



naviation

UTM solutions anywhere



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Introduction

Naviation AB is a Swedish **tech** company dedicated to innovating technology within the **Airport and Air Traffic Services sector**. Alongside the Dronerequest brand, we offer cutting-edge solutions for screen recording, ATCO position logging, ramp management, and more.



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Dronerequest User Interfaces



Dronerequest Mobile app

The Dronerequest mobile apps for Android and iOS have managed many thousands of drone missions in Sweden.

These mobile apps offer an intuitive user interface, reliable positioning and tracking. They help drone pilots adhere to airspace regulations, view other drone missions and manned air traffic, and streamline the process of requesting permission to fly in controlled airspace.



Dronerequest tower interface

The Dronerequest tower interface offers Air Traffic Controllers a quick overview of planned drone activity.

It simplifies communication, provides details on planned missions, time- and area of operation and more. The tower interface visualizes restrictions, airspace sectors, and informs of terrain elevation. It tracks drone pilot activity, and can alert the tower if pilots deviate from assigned areas.



Dronerequest PRO webapp & API

Dronerequest PRO is an **API-first solution** with a web interface, enabling professional drone operators to automate platform interaction.

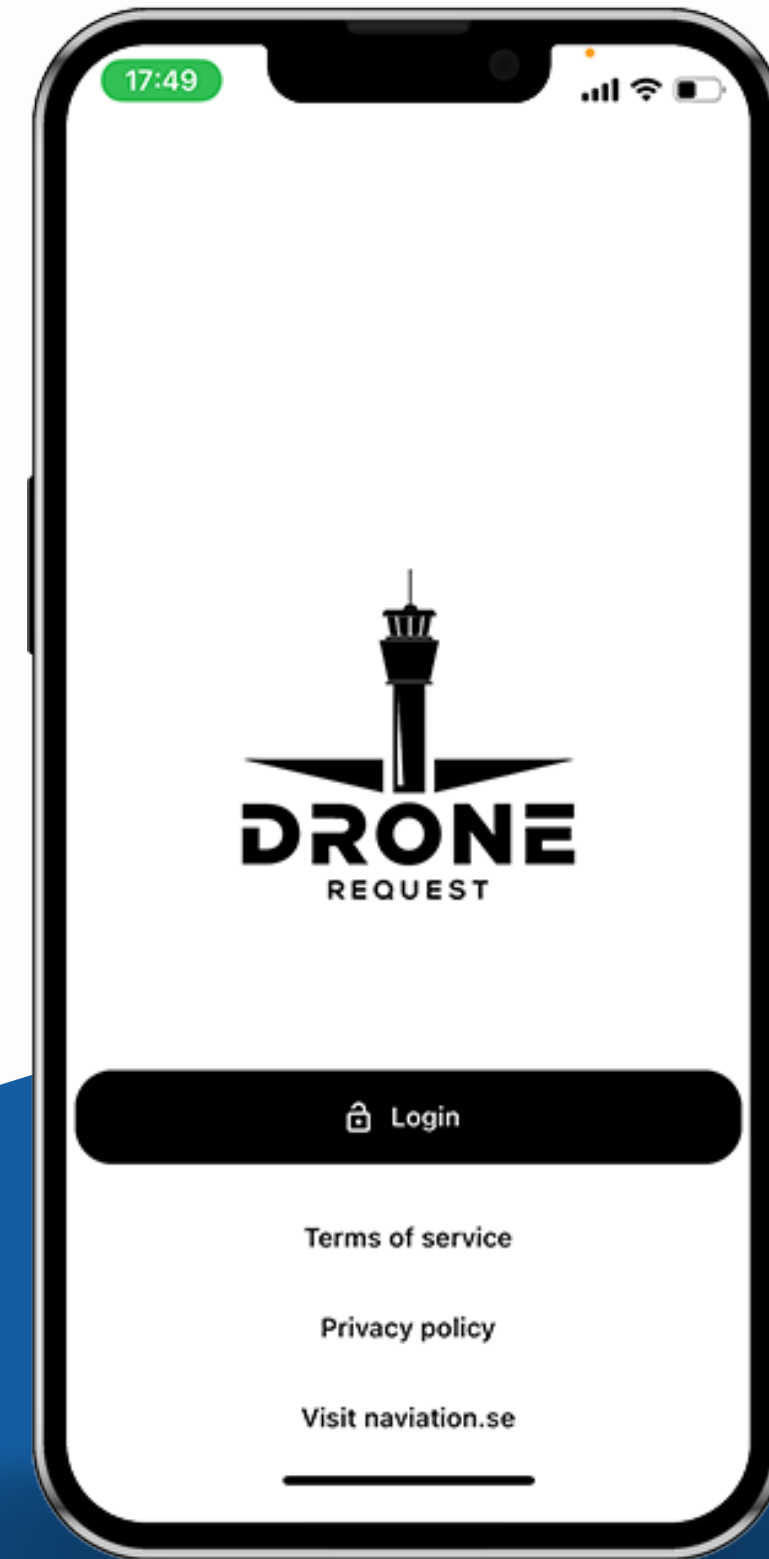
It has managed **hundreds of autonomous BVLOS flights**. The API and web interface provide access to airspace information, restrictions, conflicting traffic etc. A messaging system **keeps everyone informed in real time**.

