



NEWSLETTER #5  
**DECEMBER 2020**

**Ready for future challenges**

**ALADDIN**

**Advanced hoListic Adverse Drone Detection,  
Identification & Neutralization**



European  
Commission

Horizon 2020  
European Union funding  
for Research & Innovation

**[aladdin2020.eu](https://aladdin2020.eu)**

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## READY FOR FUTURE CHALLENGES

Dear Reader,

ALADDIN is approaching its conclusion as an H2020 research and innovation project. However, this is not the end; ALADDIN is ready to take on the challenges of its exploitation in the real world to help Law Enforcement Agencies fight crime and terrorism.

In spite of the difficulties brought by the COVID-19 pandemic, which caused the cancellation of the final integration Pilot tests and live demonstration, the project has successfully implemented the final activities in a virtual format.

This newsletter gives you an account of the recent project achievements:

- ALADDIN presentation at European **institutional security forum** and **network of practitioners**
- Successful **3rd ALADDIN End-User Workshop** and **virtual demonstration** of ALADDIN Final release
- Improved 2nd edition of **ALADDIN End-User training**
- New scientific publications, public reports and exciting video released to pave the way for **future exploitation** of ALADDIN results

The whole Consortium thanks you for your support and hopes you remain safe and united against future security challenges.

Enjoy your reading and keep up to date with the project through the events published on the website.

**The Project Coordinator**

## THE ALADDIN CONSORTIUM

<b>CS GROUP / FRANCE</b> <a href="http://www.c-s.fr">www.c-s.fr</a>		<b>Centre for Research and Technology Hellas (CERTH) / GREECE</b> <a href="http://www.certh.gr">www.certh.gr</a>	 <b>CERTH</b> CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
<b>Fraunhofer / GERMANY</b> <a href="http://www.idmt.fraunhofer.de">www.idmt.fraunhofer.de</a>		<b>Przemyslowy Instytut Automatyki i Pomiarow (PIAP) / POLAND - <a href="https://piap.pl/">https://piap.pl/</a></b>	
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<b>Ingegneria Dei Sistemi S.p.A. (IDS) / ITALY</b> <a href="http://www.idscorporation.com">www.idscorporation.com</a>		<b>HGH Infrared Systems (HGH) / FRANCE</b> <a href="http://www.hgh-infrared.com">www.hgh-infrared.com</a>	
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<b>Center for Advanced Aerospace Technologies (FADA-CATEC) / SPAIN</b> <a href="http://www.catec.aero/en">http://www.catec.aero/en</a>		<b>Ministère de l'Intérieur Français (MIF) / FRANCE - <a href="http://www.interieur.gouv.fr">www.interieur.gouv.fr</a></b>	
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<b>Home Office/Defence Science &amp; Technology Laboratory (dstl)/UK</b> <a href="http://www.dstl.gov.uk">www.dstl.gov.uk</a>		<b>Ayuntamiento De Madrid (ADM) / SPAIN</b> <a href="http://www.madrid.es/portal/site/munimadrid">www.madrid.es/portal/site/munimadrid</a>	
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Members of the ALADDIN consortium



