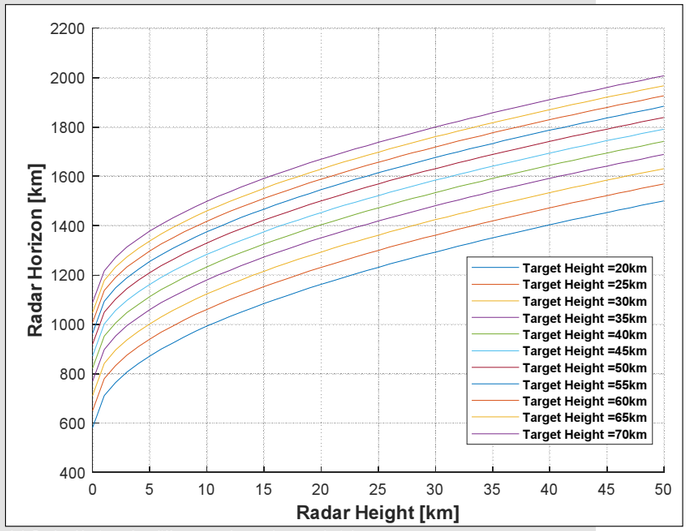
PROJECT HYPOTENUSE

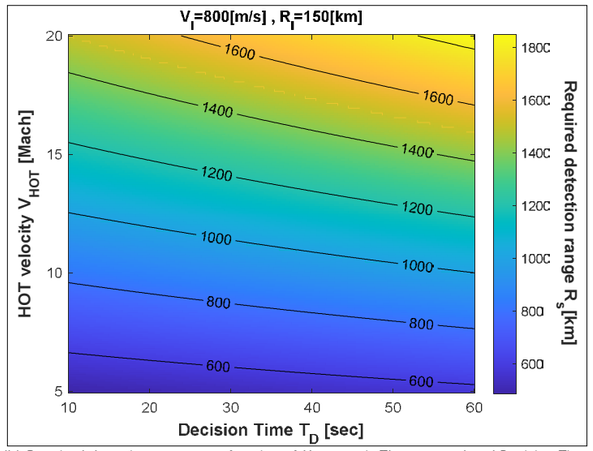
HYPersOnic Threat dEtection aNd coUntermeaSurEs

Hypersonic missile threats are considered a game-changing military technology. Specifically, hypersonic missiles can fly between approximately 5,000 and 25,000 km/hour, they fly at unusual altitudes of between tens-of-kilometres to in excess of 100 km, their manoeuvrability enables them to evade even the most sophisticated layered missile defence infrastructures. Their speed, unusual altitudes and manoeuvrability combine to render hypersonic missiles extremely elusive to detect and to intercept. A hypersonic strike would unfold more rapidly than a conventional strike and would significantly compress the timelines for an attacked party to respond. The purpose of this study is not to analyse hypersonic missile developments per se, but rather to identify and study the state-of-the-art sensor and intercept (hard- and soft-kill) technologies that constitute a robust Hypersonic Missile Defence (HMD) mechanism. It is clear that no one sensor, or class of sensors, will be able to fully observe hypersonic threats throughout their various phases from launch, glide, cruise to impact. Rather a constellation or layer of technologies will need to be deployed that comprise different types of radar operating with IR sensors and associated intercept (hard- and soft-kill) measures. The layers of electronic sensors including different types of radar and IR sensors represent a stand-alone OODA-loop (Observe–Orient–Decide–Act). For example, the sensor-constellation "holistically" observes the threat, then the constellation Orientates sensing and/or intercept assets toward the threat corridor. All the while, the layer of sensors is providing data to enable the Decide and Act steps of the OODA-loop.

Technical Sheet
Funding institution:
European Defence Agency (EDA)
Project partners
ONERA, FHR, Flysight, HENSOLDT, Leonardo, ISL, MBDA It, LINKS, WUT
Project duration
April 2022 – April 2023
Involved countries
France, Italy, Germany, Poland



(a) Radar Horizon for different radar and target height



(b) Required detection range as a function of Hypersonic Threat speed and Decision Time

PROJECT ISS DRASS

Integrated Submarine System with DRASS

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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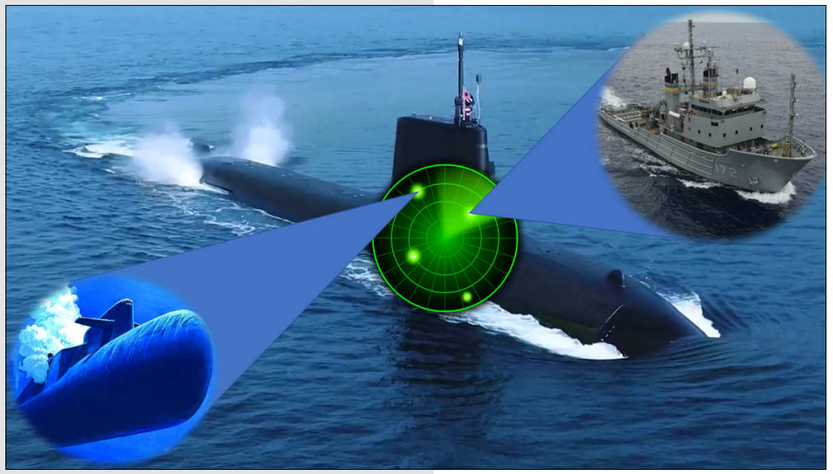
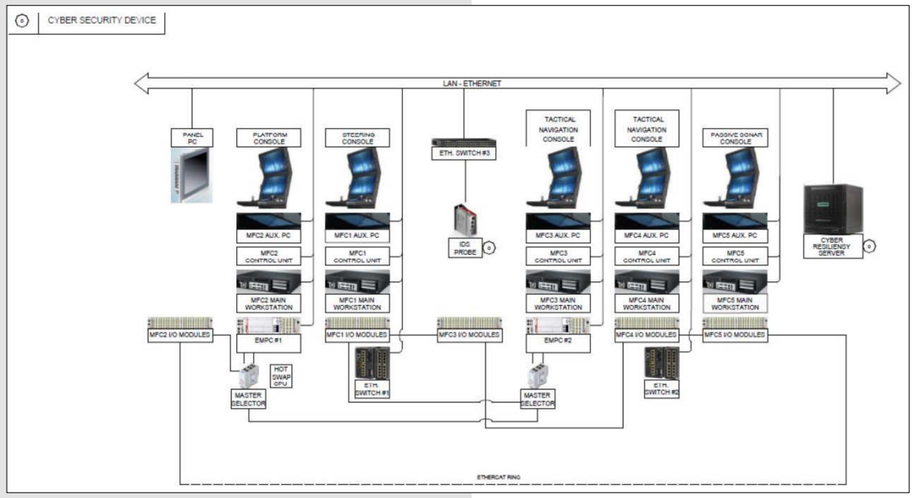
Project duration
January 2021 – October 2021
Involved countries
Italy



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



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