The iFURTHER project aims to address wide area air and sea covert surveillance, by developing new concepts of Over-The-Horizon radar to be integrated into a collaborative network of high-frequency sensors. This project will therefore focus on a cognitive network of high-frequency radars as a disruptive future defence capability to protect the EU. The main objectives of this project are:

- Detect and track air and sea targets at long range (over the horizon), far beyond currently existing systems, by using the reflections of skywave and surface-wave propagated signals.

- Fill gaps and extend the current EU air and sea radar coverage by introducing a multistatic sensor configuration supported by ad-hoc network protocols and an appropriate infrastructure for synchronisation and coordination of sensors (e.g., C2).

- Implement cognitive radar management systems to optimise operational parameters in real time and as a function of environmental conditions (e.g., the state of the ionosphere), based on robust ionospheric models and sounding protocols (not excluding the development of ionospheric sensors).

- Implement advanced signal processing techniques to improve over-the-horizon detection and track performance as well as target localisation capabilities.

- Utilize available non cooperative illumination and apply cognitive features at network level to develop new techniques for optimized use of the electromagnetic spectrum and passive processing.

Technical Sheet

Funding institution:

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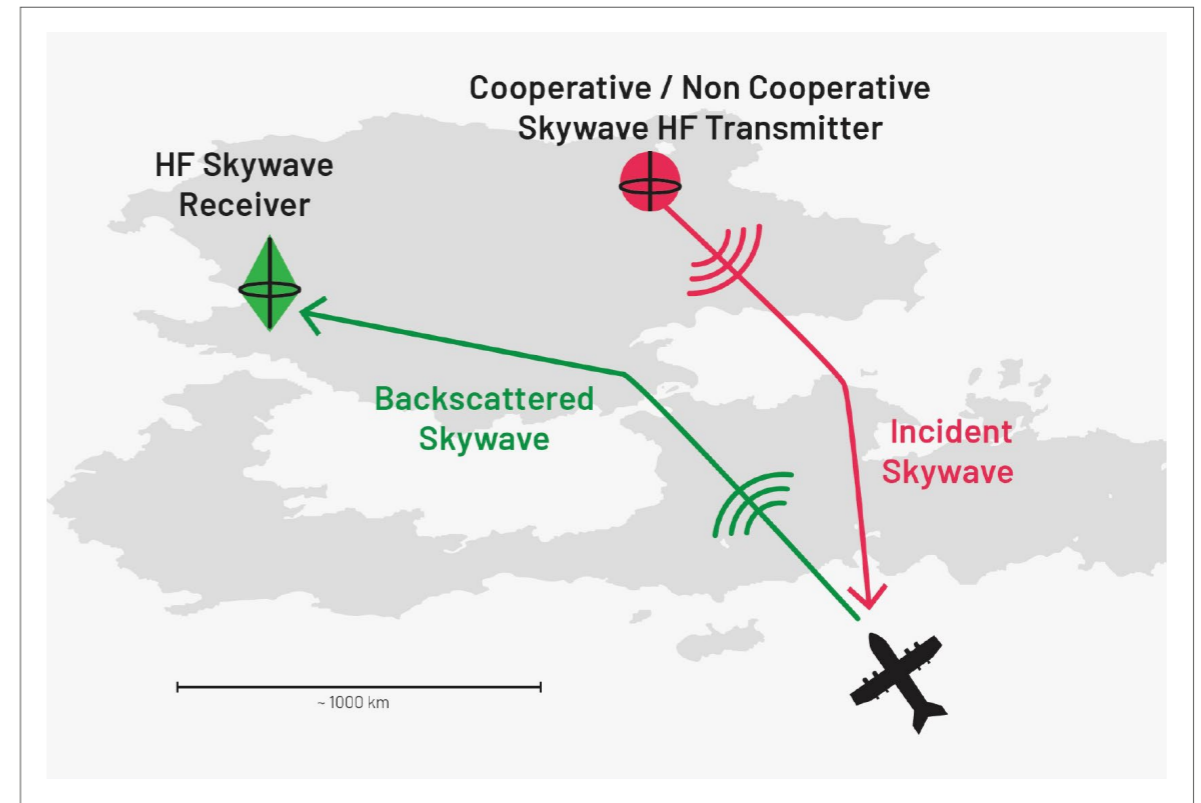
Project partners