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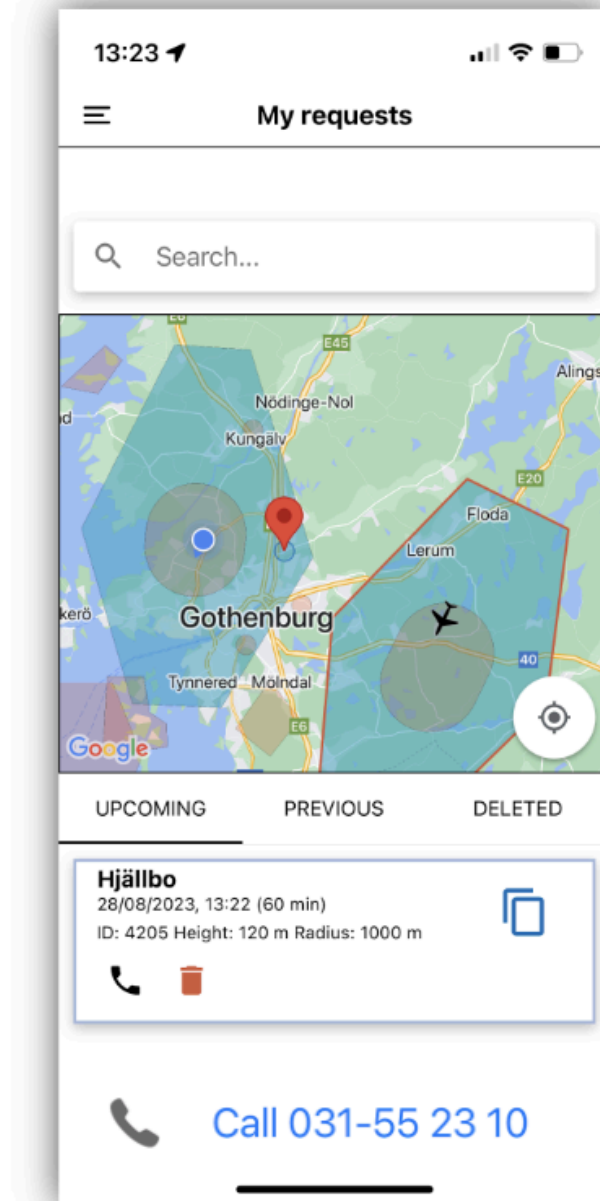
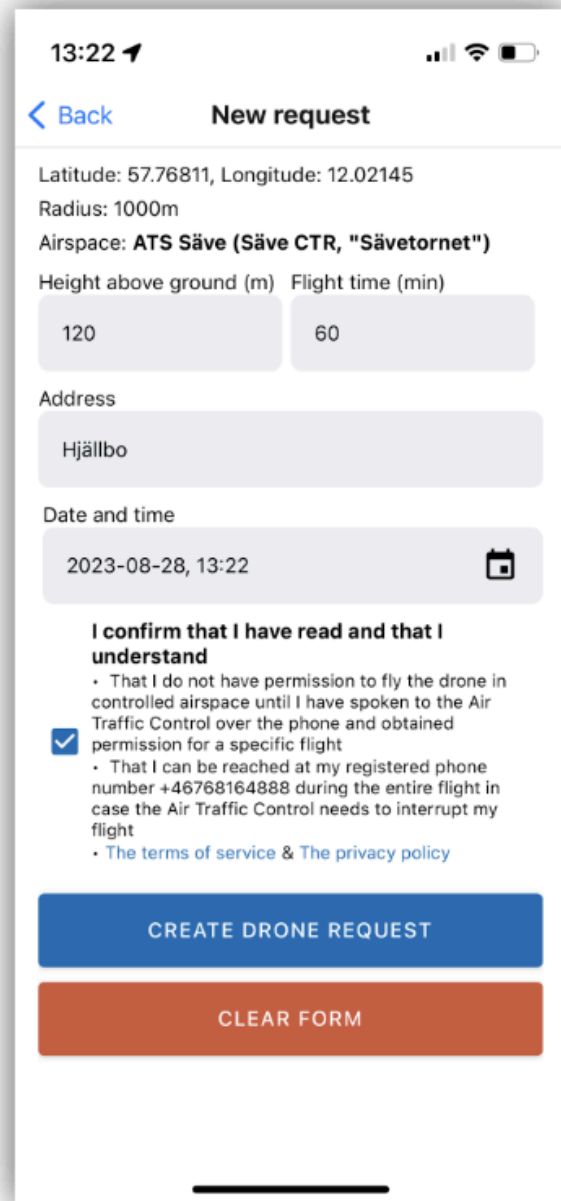
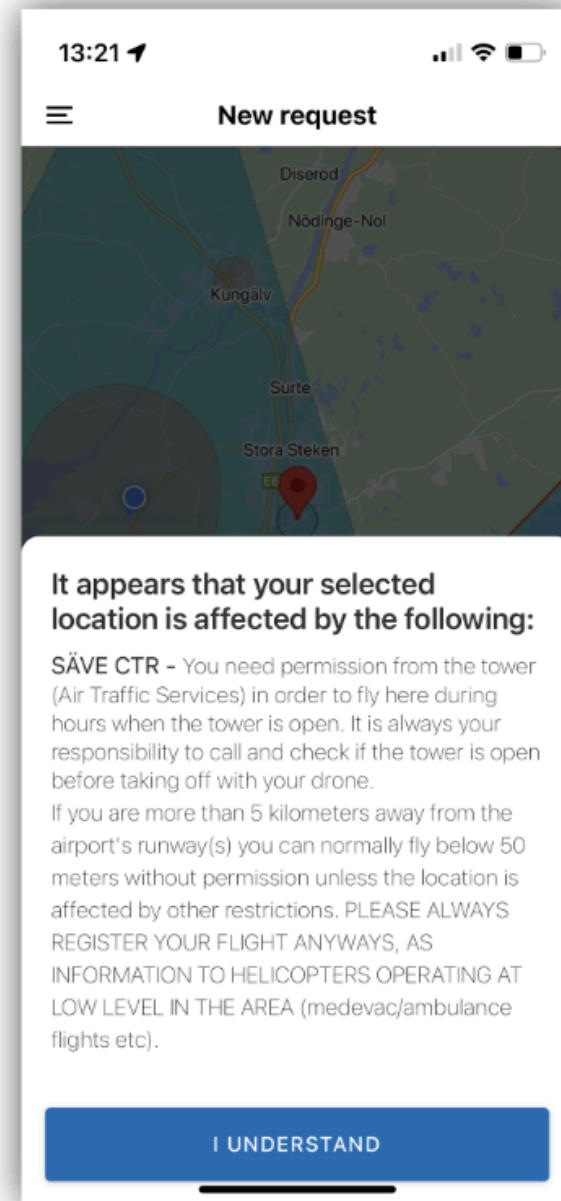
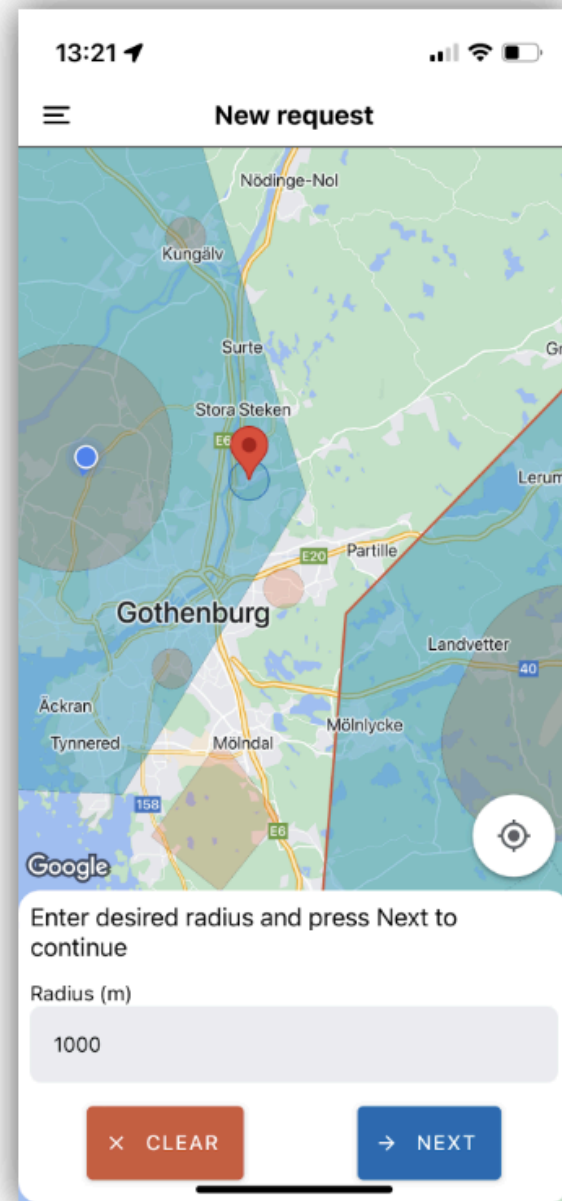


Dronerequest Mobile App



Dronerequest Mobile App

The Dronerequest mobile app allows drone pilots to **notify others** of their flight. It **guides drone pilots** by indicating the locations of controlled airspace and restricted areas, and provides information on **other air traffic** in the area.



Controlled Airspace

For flight within controlled airspace, the process is further streamlined when the airport tower is equipped with the Dronerequest tower interface.