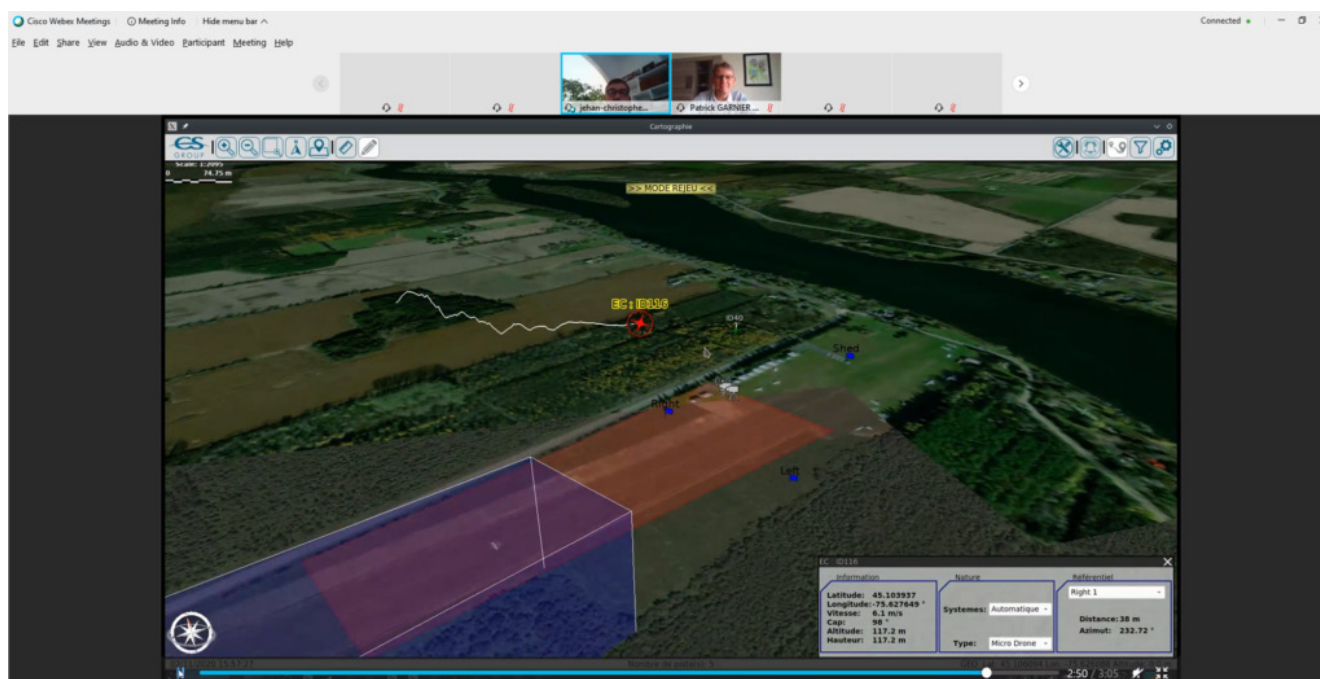
## ALADDIN PRESENTED AT DG HOME COU EVENT: INNOVATION TO COUNTER THREATS CAUSED BY UAS

Under the umbrella of the **Community of Users for Secure, Safe and Resilient Societies (CoU)**, DG HOME organized a [virtual workshop on innovative counter-UAS solutions and strategies](#). This took place on Tuesday, 10 November 2020. The event brought together representatives of EU-funded Horizon 2020 and Internal Security Fund projects, as well as academia, European policymakers, practitioners, and industry. The workshop encouraged discussions of specific scenarios with the focus on innovation and thus offered an opportunity for projects to demonstrate how their specific solutions could fit into existing counter-UAS strategies.

CoU workshops are a crucial instrument for the European Commission to boost the involvement of practitioners in security research projects. Through the CoU workshops, the Commission collects input for the formulation of future funding priorities but also aims to foster exchange between relevant stakeholders.

In this framework, the **ALADDIN coordinator** presented the project concept and outcomes to a wide audience, using both slides and videos with simulated data to display the ALADDIN system in action!

The following snapshot taken during ALADDIN's presentation in the CoU workshop, demonstrates the ALADDIN Command and Control Console, offering a 3D situational awareness of an incoming drone threat (red) tracked by the ground sensors (white) before it enters the user-defined no-fly zone (blue box).





## ALADDIN PROJECT INTRODUCED TO ILEANET PRACTITIONERS

ALADDIN coordinator, CS Group, presented at the third public and virtual workshop of **ILEAnet project**, the "[ILEAnet Public Workshop on Innovative technologies for border management](#)", which was held on 4-5 of November 2020. The presentation included the overall concept of the ALADDIN solution, project results and several videos displaying the system in action.

The [ILEAnet](#) (Innovation by Law Enforcement Agencies Networking) project aims to bridge the gap between LEA practitioners and the security research community to support concrete results for a more secure Europe. It facilitates the uptake of security research projects' outputs by police forces, from the articulation of operational needs to the identification and implementation of innovative solutions that could assist them in their daily work. This third ILEAnet Public Workshop was supported by the **European Border and Coast Guard Agency (Frontex)**. The event brought together LEA experts and the security research community to reflect on approaches and explore solutions that could assist police forces in three areas of work: registration of irregular migrants, pre-frontier area monitoring and the use of information systems.

