

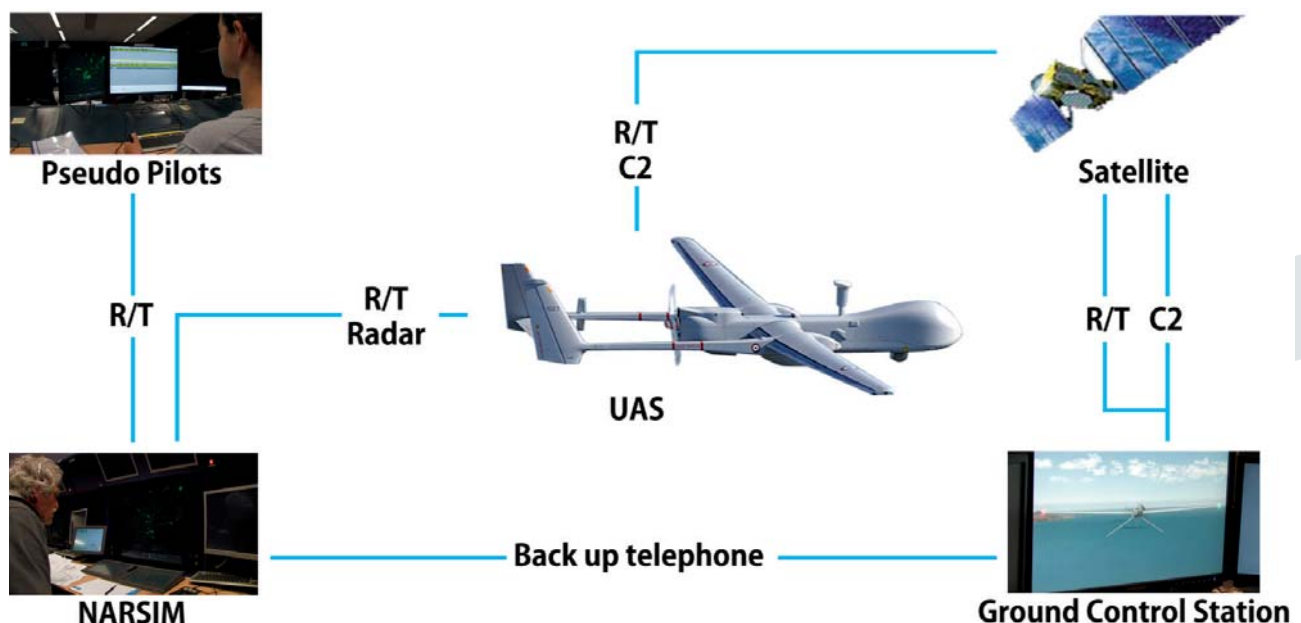
# Integration of Unmanned Aircraft Systems in Controlled Airspace

**Unmanned Aircraft Systems (UAS) are currently deployed in military environments and they will soon see their operational use in civil airspace as well. Until now, such aircraft have been operated in segregated, special use airspace. Passages through controlled airspace are performed through special corridors.**

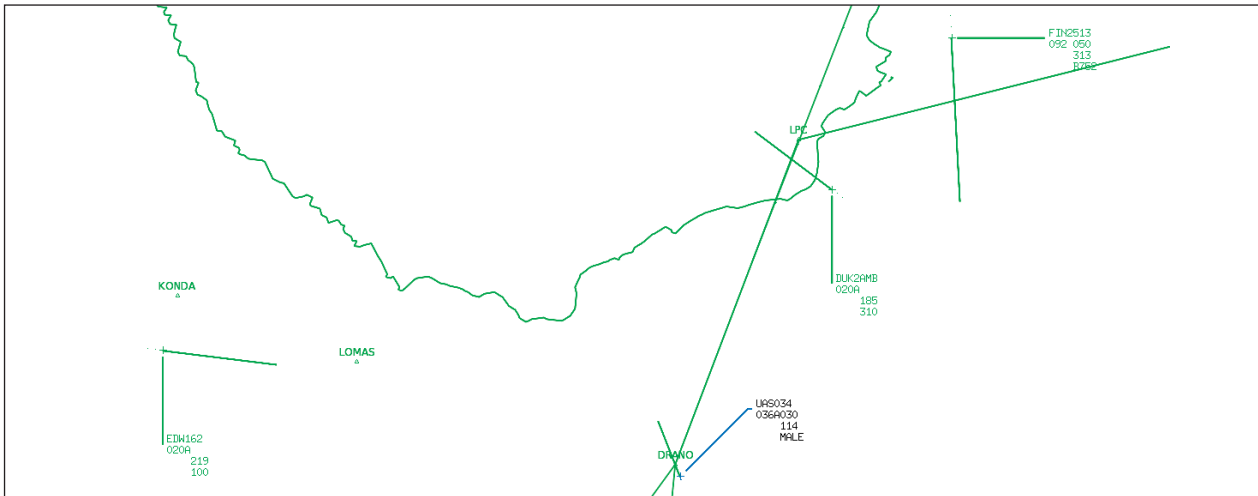
The European Defence Agency (EDA) developed a roadmap for the integration of UAS into civil airspace named Air4All Roadmap. The next step is the execution of one dedicated flight. In preparation for this a simulation of the flight is an important aspect.

## The SINUE Project

Within SINUE, a European Space Agency contracted project, a real time simulation has been performed to prepare a real flight as a further step towards integrated real UAS flight operations in the airspace. The AT-One ATC Research Simulator NARSIM has been linked to a Ground Control Station (GCS) and a UAV flight dynamics simulation to simulate an unmanned aircraft flying in controlled airspace. Communication between the GCS pilot (on the ground) and the ATC centre was set up through a simulated satellite connection.



SINUE communication overview



A UAS (blue) flying between other traffic (green) on the NARSIM simulator

During human-in-the-loop simulations with Air Traffic Controllers, the set-up for the real flight was investigated to evaluate aspects of UAS integration in controlled airspace such as the ATC Interface, separation, satellite coverage, radio bandwidth allocation, emergency procedures and emergency recovery. In USICO, a preceding project under European Commission contract, the safety of UAS operations was investigated. SINUE and USICO together form a solid basis for the further integration of UAS and pave the way for operational integration, through simulation of the concept and procedures.

AT-One supports Air Navigation Service Providers that need assistance with the concept of UAS integration through setting up route structures, emergency procedures, and an ATC interface. The concept can then be simulated in an integrated ATC/GCS facility to validate the routes and procedures to further prepare future UAS flights in civil controlled airspace.

## AT-One combines the strength of NLR and DLR in ATM Research

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