U-space

Features for digital flight authorization (including automatic authorization in dynamic geozones) will be available for areas within U-space

The app will tell pilots what airspaces or restrictions affect their requested area

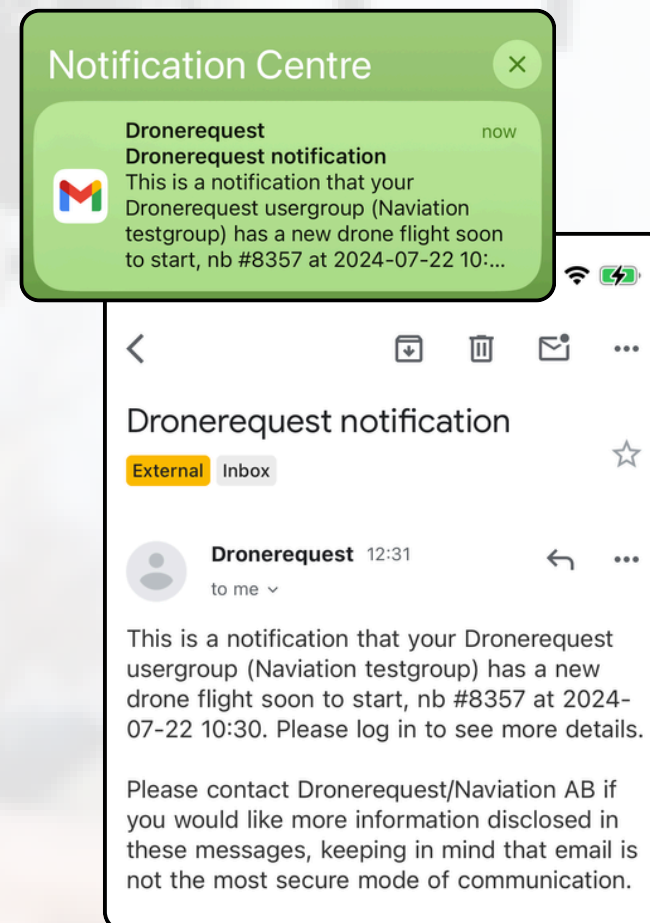
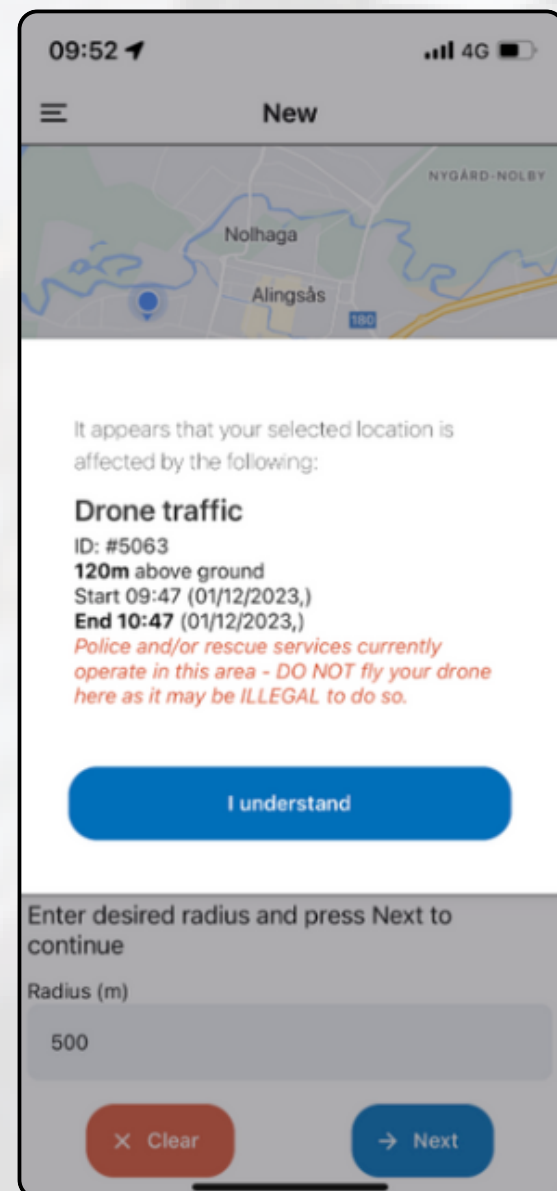
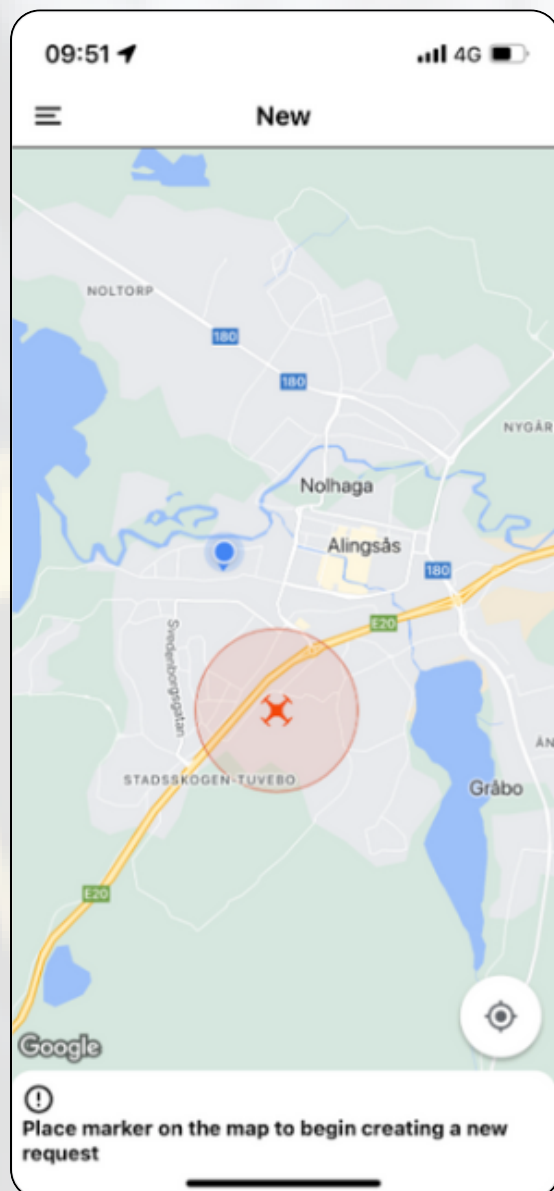
The app will tell **how to obtain clearance** if inside a controlled airspace



Police & Rescue services

In close **cooperation** with Swedish **rescue services**, we have developed several features exclusive to them. One of these features is the ability to notify other drone operators about active bluelight operations.

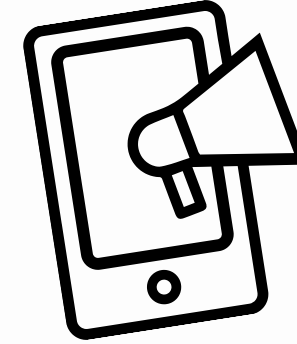
It also informs pilots that, according to Swedish and EU law, it is **illegal to fly any other drones within the designated area**. Another feature is notifications when an operator in the group has a drone flight under way.