In that framework, ALADDIN was one of the H2020 projects that presented, depicting the effort made by EU funded research projects to address and counter the threat posed by non-cooperative UAS flying near or over restricted areas. ALADDIN results collected during the First Pilot in Spain and the data capturing session in Markopoulo, Greece, were also presented. Attendees of the presentation had the opportunity to explore the capabilities of each sensor and the efficiency of the ALADDIN system as a whole.

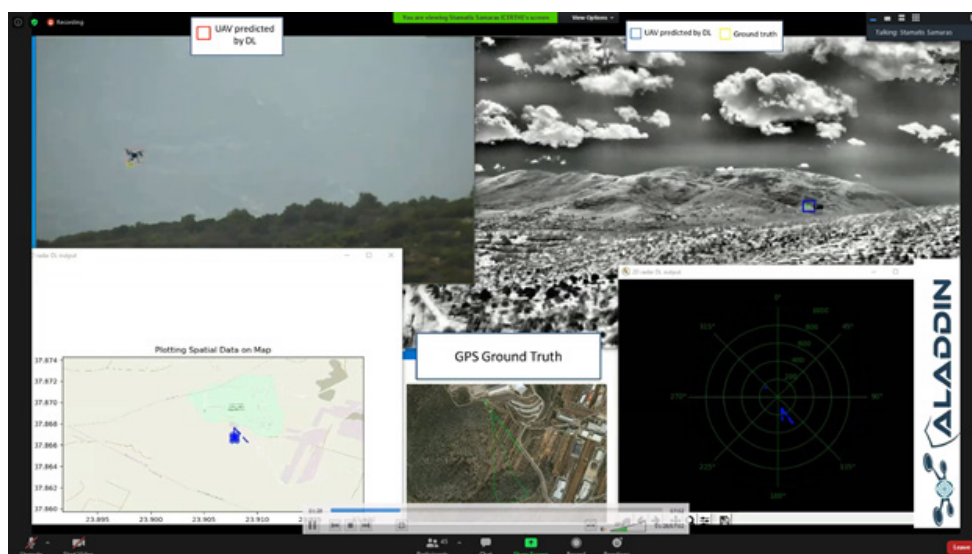


## SUCCESSFUL 3RD ALADDIN END-USER WORKSHOP

The restrictions incurred by the COVID-19 pandemic caused the delay (from May to October 2020) and eventual cancellation of the final integration, Pilot tests and live demonstration. Despite these unfortunate circumstances, the consortium implemented the final activities in a virtual format. As an alternative to a live demonstration of the final ALADDIN platform, the consortium held the **final end-user workshop** virtually on 18 November 2020. The purpose was to present the ALADDIN final release to the consortium LEAs and external stakeholders and to facilitate its evaluation by potential end users. The invitation sent out by the ALADDIN User Group manager informed the end users about the workshop agenda, its main objectives and the overall solution that the ALADDIN project offers.

