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CASSATA advances towards its final phase achieving key technical milestones in collaborative and covert sensing

How can different sensing technologies work together more effectively in complex defence environments? This question lies at the heart of CASSATA, an EDF research project now in the final months of its 36-month duration. Through a series of key technical milestones, the consortium has advanced research and design work on collaborative, covert and multidomain sensing, contributing to the foundations needed for European defence innovation.

As modern defence operations become increasingly complex, the ability to collect, exchange and interpret information from multiple sensor sources is becoming essential. CASSATA contributes to this challenge by studying collaborative, covert and multidomain sensing approaches, with a focus on how heterogeneous technologies could support improved situational awareness and decision-making in future operational scenarios.

A central part of this work concerns **interoperability**. To support the development of **CASSATA's initial interoperability layer**, existing military interoperability standards and protocols were examined, while technical requirements were collected across the project's key technologies. These requirements included input and output data, communication protocols and data exchange needs within the project's use cases. This work supported the definition of common message structures for data exchange between CASSATA technologies.

The project has also progressed research on **covert optronic sensing**. Work on strategy definition generated knowledge that led to experimental proofs of principle, while further experimental and modelling studies produced preliminary data to support upcoming design tasks related to active optronic sensors, passive imagers and non-visual sensors.



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Further progress was also achieved through the preliminary design of a **modular, edge-based multi-sensor platform**. Combining robust hardware with flexible, containerised software, the platform is designed to perform reliably in demanding operational environments. Its multimodal sensing capabilities are expected to strengthen object detection and surveillance, including under challenging conditions such as heavy occlusion.

Another important area of progress concerns the comprehensive design of **Sensor Resource Management**, which focuses on prioritising service-based interactions across diverse platforms and operational domains. This design adopts an integrated perspective encompassing functional behaviour, architectural structure, interfaces, deployment strategies, and critical non-functional requirements. It places particular emphasis on dynamic resource management, the integration of AI and machine learning models, and covert sensing algorithms.

A core component of the CASSATA project is the design and architecture of a **Multi-Sensor Fusion Module**, responsible for combining data from heterogeneous sensor sources. The module is responsible for ingesting, synchronizing, associating, tracking, and classifying data originating from heterogeneous sensor sources, and for exposing fused outputs to downstream systems and demonstration environments. This capability is closely linked to the project's Collaborative Sensor System design, which supports the shift from isolated sensor operation towards a coordinated, network-centric and service-based approach.

The **Collaborative Sensors design document** defines the architecture and design details required to transform CASSATA's collaborative sensing concepts into a deployable technical reality. This work provides a structured basis for connecting distributed, multidomain and heterogeneous sensing assets, enabling them to operate in a coordinated manner across different platforms, domains and operational contexts. By enabling closer coordination between distributed sensing assets, the system supports enhanced situational awareness and enables more agile and effective decision-making in complex Intelligence, Surveillance and Reconnaissance scenarios.

The project also advanced its technical foundations through the analysis of standards for **Radio Detection and Ranging (RADAR)** systems. Following this assessment, ASTERIX Categories 15 and 16 were proposed as suitable formats for transferring data in support of fusion activities. This work also contributed to the definition of an initial concept for a Multi-Sensor Fusion Engine, envisioned as a central system core supporting tracking, situation assessment and adaptive sensor control.



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In the field of **acoustic and seismic sensing**, the project identified relevant data exchange protocols to support the operation of networked sensors. Given the importance of low-signature and stealthy operation in battlefield environments, this work supports the selection of resource-efficient systems and concise detection messages, particularly in scenarios where wireless communication is used. Following the modelling phase, the designed acoustic sensors were built and tested in a laboratory environment, with their full characterisation documented in the project's technical outputs. Additionally, acoustic sensors were partially tested in harsh environment to achieve a level of robustness and safety for development. To enhance the communication between standalone or a network of acoustic and seismic sensors, several interfaces were implemented.

Together, these achievements demonstrate the strong technical momentum built by the CASSATA consortium as the project approaches its final months. By advancing interoperability, covert sensing, sensor fusion, collaborative sensor design and edge-based multimodal platforms, CASSATA is laying the groundwork for integrated validation and demonstration of innovative European defence technologies designed to enhance operational awareness, resilience and effectiveness in future multidomain environments.

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