Seamless Integration

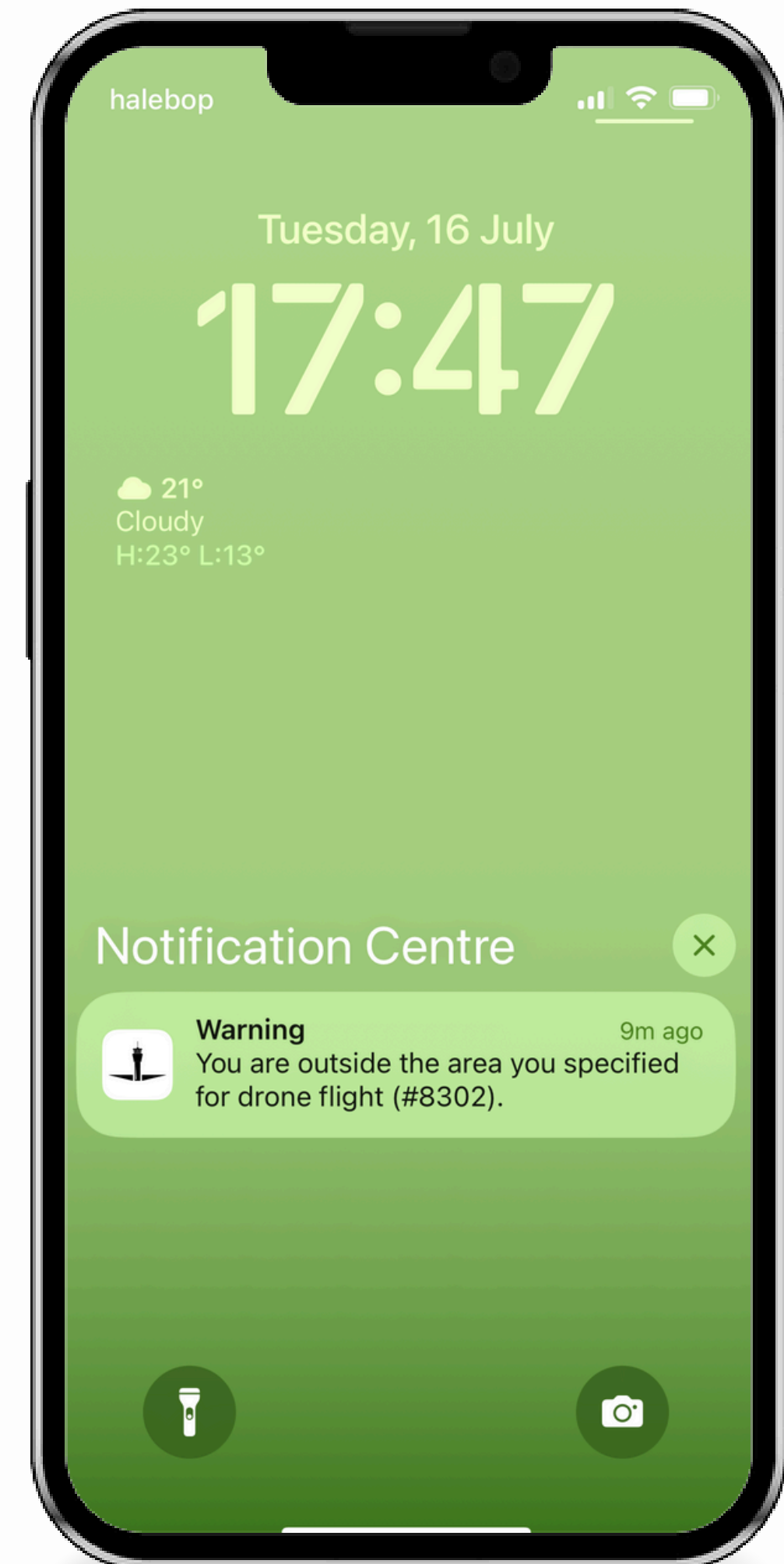
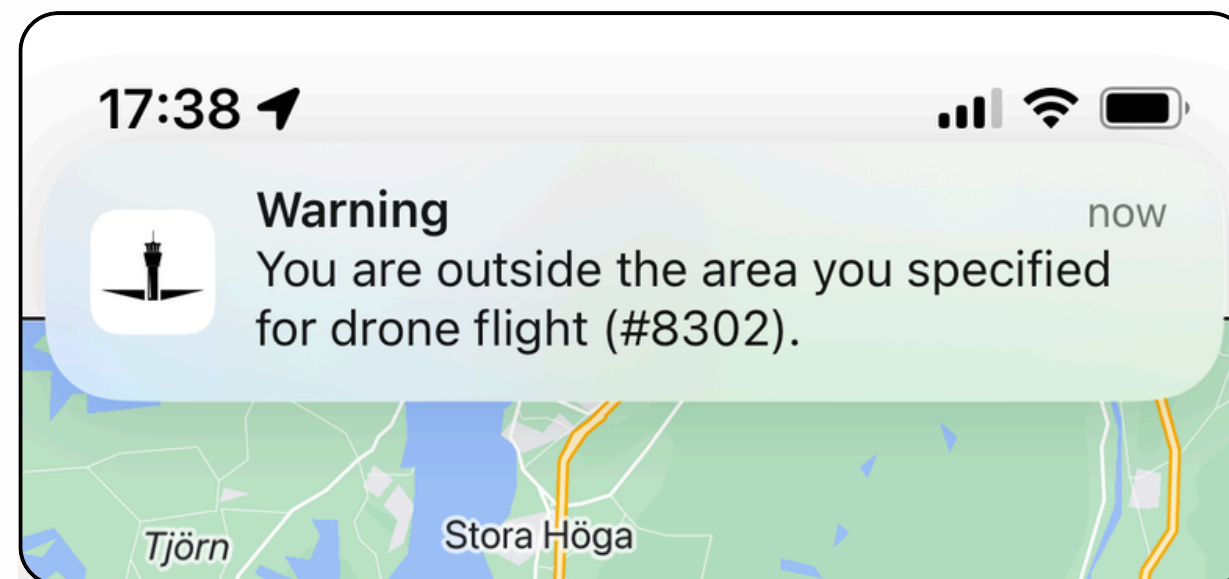
Fully integrated with existing on-board systems (EFB) for Swedish, Norwegian, and Danish HEMS (Helicopter Emergency Medical Services), SAR (Search and Rescue) helicopter operations, as well as Police, Coastguard, and Military operations.

Location warnings



If the Dronerequest app is running and you have submitted a request for drone flight inside controlled airspace, you will receive **warnings if you move outside of that area.**

A safety feature if you are actually flying outside of the area, and if you have packed up and left site it serves as a reminder to properly close your flight with air traffic control.