Hellenic Aerospace Industry SA, Office National D'etudes Et De Recherches Aerospatiales, Ethniko Asteroskopeio Athinon, Imatik - Efarmoges Ypsilis Texnologias Etaireia Periorismenis Efthinis, Consorzio Nazionale Interuniversitario per le Telecomunicazioni, Istituto Nazionale di Geofisica e Vulcanologia, Politechnika Warszawska, Fraunhofer Gesellschaft Zur Foerderung Der Angewandten Forschung E.V., Helzel Messtechnik GmbH, Technisch-Mathematische Studiengesellschaft Mit Beschrankter Haftung, Indra Sistemas SA, Universidad De Alcala, SignalGenerix Limited, Patria Aviation Oy, Era AS, Ministry Of National Defence, Greece, L - up SAS
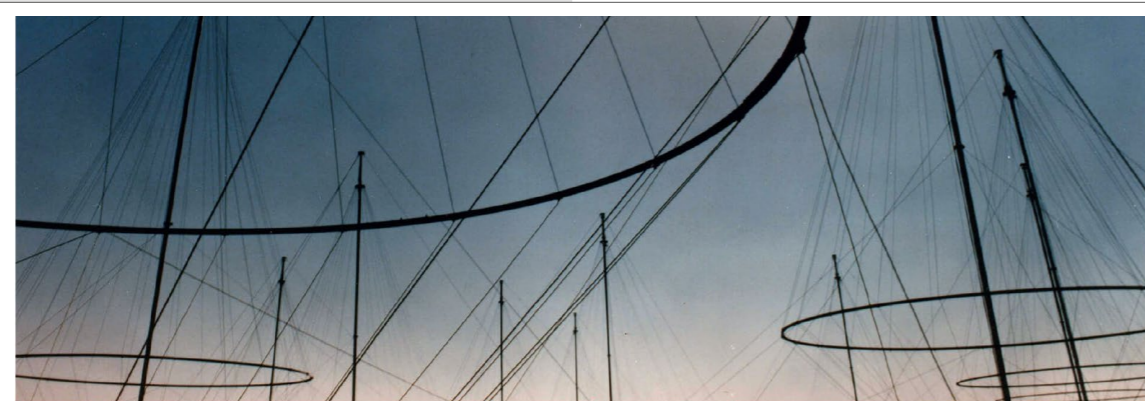
Project duration

