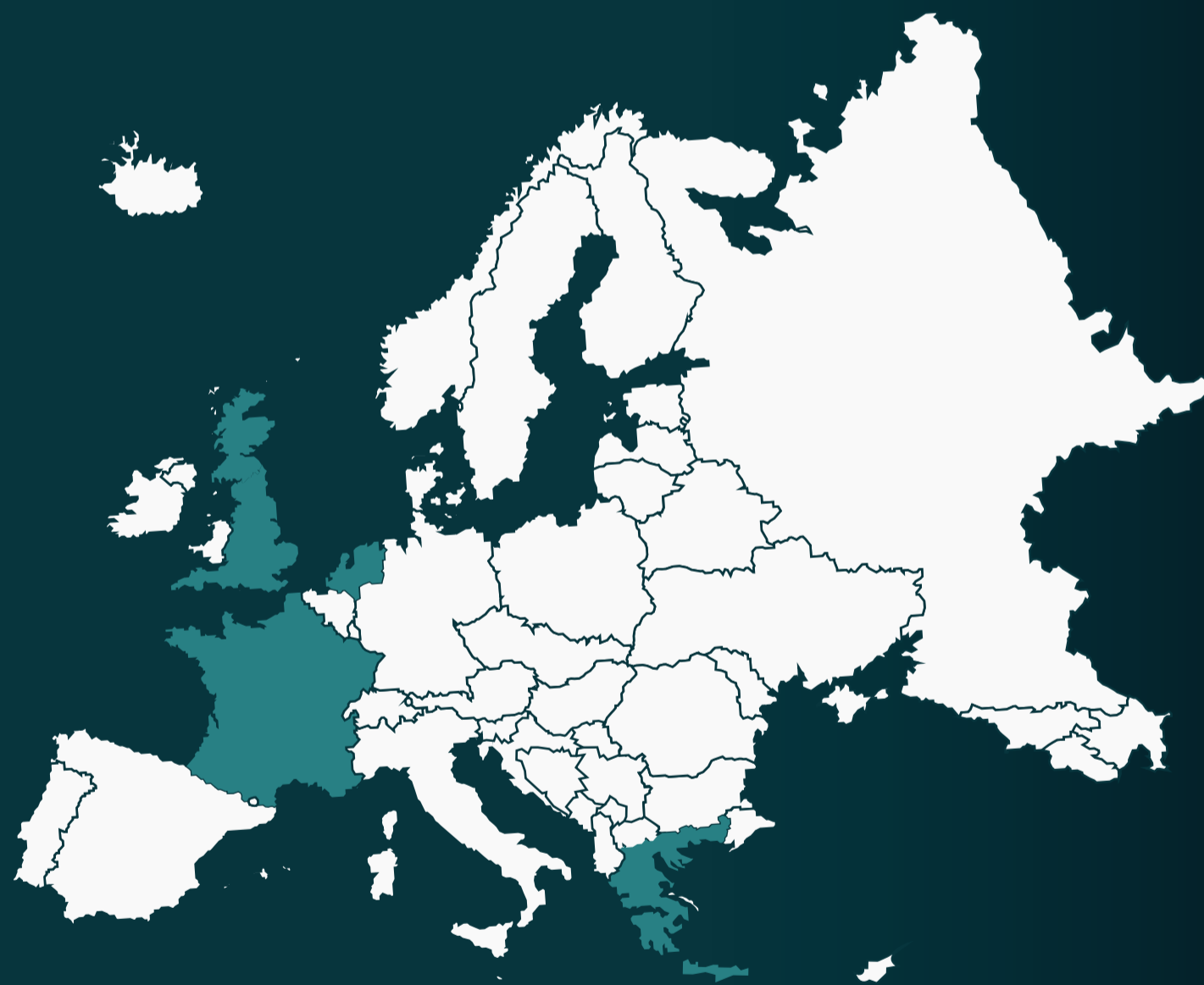
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TUBERS

Scalable & Modular robotic tools for pipeline inspection & repair

Our Consortium



TUBERS FACTS

Starting date: 1st September 2022

Duration: 48 months

Coordinator: Demcon

Consortium: 8 partners from 4 EU countries

More TUBERS info at tubers-project.eu

The development of the TUBERS project is undertaken by a multinational, multidisciplinary consortium that brings complementary skills and expertise to the table, from water network management, machine learning, and ultrasonic testing to teleoperation for inspection/maintenance to robotics and pneumatically actuated soft robotics.

ROBOTICS

AT THE SERVICE OF WATER

Project Statement

The water management industry is deeply affected by its construction inconsistencies leading to failures and water leakages. Per year, there is a 20% average loss of treated water globally. So, assuming that leakages are left unattended, they can result in a loss of around 31.5 million m³/year of water and €16 million in revenue. At the same time, processing water and wastewater is energy-intensive and accounts for around 40% of municipal energy use, commonly produced by burning fossil fuels with carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) emissions of up to 5%.

Technologies



Resident Snake-like Robot

1. Modular design for extended functionality
2. Accurate water network navigation
3. Continuous pipeline scanning



Base Station

1. Provision of resident robot charging
2. Wireless data exchange between resident robot and DSS
3. Retrieval and delivery of mission plans



Decision Support System (DSS)

1. Assistance with the decision-making process of inspection and maintenance scheduling
2. Structural defect identification
3. Data logging and archiving



Soft-robotic modular Robot

1. Accurate detection of leaks
2. Novel repair deployment mechanism for pipeline repairs

Why TUBERS?

TUBERS is a robotic solution that...

- is suitable for underground and aerial pipe networks of various materials and diameters.
- doesn't need upfront investment from water/utility companies or municipalities for deployment.
- can be operated remotely, gathering/processing data for asset integrity diagnostics and repairs.



Impact

- Address Non-Revenue Water (NRW) and leakage challenges
- Help maintenance teams reduce costs and unplanned interventions
- Prevent service breakdowns due to ageing pipe networks and lack of inspection data
- Reduce energy waste and resulting CO₂/GHG emissions
- Conserve natural resources

"TUBERS aspires to save **158GWh of energy** and **79,000 tonnes of CO₂** emissions in a **5-year** period."



TUBERS Mission

- Enable water and utilities companies and municipalities to manage drinking water pipe distribution networks remotely
- Conduct internal monitoring to assess asset integrity and associated risks
- Perform internal repairs of micro-leaks without interrupting the water supply
- Assist in decision-making and planning of preventive maintenance activities for pipe networks

Objectives



Upgrade the snake-like resident robot and implement the necessary navigation software for autonomous operation over long distances and effective negotiation of pipeline features such as junctions and bends.



Develop a modular soft-robotic platform with a locomotion mechanism and a novel mechanism capable of inspecting and repairing pipe segments from the inside.



Research and develop a high-accuracy ultrasonic inspection system and the respective interpretation modules that can detect leaks and, most importantly, measure wall thickness loss.



Research and develop a Decision Support System powered by Explainable Machine Learning algorithms for holistic inspection and maintenance planning.