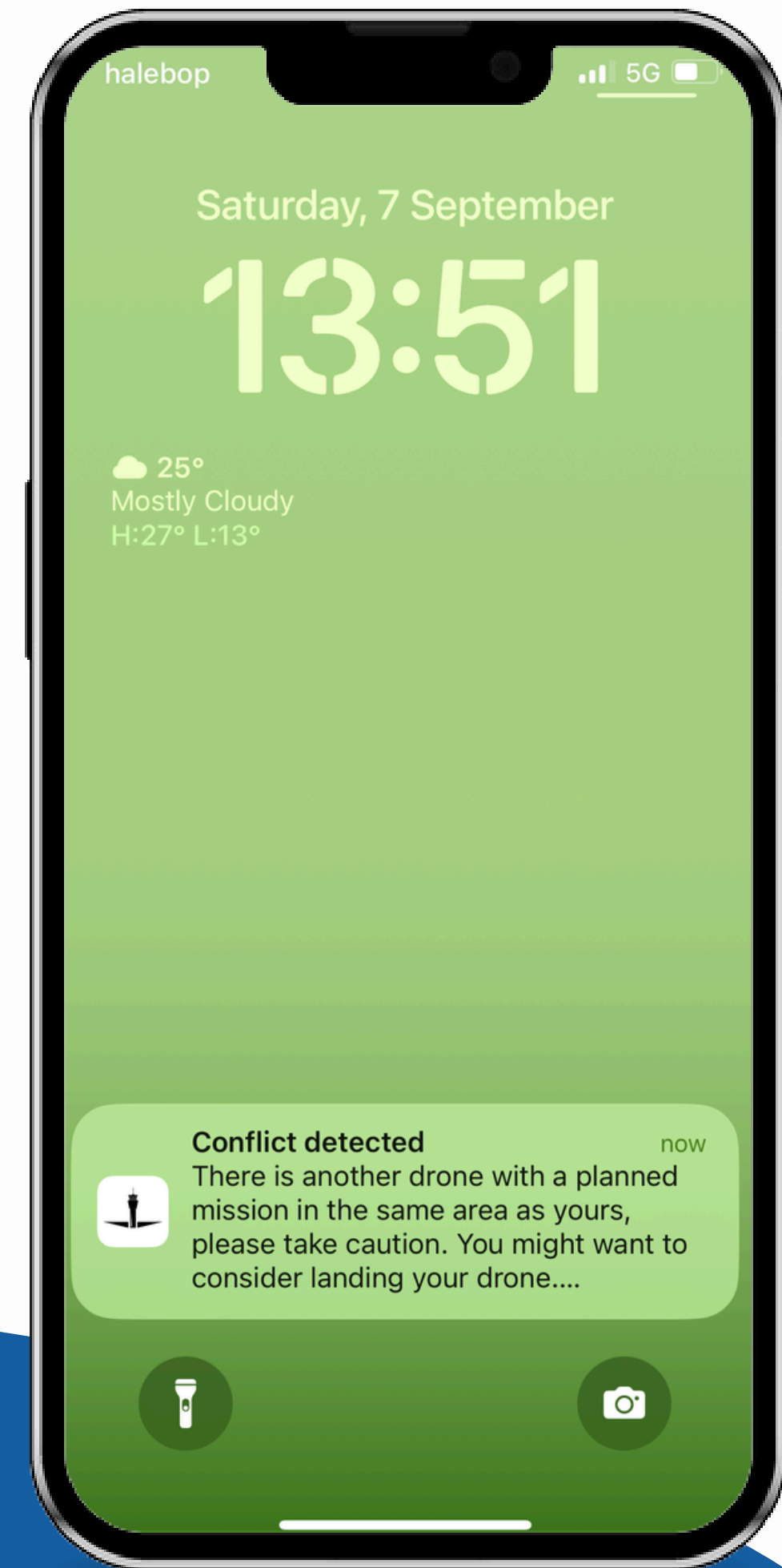


Conflict warnings

If you submit an area for drone flight and our platform detects **overlapping drone activity**, Dronerequest users will receive a conflict warning.

Users of other products (similar to Dronerequest) might receive such warnings as well (these products may for instance subscribe to our conflicts API & database).

When operated outside of U-space the Dronerequest platform provides traffic information for UAS operators, air traffic control units, and manned air traffic, allowing **each to make their own safety decisions**.



Conflicts in U-space

Dronerequest is designed for use in **any airspace**, including uncontrolled (non U-space) environments, and is built to seamlessly **co-exist** with other platforms.

In regions where U-space is established, authorization for a second, conflicting drone plan will naturally not be granted. It is the responsibility of the certified U-space Service Provider (USSP) to deny clearance for drone flights in the event of a conflict.



In a well managed U-space conflict situations would never occur.

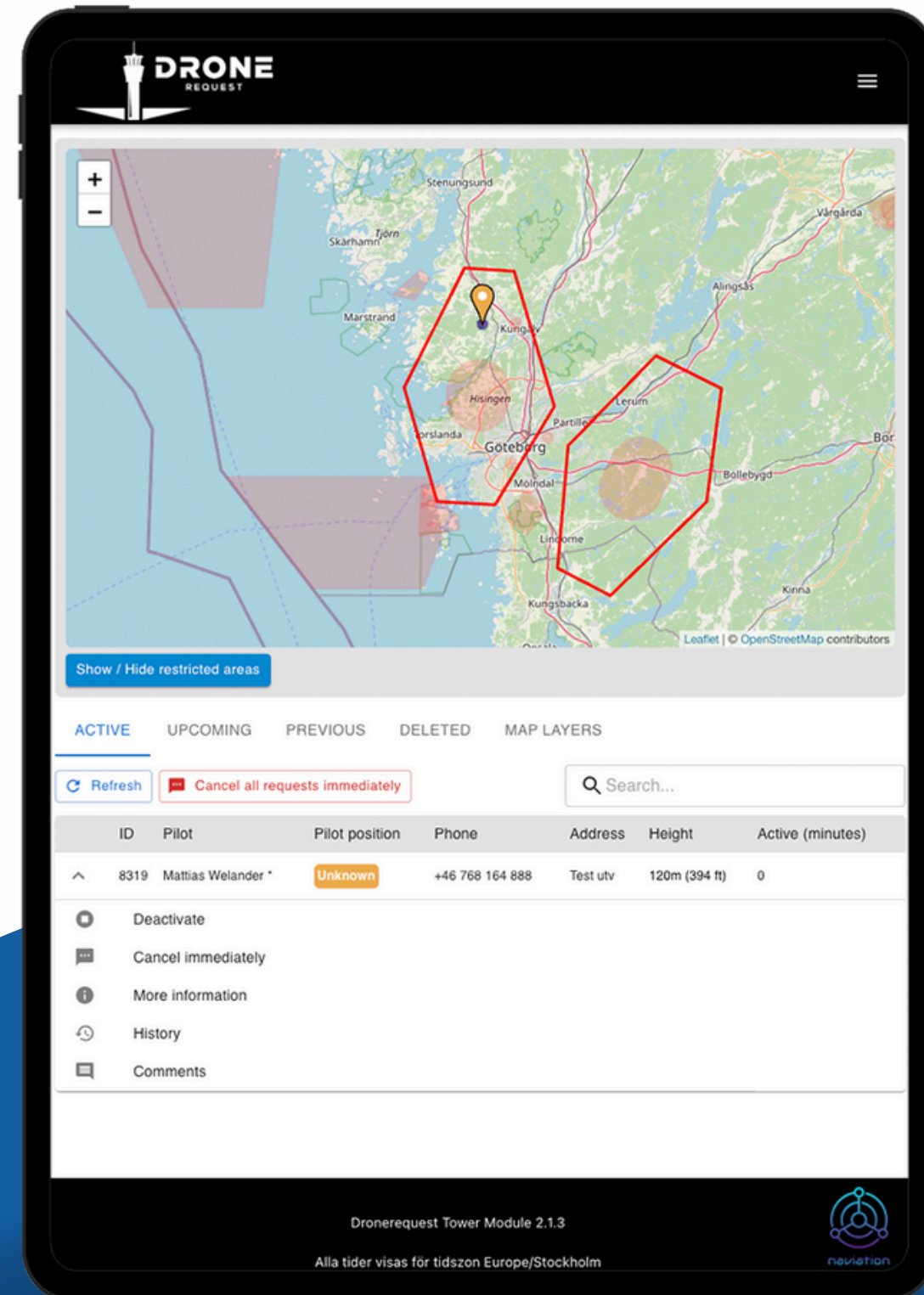
Even outside of U-space, the Dronerequest platform is designed to prevent such scenarios.

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Dronerequest Tower Interface



Dronerequest Tower Interface

The Dronerequest tower interface provides Air Traffic Control with all relevant data pertaining to a drone flight so as to **streamline** the risk identification and flight **approval process**.

The screenshot displays a map of Göteborg, Sweden, with several key features and annotations:

- Airport (ESGP):** An arrow points to the Hisingen Södra Flygplats (Hisingen Södra Airport) on the map.
- ESGP Control zone border:** A red line on the map indicates the boundary of the airport's control zone.
- Activated map layer (only visible to tower):** A green polygon on the map represents a restricted area, which is only visible to the tower.
- Upcoming drone flight preview:** A black pin on the map indicates the location of an upcoming drone flight.
- Drone pilot & mission information:** A table below the map provides details for the upcoming flight.

ID	Pilot	Pilot position	Phone	Address	Height	Planned date
8306	Mattias Welander *	Unknown	+46 768 164 888	Test (utv)	110m (361 ft)	17/07/2024, 13:18:02

Zoom & details

A customizable buffer area can be displayed in the tower interface (in case air traffic services wants to **visualize a separation buffer** etc.)

Details for the drone mission can be brought up, including **coordinates** in DMS format (commonly used in radar displays) and the **terrain elevation** of the requested area.

