Gefördert durch:
Bundesministerium für Forschung, Technologie und Raumfahrt
VDI|VDE|IT Project Executive Agency

# KONFORMUS

## Cooperative network for interoperable, regulatory-compliant mission operations in U-space

Urban delivery drones • medical transport missions • automated 3D geospatial data processing • flight planning • operational dashboard • electrically powered drones (eVTOLs) • emergency landing

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| Funded by | Bundesministerium für Forschung, Technologie und Raumfahrt (Bereich „Vernetzung und Sicherheit digitaler Systeme“) |
| Project Execution Contact and Info | PSU \| Prof. Schaller UmweltConsult GmbH<br>info@psu-schaller.de \| psu-schaller.de |
| Consortium Partners | uVigilant GmbH (project coordination)<br>esc Aerospace |
| Subcontractors to PSU | ili gis-services<br>SmartGeoMaps |
| Project Period | 2023-2025 |
| Services of PSU | ▪ GIS analysis and data preparation<br>▪ Development of a 3D city model<br>▪ Creation of a dashboard for 2D and 3D route planning and flight preparation<br>▪ Real-time data processing<br>▪ Virtual 3D flight visualization |

### The Project

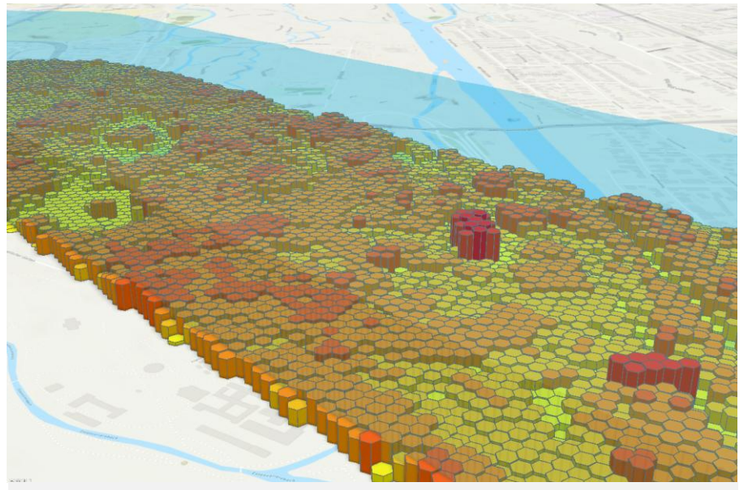
The KONFORMUS project developed an innovative, secure, resilient, and high-performance network system that ensures uninterrupted and loss-free communication between the relevant participants in the operation and monitoring of unmanned aerial vehicles (drones). The network system combines multiple innovative hardware and software components to provide future certification-ready U-Space services (U-Space: lower airspace for drones).

A central element is an integrated, fail-safe communication system based on various mobile transmission channels for the resilient transfer of critical aircraft information between the drone and central data processing. Additionally, an autonomous, drone-independent identifier was developed to generate highly precise navigation and flight data. These data are processed in real time in a central USSP data management system in compliance with regulations.

In addition, the system includes a reliable 3D geospatial model for urban airspace, which is made interactively available in real time to all relevant stakeholders through the developed dashboard.

### Data Processing

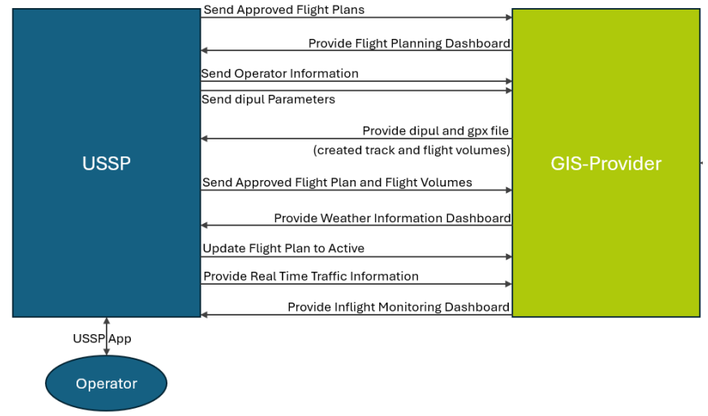
Within the project, PSU acted as a GIS data provider and created a comprehensive 3D geospatial dataset for use by the stakeholders. Selected geospatial data were processed using ArcGIS® Pro, FME, and Python, and integrated into a geodatabase containing all static and dynamic data relevant for U-Space. Additionally, emergency landing sites from the R&D project UmSiTrUL were incorporated. This resulted in a high-resolution city model that supports both flight planning and in-flight monitoring.



Hexagons with altitude and obstacle information for simplified flight planning

### Interfaces

Interfaces with the other subsystems were defined and implemented to ensure reliable data transmission between the GIS provider and the USSP (real-time data, weather data, webcams, flight plans, traffic volumes, etc.). For this purpose, an architecture for the transfer of geospatial data, real-time data, and flight plans was established. The interfaces were implemented via HTTP-based APIs, extensively tested, and optimized.



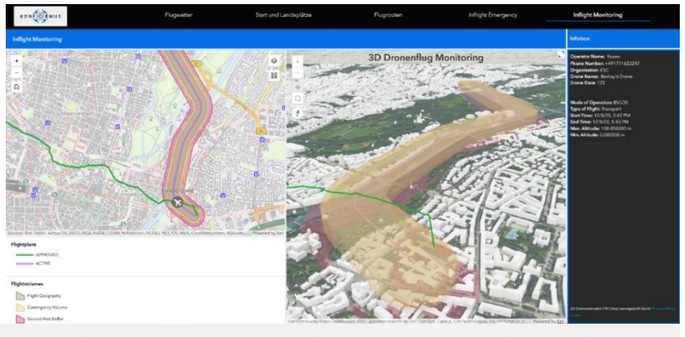

Interfaces between the U-Space Service Provider (USSP) and the GIS provider (provision of 2D and 3D GIS data)

### Dashboard for Route Planning and Flight Preparation

PSU developed a demonstrator web dashboard for route planning and in-flight monitoring, built using ArcGIS® Experience Builder. It visualizes both static and dynamic GIS data, including geometries and attributes, in 2D and 3D. Relevant interfaces for real-time display of drone positions were integrated..

### Final Tests

At the conclusion of the project, test cases were defined to optimize the overall system through systematic end-to-end testing and to validate the various use cases. Hardware and software, as well as communication with the prototype drone, were demonstrated to verify the results. The tests were carried out in close coordination with the project partners uVigilant and esc, and included both error identification and correction as well as targeted system improvements.




Dashboard view with in-flight monitoring in 2D and 3D

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Subcontractors to PSU: SmartGeoMaps, ili gis-services
Associated Partners: DLR Gesellschaft für Raumfahrtanwendungen