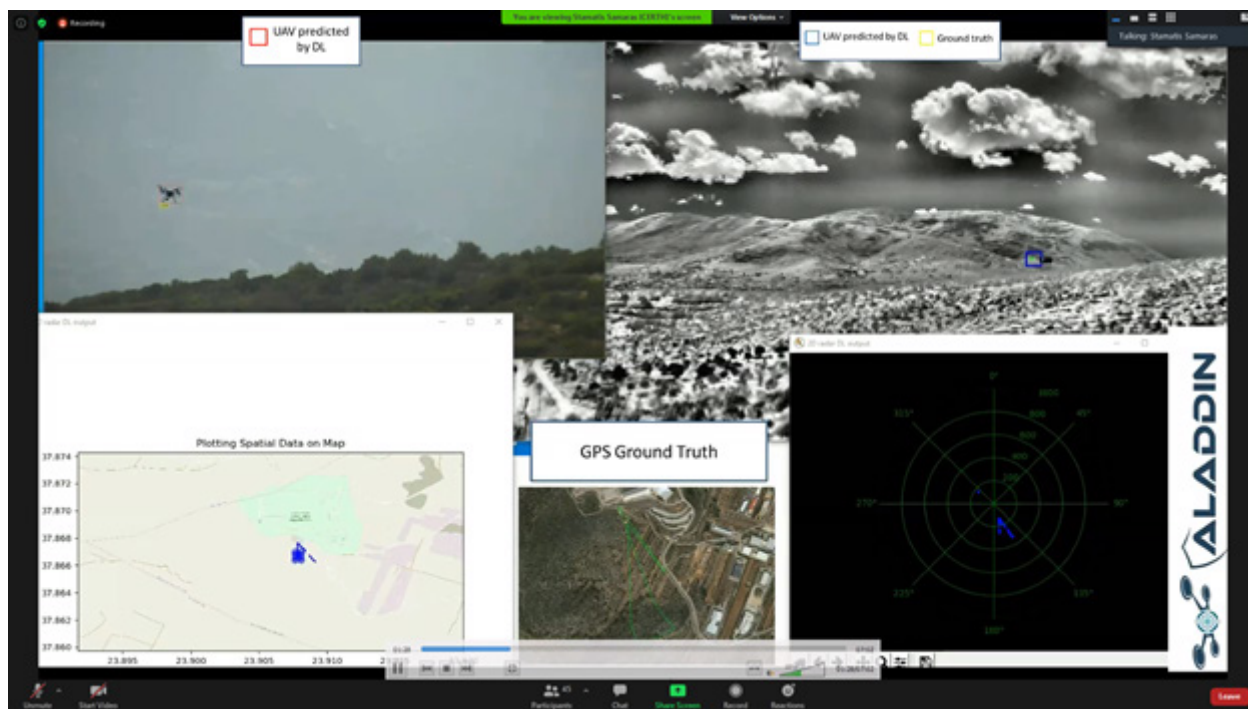
The ALADDIN consortium used the data acquired from each sensor during the Markopoulo data capturing campaign in October 2019 to present a virtual demonstration of the captured test flights. The simultaneous data acquisition from all five ALADDIN sensor modalities during the Markopoulo campaign, synchronised using the timestamp, created a virtual demo close to the actual overall system functionality and enabled the fusion of multiple sensors. This solution required the development of a **simulator for each sensor modality**, which loads the selected flight plans from the Markopoulo dataset, connects locally to the ALADDIN Command and Control (C2) and sends the UAV detection results to the C2 with the same output rate as a live session. This approach allowed the remote demonstration of ALADDIN detection and classification capabilities. Additional videos demonstrated the neutralization capabilities: jamming, net launcher and the drone interception principle.

Over 45 participants attended the workshop, both from end-user and technical partners. In spite of the virtual environment, the end users provided positive feedback. The LEAs acknowledged the great efforts of the technical partners to provide a good demonstration of the platform features, C2 and Deep Learning results.



*ALADDIN C2 displaying radar tracks and video recording from the Markopoulo data acquisition campaign (October 2019)*





*Results of unimodal Deep Learning applied to video, thermal and radar data*



*Fusion Deep Learning Module*

## EXCITING SECOND EDITION OF ALADDIN END-USER

A large group of ALADDIN LEAs and external stakeholders benefited from the **second edition of ALADDIN End-User training**, based on a rich and varied training curriculum with learning material on drone threat and ALADDIN counter-drone technologies. KEMEA coordinated the training with material prepared and proved by technical partners. Similar to the first version, this training curriculum included two main parts: **e-learning** and **in-class** sessions on the theoretical aspects of the various technologies involved and **on-field** and **simulation** sessions for training on the practical aspects of the ALADDIN system.

