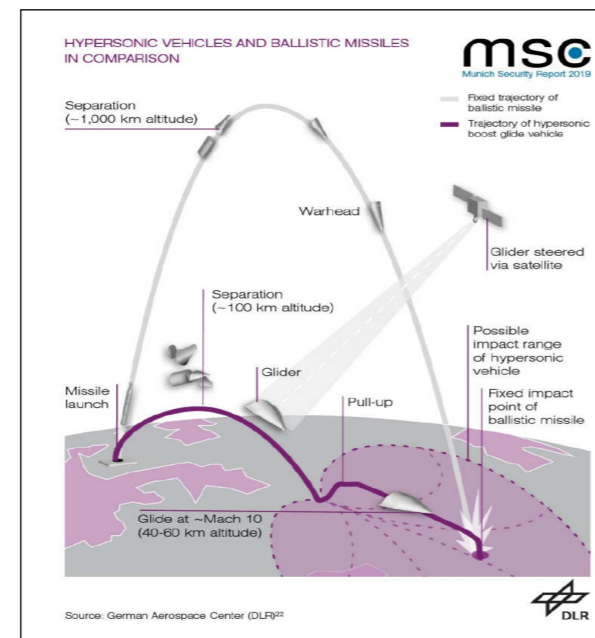


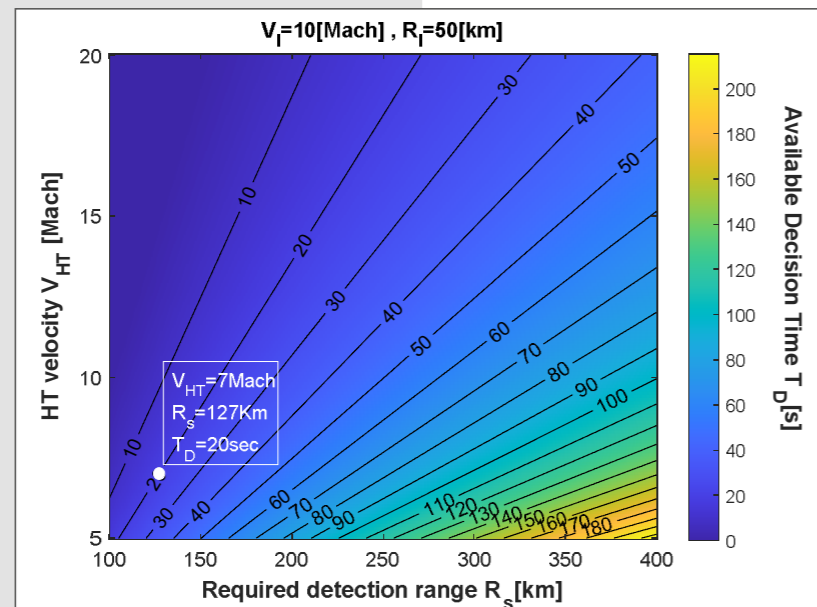
The aim of this project is to 1) define the essential and sufficient requirements to be able to detect and track next generation Hypersonic Threats (HT) for interceptor missile on-board radar and sensor systems and 2) to study radar and RF sensor architectures on board the interceptor missile in order to meet these requirements, taking into account the state of the art and current scientific and technological gaps. To achieve the aim of the project, the study will address the following topics:

- Analysis of the plasma layer around objects in hypersonic regime. The aerothermodynamic field around representative forms of MI will be simulated numerically through computational fluid dynamics in different conditions of hypersonic regime to verify the presence of plasma and calculate its eventual distribution.
- Interaction of the EM wave with the representative model of the object and the plasma volume for the determination of the RCS as the frequencies, angles of incidence, phase (and height) of the flight, hypersonic speed, etc. vary. (applied electromagnetism). Analysis of the distortion of the radar signature of the model due to the effect of timevarying plasmas at the various transmission frequencies.
- Study of the characteristics of existing radars: the performance of radar systems sized for “conventional threats” need to be re-evaluated in HT scenarios, where the threat, flying at lower altitudes, appears on the radar horizon at lower ranges and remains immersed in the superficial clutter.
- Study of the interaction of RF sensors, Seeker RF, on board the missile due to the presence of plasmas.
- Study of the architecture of the single radar sensor (ground sensors, seekers, sensors on air and space platforms) and of the radar networks (on various platforms) to meet the requirements necessary for the detection and tracking of HTs.

Technical Sheet	
Funding institution:	Italian Ministry of Defence (MoD)
Project partners	LEONARDO S.p.A, MBDA, LINKS, POLITECNICO DI TORINO
Project duration	February 2022 – March 2023
Involved countries	Italy



(a) Trajectory Comparison between ballistic missile and hypersonic weapons



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