Created by:
Name: Mattias Welander
Phone:
+46 768 164 888
Email: mattias.welander@acr-sweden.se

Dronerequest:
ID: 8306
Address: Test (utv)
Latitude: **Decimal** 57.690747 **DMS** 57° 41' 26" N
Longitude: **Decimal** 11.913338 **DMS** 11° 54' 48" E
Radius: 500m
Height: 110m (361ft) above ground
Planned: 17/07/2024, 13:18:02
Approximate flight time (min): 40 minutes

BETA
Terrain: 8 MASL (27ft QNH)
Terrain + flight altitude: 118m (388ft QNH)

ID	Pilot	Pilot position	Phone	Address	Height	Planned date
8306	Mattias Welander *	Unknown	+46 768 164 888	Test (utv)	110m (361 ft)	17/07/2024, 13:18:02



Because the Dronerequest Mobile app requires login via phone number, the tower will **always have** the current **phone number** of the drone **pilot**.



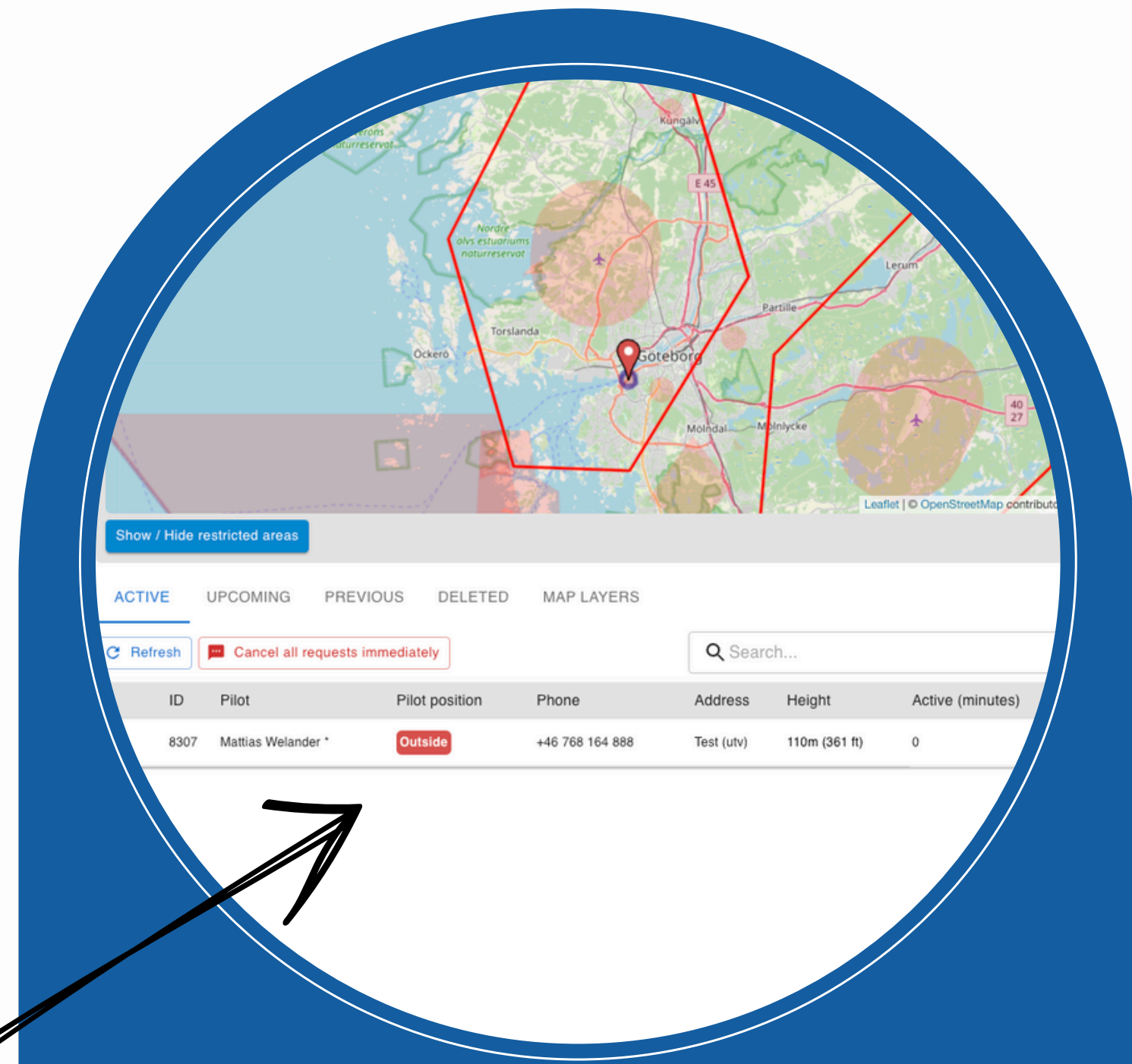
Location warnings

Dronerequest mobile app has a feature that helps drone pilots remain within the area they have requested for drone flight. The tower interface has a similar safeguarding feature. If...

- The pilot's Dronerequest **app is running**, and
- The drone pilot has a **current request** for flight within that tower's airspace

...then the tower will receive an indication of whether the pilot is **inside the requested area** or not.

Similar to the notification on a drone pilot's phone when moving outside the requested area, this feature also acts as a wake-up call if a pilot has packed up and left the site without notifying the controller.



Location sharing privacy

Segmentation ensures that a pilot's actual **location** (as reported by the Dronerequest mobile app) is **inaccessible through any user interface**. Even the server behind the tower interface cannot access the position, only an inside/outside status. Positions are **permanently deleted** after a few minutes.

When operator security is prioritized over flight safety, **112 (bluelight) operators** can have **position** reporting fully **disabled**.