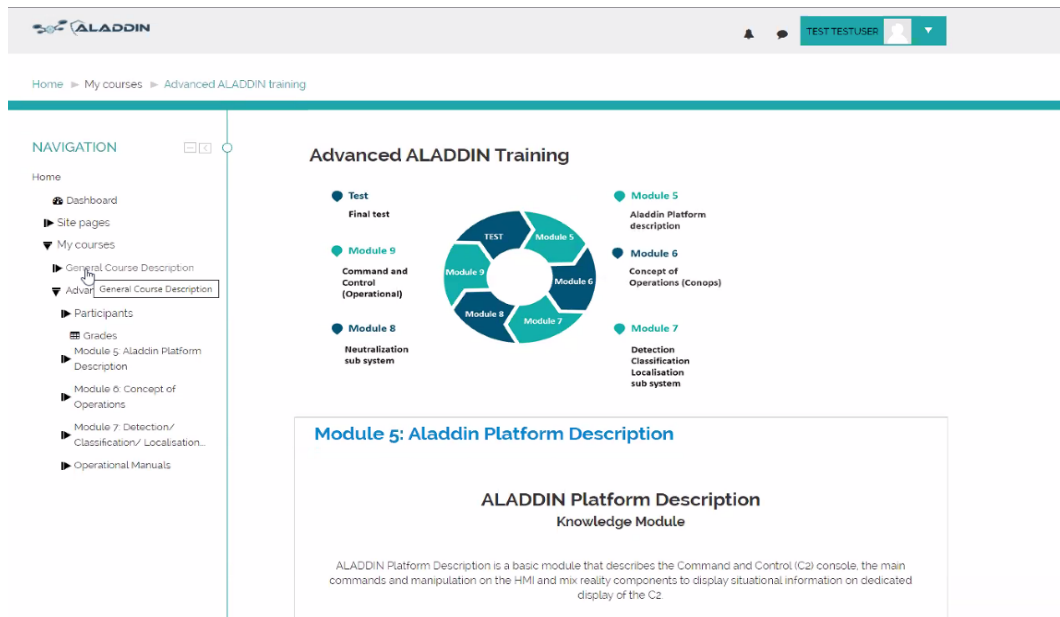
The theoretical courses were regularly delivered through the [ALADDIN e-learning platform](#) (secured by proper access credentials) to subscribers from the ALADDIN User Group (AUG) and External Advisory Board (EAB). The on-site courses (in-class, simulation, on-field training) were initially scheduled to take place during the second Pilots and demo at Markopoulo training facilities, along with the system evaluation by end-users. After the cancellation of the live Pilot exercises, the Consortium devised a plan B for delivering the second part of the ALADDIN training in a virtual format.

**In-class training** was organised and hosted on the e-learning platform as Advanced ALADDIN training. To provide each trainee with a sense of being in a physical class, every lecturer created a video by adding narration on top of the in-class presentation slides. Additional videos for each sensor and neutralization modality and for the C2 console complemented the practical training to show the system in action and to clarify operational aspects of its main hardware or software components, including the Deep Learning methodology applied to real-data from previous campaigns.

The online Advanced ALADDIN Training was open for three weeks (from 16/11/2020 to 4/12/2020) and attended by 34 participants. Those who successfully completed the training received a Certificate of Completion. The attendees were enthusiastic about the completeness of the course, its accessibility and fitness for purpose.

Finally, the end-user **on-field training** was held on 10 December 2020 in a webinar format. The webinar featured a **demonstration of the ALADDIN Command and Control system's usage and capabilities**. The main objective was to present the Command and Control platform including the console itself, the different interfaces, its capabilities and a "how to use" guide. The webinar aimed to provide the end-users with a hands-on experience, basic & advanced commands and interfaces of the C2 platform. The interactive workshop gave the participants the opportunity to ask questions regarding the C2 system, its functionalities and its configuration. 23 stakeholders attended the Training Workshop, both internal and external to the consortium end-users.





The screenshot shows the ALADDIN training interface. At the top, there's a header with the ALADDIN logo and a user profile 'TEST TESTUSER'. Below the header, a navigation bar shows 'Home > My courses > Advanced ALADDIN training'. On the left, a 'NAVIGATION' sidebar lists various options: Home, Dashboard, Site pages, My courses (expanded), General Course Description, Advanced General Course Description, Participants, Grades, Module 5: Aladdin Platform Description, Module 6: Concept of Operations, Module 7: Detection/Classification/Localisation, and Operational Manuals. The main content area is titled 'Advanced ALADDIN Training' and features a circular diagram with segments for 'TEST', 'Module 5', 'Module 6', 'Module 7', 'Module 8', and 'Module 9'. To the right of the diagram, a list of modules is shown: Module 5 (Aladdin Platform description), Module 6 (Concept of Operations (Conops)), and Module 7 (Detection Classification Localisation sub system). Below this, a section titled 'Module 5: Aladdin Platform Description' contains the text 'ALADDIN Platform Description Knowledge Module' and a paragraph explaining that the module describes the Command and Control (C2) console, the main commands and manipulation on the HMI and mix reality components to display situational information on dedicated display of the C2.

