# COMBATING MALICIOUS DRONES

## AN INTELLIGENT DATA FUSION DEMONSTRATOR

(AAE)

To support the French Air and Space Army (AAE) in developing its air safety and security system, the Defense Innovation Agency (AID) tasked ONERA with creating a data fusion module in time for the 2023 Rugby World Cup and the 2024 Paris Olympics. The drone data fusion module, DIAMOND (Démonstrateur Intelligent Agrégeant de Multiples dONnées Drones), has since proven its effectiveness.

## WHAT IS THE DIAMOND MODULE?

DIAMOND merges available data to provide the most comprehensive understanding of small drone air activity. This module can fuse information from connected systems, integrating into the Single Air Picture (SAP) system for drone activity visualization.

## PROJECT OBJECTIVES

Example of a fused system track visualization by DIAMOND during JOP 2024 operations (in this example, 6 provider tracks participated in creating the system track). (© Thales La Ruche)



The primary goal is to provide users with a **single, unified visualization** of activity corresponding to a single drone. DIAMOND's fusion **significantly reduces the operator's workload**, enabling focus on high-quality, aggregated information rather than numerous heterogeneous tracks from various input systems. This enhances accuracy and readability for the user, ultimately improving surveillance mission success.

In addition to the fusion module, ONERA defined a shared messaging format to standardize data exchanges between the fusion node and interconnected systems, approved by the Interministerial Committee for Air Safety (CISA). DIAMOND has also demonstrated its ability to process information in the SAPIENT[1] format adopted by the Atlantic Alliance for Counter UAV Operations (LAD) operations.

## ONERA EXPERTISE

**DIAMOND's Fusion Algorithm -** ONERA developed three fusion algorithms during the project, including the F0.3 algorithm currently used in DIAMOND, which was developed between January and March 2023. This algorithm incorporates feedback from the COUBERTIN LAD exercise (January 2023), particularly addressing the heterogeneity of potential tracks to be processed at the fusion node.



SAP Screen during COUBERTIN LAD 2 Exercise. (EMA)

## KEY DATES FOR SAP UTILIZATION

- July 2022: Initial DIAMOND deployment during Bastille Day ceremonies
- 2023: France-Wales rugby match, Bastille Day ceremonies
- 2024: Olympic Torch arrival in Marseille, D-Day anniversary, Bastille Day ceremonies, and Paris 2024 Olympics
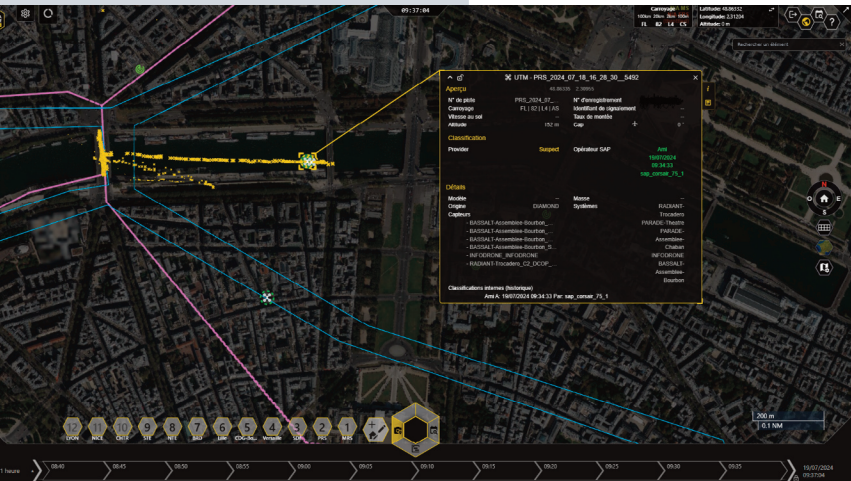- 2024: Notre Dame de Paris inauguration

## PARTNERSHIP

In July 2023, Thales la Ruche[2] joined ONERA as part of a Temporary Enterprise Group for the SAP prototype development phase. Thales la Ruche is responsible for developing the operational Human-Machine Interface (HMI) and integrating the SAP system, while ONERA retains responsibility for DIAMOND data fusion.

## WHAT'S NEXT?

With SAP meeting the French Air and Space Army's expectations, they have decided to permanently integrate it into their forces. SAP is currently in the industrialization phase, with DIAMOND remaining its core fusion component.

[1] Sensing for Asset Protection with Integrated Electronic Networked Technology
[2] Thales la Ruche is a Thales LAS entity created in 2019, based in Rennes and specializing in cybersecurity.