

Extending the vertiport management tool VERTIGER for IAM scenarios: A drone-cage demonstration

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Innovative air mobility (IAM) is a novel concept that is designed to supplement the existing transport networks with safe, secure and sustainable air mobility. Among others, use cases of IAM include inner city and regional passenger transport, as well as cargo and medical operations. This novel concept needs to address many challenges, as it deals with a large number of aircraft and includes low-level airspace that was previously not considered for air traffic. To facilitate these new operations that involve the previously mentioned large number of new airspace participants, the concept of U-space is developed, as specified by the regulations of the European Union—see the CORUS-XUAM ConOps [1] for a detailed overview of U-Space.

One of the main stakeholders of IAM is the vertiport. A vertiport is a new infrastructure that is specifically designed for vertical take-off and landing operations of electric, vertical take-off and landing aircraft (eVTOL) or other similar aircraft. It serves as an entry and exit point to the new air traffic system, as well as a possible logistic hub for cargo operations. The vertiport can be placed at different locations ranging from dedicated areas in a city or a rural area, on rooftops of buildings to locations at an airport. All of these locations have their own challenges that need to be considered, especially in proximity to an airport, which requires a close interaction with conventional air traffic and air traffic control. While the design and the facilities that are part of the vertiport are still the topic of intense discussion, at a minimum the vertiport needs one final-approach and take-off zone (FATO) and a touchdown and lift-off zone (TLOF), which can be combined in a single location, as well as their respective safety areas—for definitions and regulations see PTS-VPT-DSN [2]. Similar to the existing airports, we need to manage the arrival and departure of aircraft, assign parking positions, and operate all facilities that are part of the vertiport. This is done by a vertiport operator; however, as the long-term goal of IAM is a highly automated system, this vertiport operator does not need to be a physical person but rather an autonomous software system that is optionally only supervised by an operator.

In this presentation, we will show an extended version of the vertiport operator tool for managing vertiport operations called VERTIGER - VERTIport manaGER [3] developed in the project HorizonUAM [4]. This extension provides the framework for more complex services provided at a vertiport, which are a topic of future research. Additionally, we will present a series of flight trials with three vertiports and three drones in a drone cage to showcase the functionality of the vertiport manager and the lessons learned from these

trials. These scenarios represent simple use cases expected in IAM in an urban environment with a focus on the management of the vertiport's FATOs. We will further highlight the interactions with a simple instance of U-space, which can serve as a baseline for more advanced U-space services that are provided at a vertiport in the future.

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Biography

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