## Advanced ALADDIN Training



Snapshot of ALADDIN C2 training workshop: 3D plotting of the sensor's coverage onto the satellite map of Markopoulo test site (Greece) dvanced ALADDIN Training

## PREPARING FOR EXPLOITATION

The ALADDIN project is approaching its conclusion, marked by remarkable achievements in various aspects of the counter-drone sector.

- The [scientific publications](#) and conference presentations by ALADDIN partners provide outstanding scientific-technical advancements in drone detection and neutralization, with particular regard to novel techniques for drone classification by radar, optical, thermal and acoustic sensors, multi-sensor data fusion exploiting state-of-the-art Deep Learning methodologies and innovative trajectory optimization methods for interception of malicious drones.
- ALADDIN [public reports](#) contribute to increasing the public awareness of the potential misuse of drone technology and the related Societal, Ethical and Legal (SoEL) issues.
- The wide attendance of thematic **workshops, exhibitions and institutional events** paves the way for the exploitation of ALADDIN results and the improvement of the counter-drone policy framework.
- The active participation of ALADDIN members in **EUROCAE** working groups **WG-105 Unmanned Aircraft Systems (UAS)** and **WG-115 Counter UAS (C-UAS)** strongly contributes to enhancing standardization in these emerging fields. Contribution to WG-105 focuses on Specific Operations Risk Assessment (SORA), while the secretary role in WG-115 is crucial to the progress of C-UAS standardization in controlled airspace (such as airports), culminating in the approval of the standard *ED-286 Operational Services & Environment Definition (OSED) for Counter-UAS in controlled airspace*.

A couple of examples highlight the scientific and technical contributions in the latest part of the ALADDIN project, in addition to the dissemination and demonstration activities mentioned in the previous pages.

### 3rd Drone vs Bird Challenge

The **3rd Drone vs Bird Challenge** was organised this year with the support of the ALADDIN project. The scientific challenge aims at attracting research efforts to identify novel solutions to the problem of discriminating between birds and drones, by providing a video dataset that may be difficult to obtain (drone flying requires special conditions and permissions). The dataset for the 2020 edition of the challenge comprises data from previous ALADDIN data acquisition campaigns. The challenge was scheduled to take place in the framework of the AVSS 2020 within the “3rd International Workshop on Small-Drone surveillance, Detection and Counteraction techniques” ([WOSDETC 2020](#)). Despite the conference cancellation due to the COVID-19 pandemic, the challenge was successfully performed online and a workshop took place on 3 September 2020. The ALADDIN coordinator, Patrick Garnier (CS Group), presented the project during the workshop. It attracted wide interest and numerous universities, research centers and companies from more than 10 countries worldwide downloaded the dataset. A publication is being prepared in collaboration with the best performing submissions.

