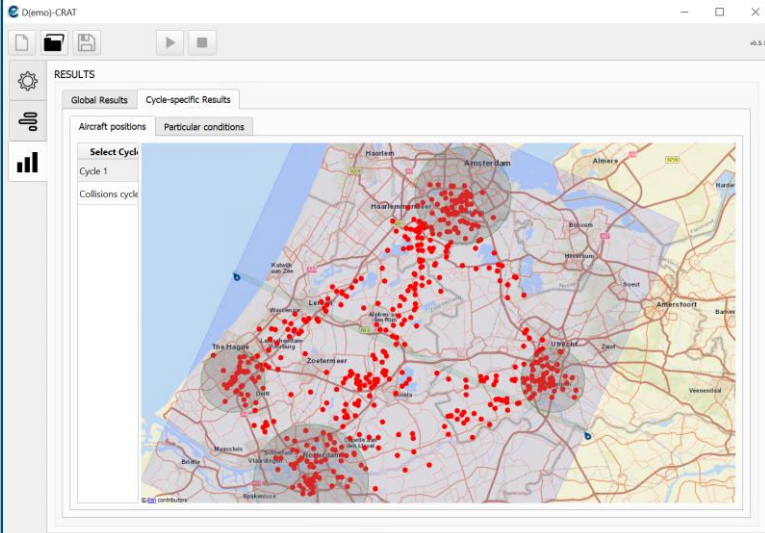


Picture



Background

Assuring safe integration of Unmanned Aircraft Systems (UAS) in all airspace classes is an important element of European research in SESAR. A central element in the European development is U-space, which is a set of new services and specific procedures designed to support safe, efficient and secure access for large numbers of drones. It is recognized in the recent Strategic Research and Innovation Agenda "Digital European Sky" that for safety assurance of U-space and urban air mobility, there is a need for new safety modelling and assessment methodologies. Tools are required to analyse and quantify the level of safety of U-space operations involving high levels of automation and autonomy, where multiple actors automatically make complex, interrelated decisions under uncertainty.

Goals

The objective of the project for EUROCONTROL is to develop a demonstrator tool for modelling and Monte Carlo (MC) simulation of drone traffic, called D(emo)-CRAT (Demonstrator Drone Collision Risk Assessment Tool). The tool is based on agent-based dynamic risk models of drone operations, which represent various types of drones (air taxis, surveillance & loitering, fixed wing drones), technical systems for communication, navigation, surveillance, and detect-and-avoid, and performance of pilots-in-command. Performance variability is represented both in nominal and non-nominal (failure) conditions. Rare-event MC simulation methods are used to efficiently assess probabilities on close proximity events and collisions between drones.

Utilisation

In cooperation with Everis ASD a software tool has been developed, which allows to define all parameters for the agent-based modelling and simulation, to execute the rare-event MC simulation, and to visualize drone risk statistics. It incorporates DAIDALUS, a NASA-developed DAA system. The research tool can be used to study close proximity and collision risks of drone operations and urban air mobility. It allows for sensitivity analyses to study the safety impact of many aspects of drone operations, such as airspace design, traffic density, DAA settings, reliability of communication, navigation and surveillance systems, and performance of pilots-in-command.