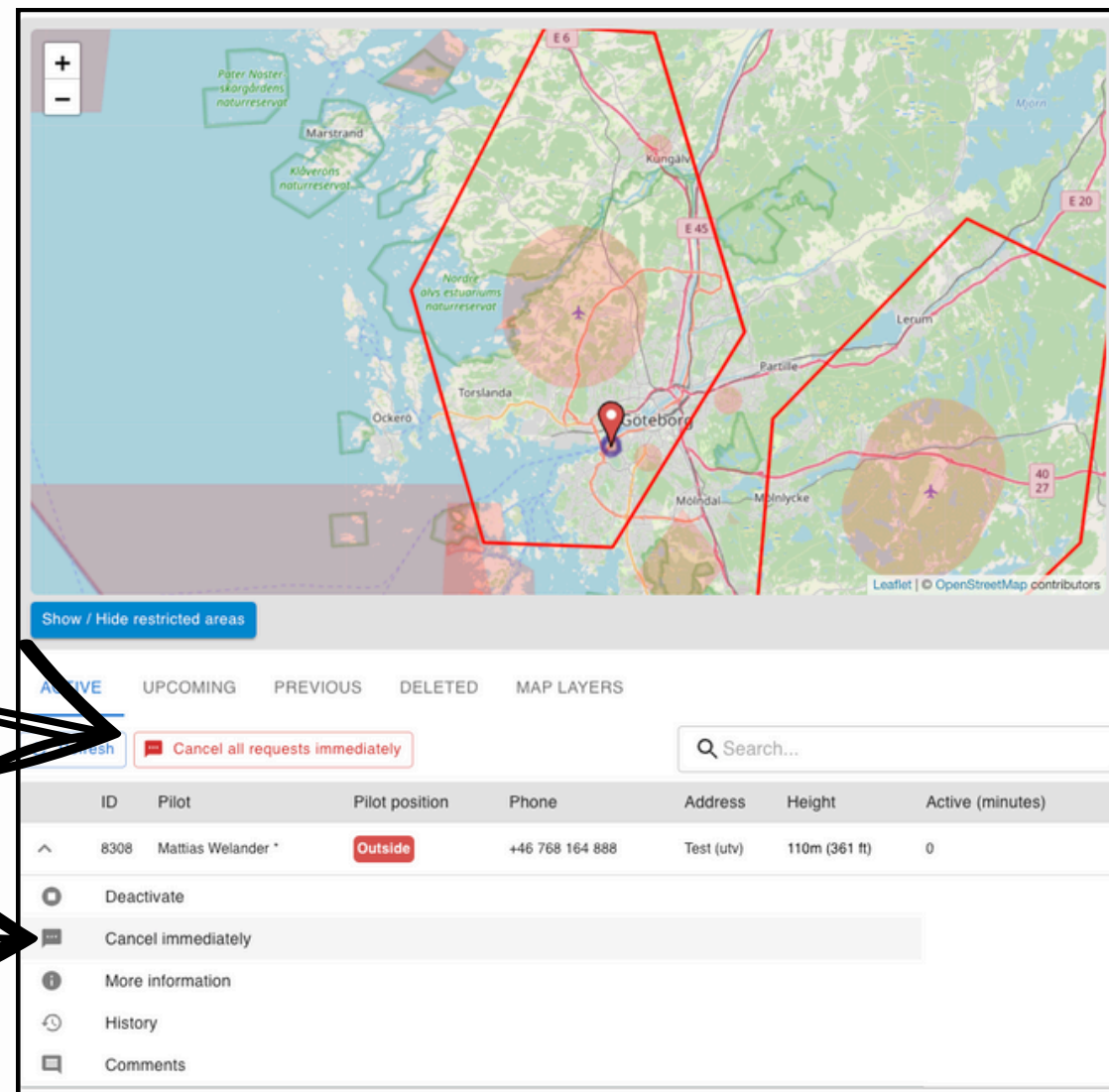
Text messages

To manage the **workload of air traffic controllers**, the Dronerequest tower interface includes a feature that allows text messages (**SMS**) to be sent to **all pilots** with active flights at the click of a button...

...or to one specific pilot with an active flight.

Hi Mattias Welander,
Please land the drone and then contact air traffic services at [031-552310](tel:031-552310).

Delivered by [Dronerequest.com](https://dronerequest.com)



*In an environment where digital clearances are not used, controllers would still need a **phone call** from **each** drone **pilot** before the areas blocked by the respective drone flights are released for other traffic, but **messages** significantly **speed up the process**.*



Levels of ATM integration

Dronerequest can be utilized strictly as an **administrative** support system, essentially **replacing email** as a means of information exchange between drone operator and air traffic control in establishing sector boundaries etc.

Dronerequest is equipped with features designed for deeper integration into the Air Traffic Management (ATM) process. Apart from digital clearance, towers authorized to **rely operationally on** Dronerequest have access to features such as automatic printing of flight progress strips.

