

Abstract

An Operational Perspective on Vertiport CONOPs – Weather-Driven Planning, Integration, and Flight Operation

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The integration of vertiports into urban environments is a critical enabler for the successful deployment of advanced air mobility (AAM) systems. However, the lack of operational experience and the complexity of urban constraints pose significant challenges—not only to site selection and infrastructure design, but also to the reliable and safe operation of vertiports. These challenges are further compounded by the need to ensure seamless interoperability between vertiports, U-space services, and classical air traffic management (ATM) systems within existing airspace structures. Addressing these interdependencies is essential to enable scalable, safe, and sustainable AAM operations in complex urban environments.

Weather is a critical component in the assessment, operation, and integration of vertiports. It directly influences track usability, service availability, and safety margins, and must be considered in both strategic planning and real-time operational decision-making. Unisphere GmbH has developed a simulation-based methodology to support vertiport planning and operations, leveraging historical weather data, regulatory frameworks, and digital infrastructure. The Smart 4D Trajectory technology, originally inspired by the Solar Impulse project, enables evaluation of vertiport usability under varying meteorological and airspace conditions. This includes automated risk assessment, wind pattern analysis, and service availability forecasting based on high-resolution weather data.

Unisphere is actively providing vertiport analysis tools today and is engaged in three ongoing vertiport projects. One of these is part of the SESAR EUREKA initiative in Rome, where Unisphere is conducting detailed usability assessments for the vertiports at Fiumicino and Piccolomini. A key outcome of this work is the development of a track analysis framework that evaluates approach and departure track usability based on wind limits, airspace restrictions, and eVTOL performance parameters. This framework, developed under the EUREKA project, supports regulatory compliance with EASA's requirement of >95% track usability and informs infrastructure design decisions.

In parallel, the presentation outlines the evolving regulatory landscape for vertiports in Europe. While VFR operations are currently governed by national regulations based on EASA's prototype specifications (PTS-VPT-DSN), a comprehensive EU-level framework for IFR vertiports is under development, with finalization expected in 2026. The NOVA Vertiport solution is introduced as a digital platform that integrates real-time weather data, METAR/TAF, and sensor fusion to support safe and efficient vertiport operations. NOVA combines aviation-grade weather sensors with cloud-based data management and API-driven distribution to ensure situational awareness and operational continuity.

The presentation will provide detailed insights into vertiport assessments, weather information, and the technologies applied to support operational decision-making. It will also actively explore the fine line between high-resolution micro weather forecasting and more pragmatic, operationally viable approaches to weather integration at vertiports. Key findings include the identification of optimal track orientations, quantification of weather-induced constraints, and the role of digital infrastructure in enabling safe and scalable vertiport operations.

This work contributes to the development of scalable solutions for vertiport integration, addressing both technical and regulatory challenges in the evolving landscape of urban air mobility.

Biography

Michael Anger



Michael Anger is Co-Founder and CTO of Unisphere GmbH, a German start-up developing smart software for automated drone and air taxi operations. An aerospace engineer and former Flight Director for Solar Impulse, he now leads innovation in simulation-based flight management and weather analytics for urban air mobility.