December 2022 - November 2025

Involved countries

Italy, Greece, Germany, Czech Republic, Spain, France, Finland, Poland, Cyprus

(a) iFURTHER overview

(b) Multistatic Skywave OTH-R system with long baseline: Concept

(c) Multistatic Hybrid (Skywave - LOS/Surface-wave) OTH-R system: Concept
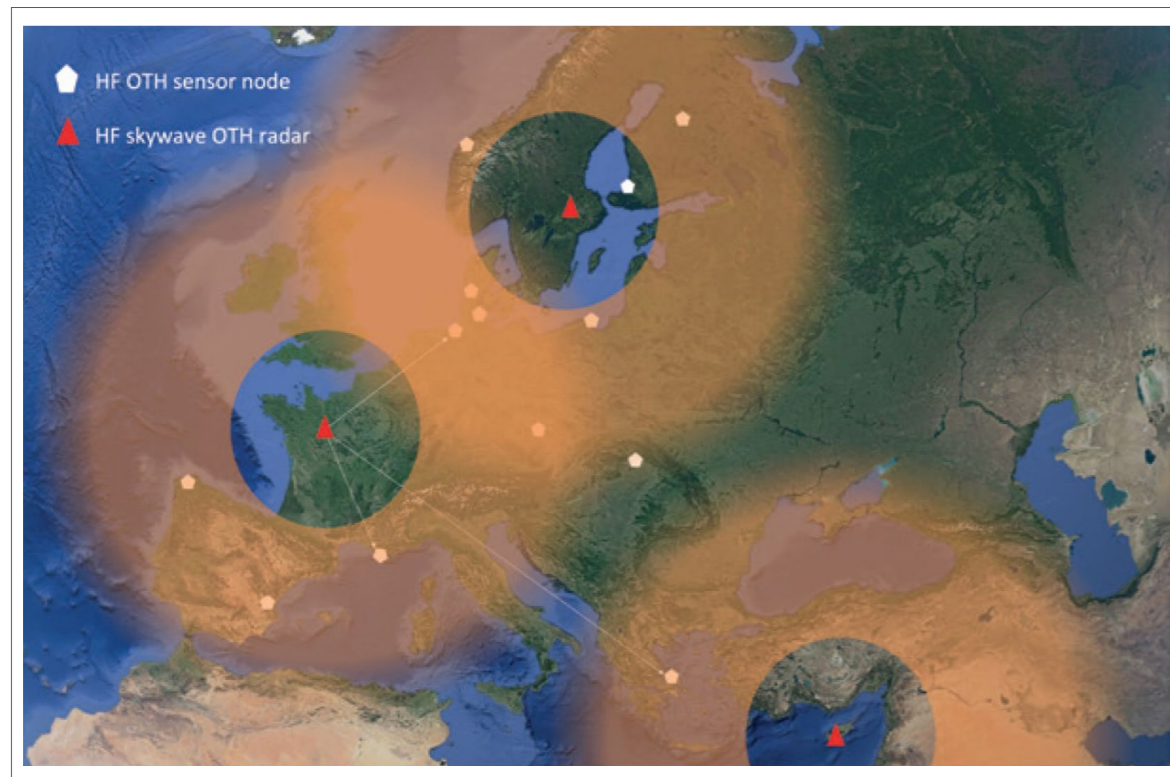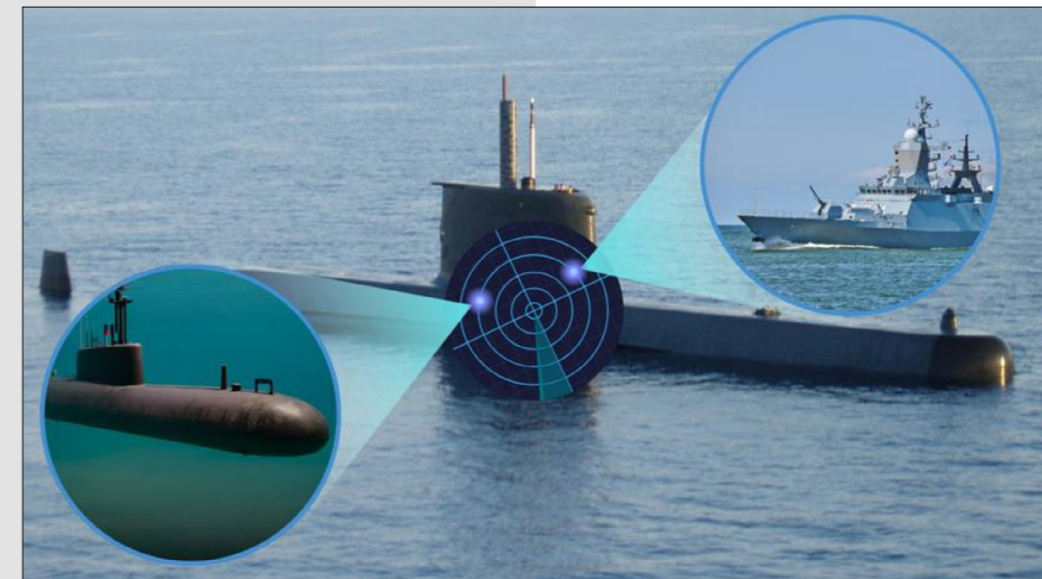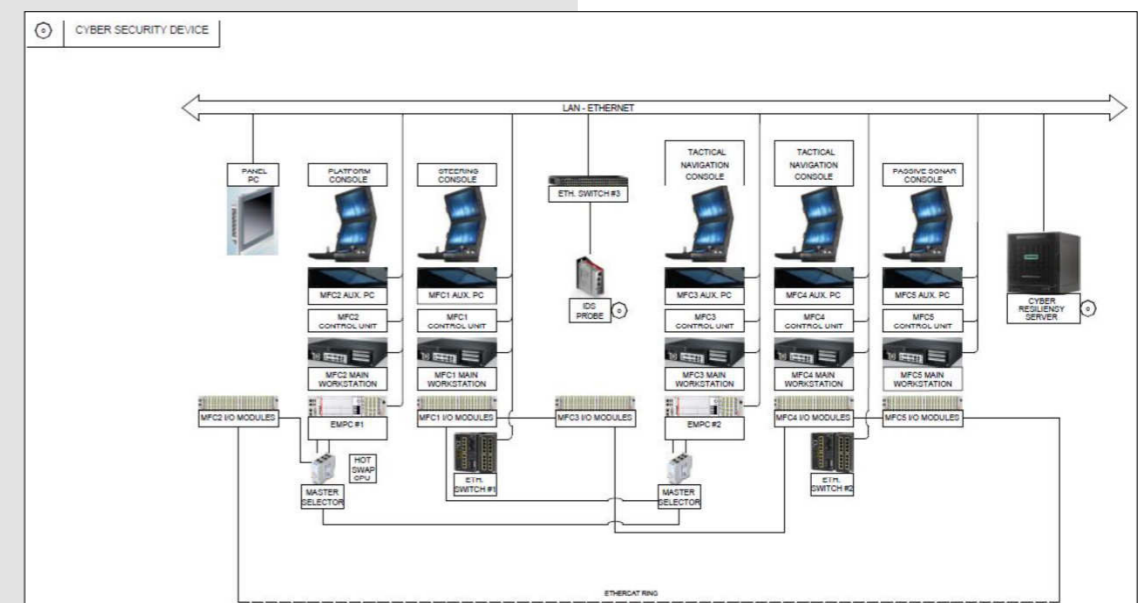
(d) Envisioned EU wide surveillance