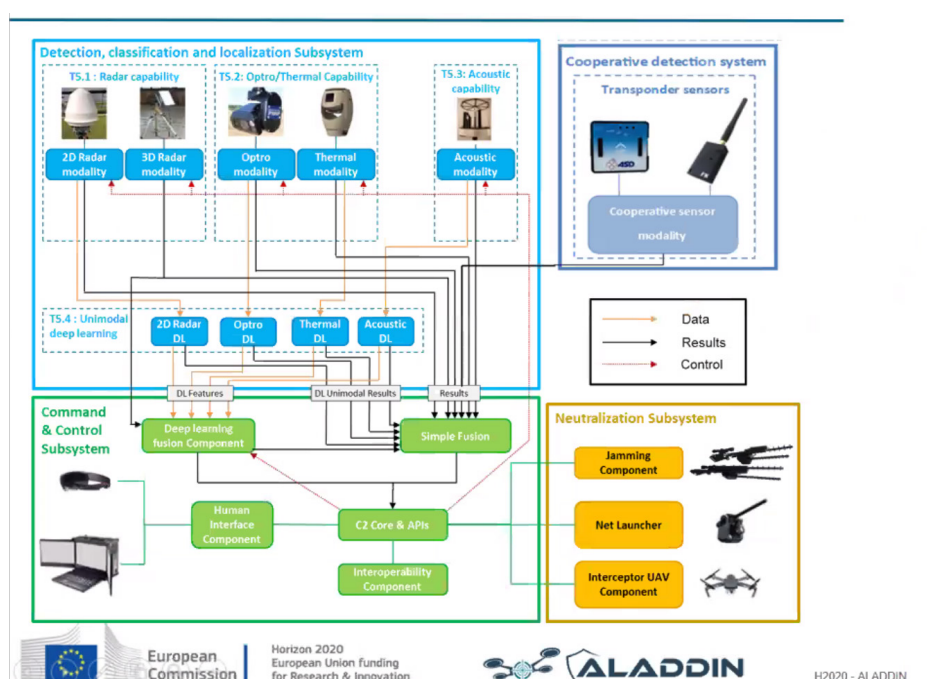
## EDA 3rd C-UAS Workshop

The ALADDIN Coordinator (CS Group) was invited to give a virtual presentation at the **3rd C-UAS Workshop** organised by the **European Defence Agency (EDA)** on 24 November 2020. This gave a very good opportunity to raise awareness of the ALADDIN project on the military side of the European Union. The presentation raised interest and some officers contacted the project through the website [contact form](#). Some videos from previous data recording campaigns showed the ALADDIN C-UAS system in action, illustrating its state-of-the-art detection, deep-learning classification and neutralization capabilities.

These accomplishments as an H2020 project mark the start of ALADDIN's exploitation to assist Law Enforcement Agencies in their daily fight against crime and terrorism conducted with light drones.

The results of the ALADDIN project have proved that the concept of a multi-sensor / multi-effector system, with advanced and cyber-secured Command and Control (C2), is capable of detecting and mitigating a drone attack. Furthermore, ALADDIN provides tools for forensic investigation and is easy for police officers to use. The greatest advancement is the large use of Artificial Intelligence (AI), based on Deep Learning methods, for improving the drone detection performance from each individual sensor and fusing them into a common detection.

Multi-equipment integration of different technologies and AI gives a very impressive tool. Additionally, it is possible to interconnect several ALADDIN C2s for covering large areas and the system is compatible with UAV Traffic Management (UTM) services and cooperative systems for the identification of legal drones. All these characteristics make the ALADDIN system the perfect tool to start a European-wide network for UAV management and C-UAV protection.



ALADDIN Final architecture



## NEXT ALADDIN MILESTONES AND EVENTS

The project is approaching its end with the Final Review with the Research Executive Agency (REA) and DG HOME scheduled for the 24th February 2021. Given the current sanitary uncertainty, this will be either an in-person meeting in REA premises in Brussels, Belgium or a virtual meeting (videoconference).

## RELATED EVENTS



**ICUAS '21**, 15-18 June 2021, Athens, Greece  
[http://www.uasconferences.com/2021\\_icuas/](http://www.uasconferences.com/2021_icuas/)



**MILIPOL Paris 2021**, 19-22 October 2021, Paris-Nord Villepinte, Paris, France  
<https://en.milipol.com/>

### Contact us:



For more information, please visit the **ALADDIN website**: <https://aladdin2020.eu/>



Send us an email to [info@aladdin2020.eu](mailto:info@aladdin2020.eu)



Join the LinkedIn group: [Counter-Drone group managed by Aladdin](#)

You may get involved in ALADDIN activities by joining the **External Advisory Board (EAB)** and the LinkedIn **Counter-Drone group managed by Aladdin (CDGMBA)**, a professional group with participants only by invitation. Send us an email (to [info@aladdin2020.eu](mailto:info@aladdin2020.eu) or through the ALADDIN contact form <https://aladdin2020.eu/contact-us/> if you are interested in joining the EAB or CDGMBA.

**Previous issues** of the **Newsletter** are available in the webpage: <https://aladdin2020.eu/media/>

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