The aim of this project is to analyse the technological and algorithmic solutions for a Target Motion Analysis (TMA) system for submarines. Particularly, a software-defined architecture is proposed to host a wide spectrum of software applications dedicated to the management of on-board systems. Using a distributed shared server architecture, data can be available from multiple users at the same time, without the need of execution on dedicated consoles. The proposed architectural approach allows to limit the space required for the HW, for which an architecture has been proposed, introducing energy saving factors and minimizing the need for heat dissipation. The modularity of the architecture makes it easy to integrate possible updates both HW (to increase system computational capabilities) and SW (to update automatic information analysis capabilities) and ensure interoperability with solutions from any future developments.

Given the software-defined nature of the system, a particular focus has been the cybersecurity aspects, adopting a security-by-design strategy, which provides the integration of special security systems in each element of the developed system.

In addition, advanced artificial intelligence algorithms were taken into account to allow the identification and mitigation of any cyber attacks. Finally, TMA and data fusion algorithms have been analysed, focusing on the integration of different type of sensors in the system without the need to modify the software.
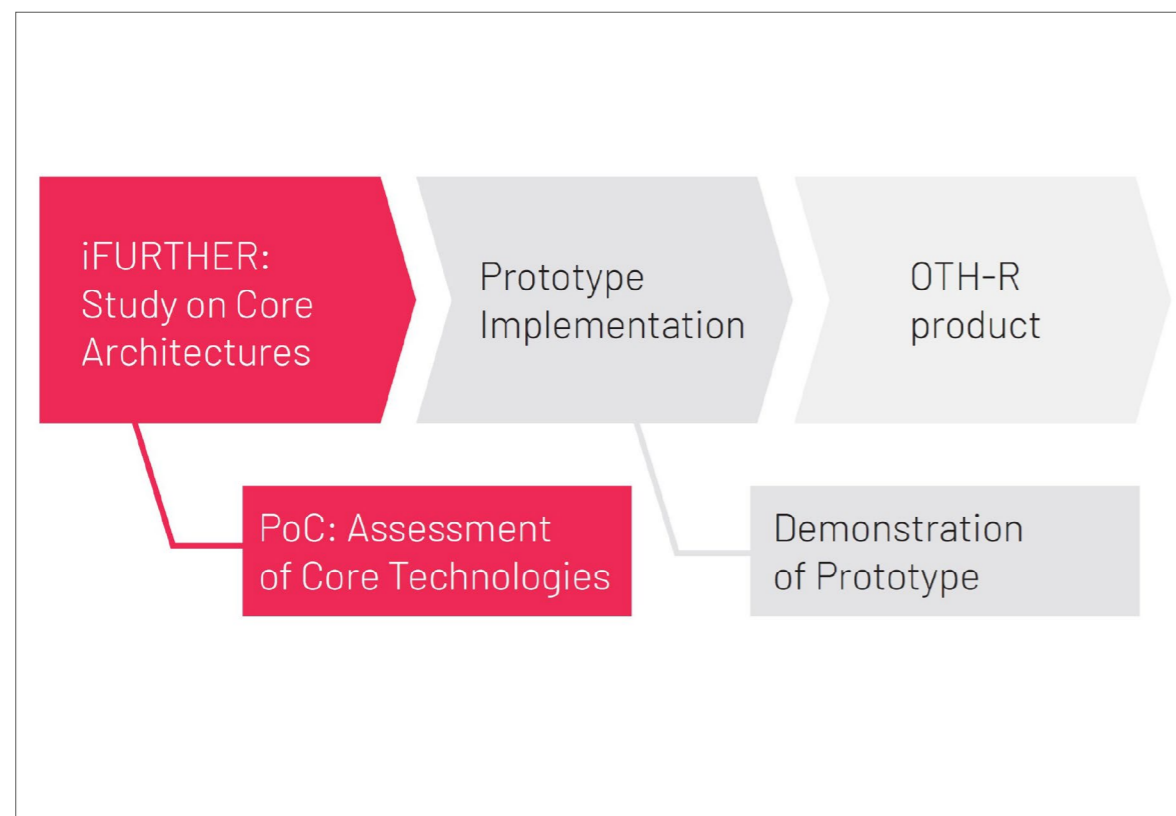
Technical Sheet
Funding institution:
DRASS
Project partners
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Project duration
January 2021 – October 2023
Involved countries
Italy

(a) The system will track both surface and underwater target

iFURTHER:
Study on Core Architectures

Prototype Implementation

OTH-R product

PoC: Assessment of Core Technologies

Demonstration of Prototype

(e) Implementation Roadmap towards an OTH Radar product

(b) Possible hardware configuration of a command and control system