inspireIT

Integrates with your existing AIDA ONE flightplan management solution

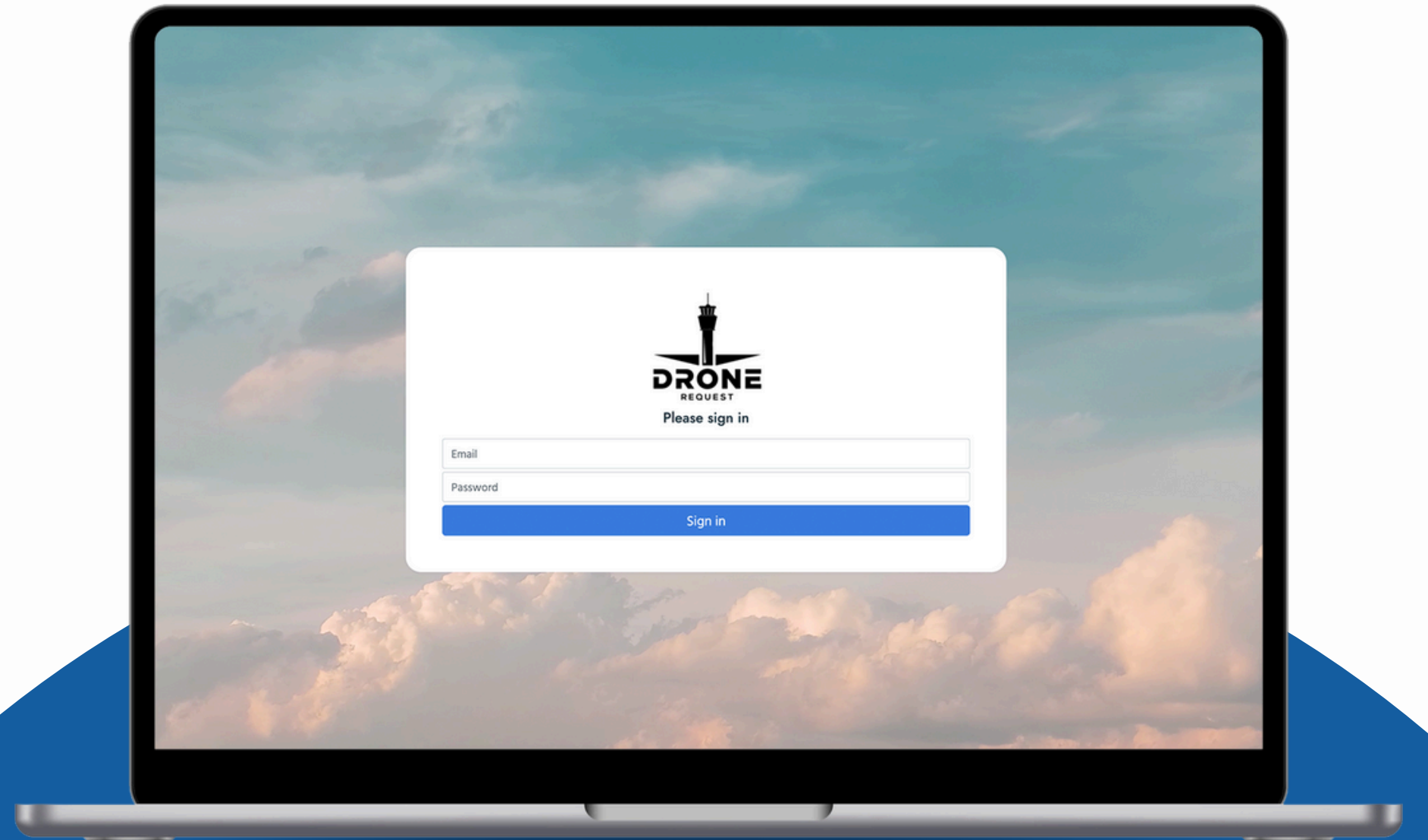


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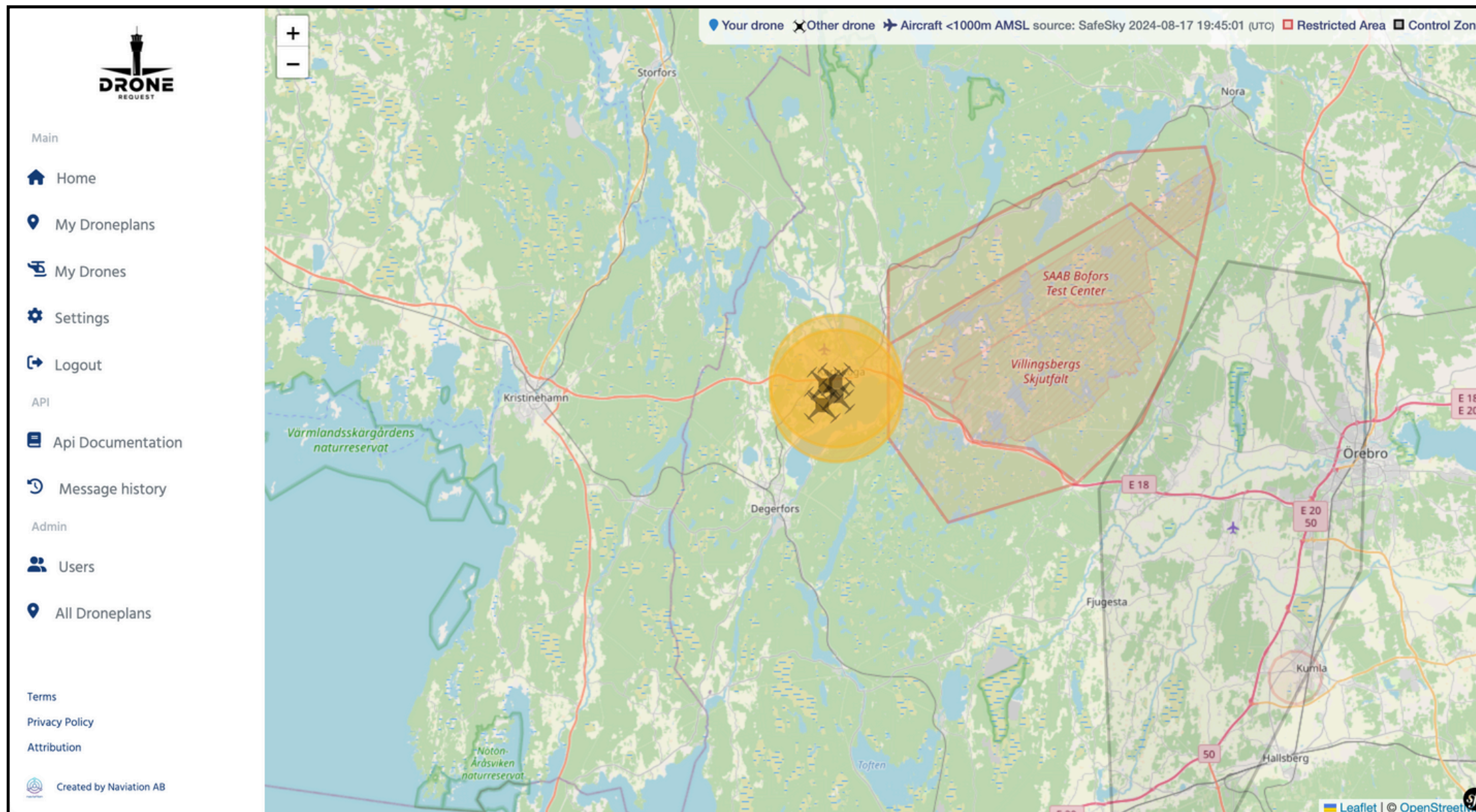


Dronerequest PRO web app



Dronerequest PRO webapp & API

The Dronerequest PRO webapp (website) & API allows professional drone operators to interact with our platform in a more advanced manner, including live position reporting for BVLOS drone activity.



MFA

Multi-factor authentication for enhanced security

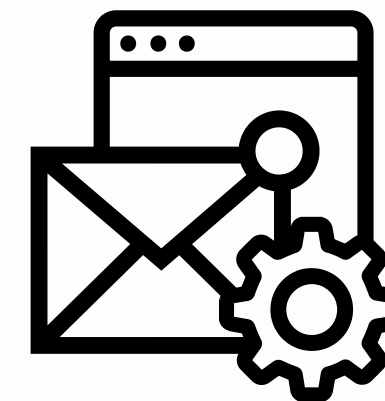
Perform actions in webapp or via API

List droneplans either with the GUI (website) or by an API call.

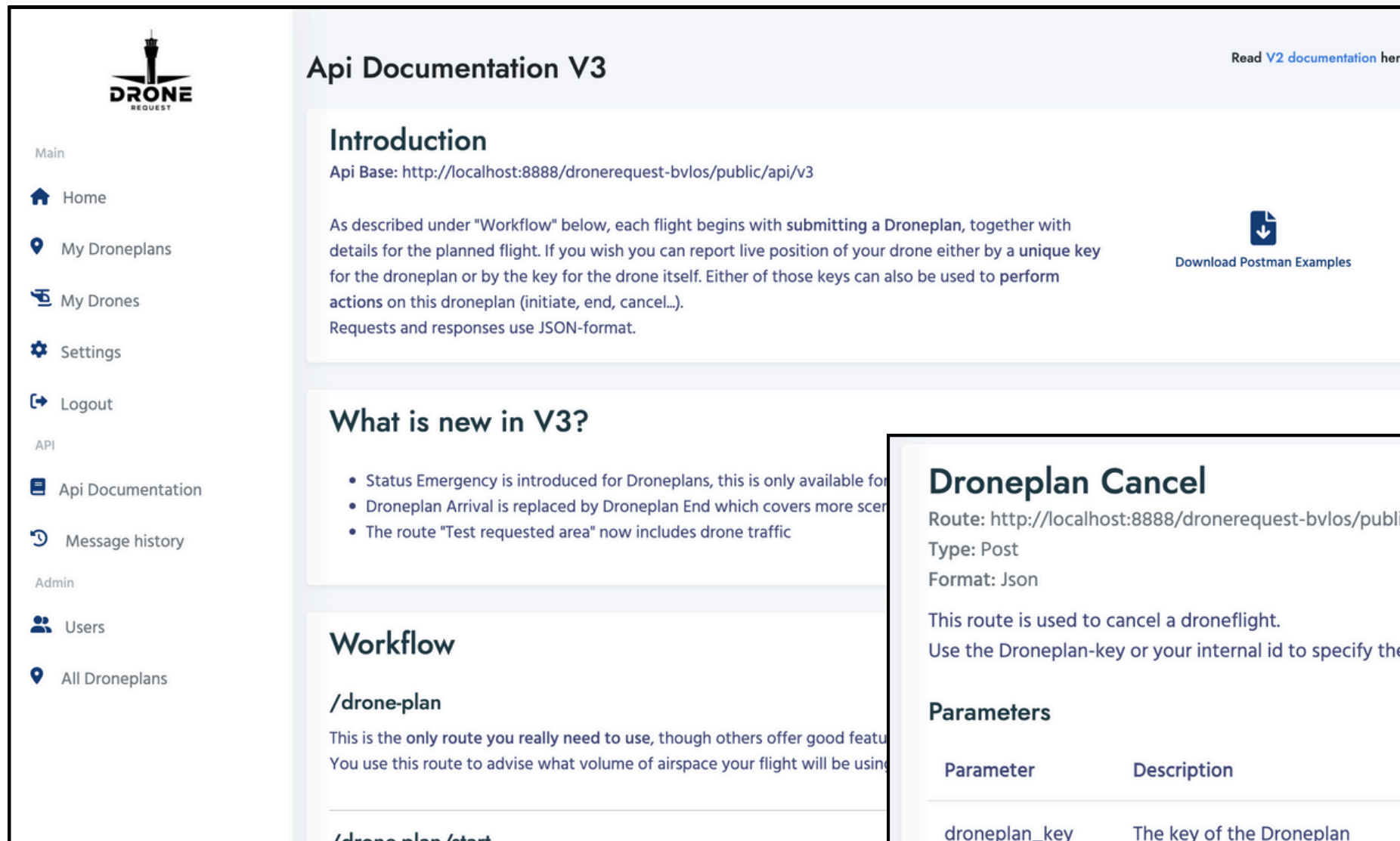
Except for live position reporting, all actions such as submitting, starting and ending a droneplan can be performed in the GUI.

ID	Start	Stop	Drone Nickname	
1	UTC 2024-04-11 06:00:00	UTC 2024-04-11 08:00:00	Jedi	Copy Show
3	UTC 2024-04-15 13:24:50	UTC 2024-04-15 13:26:30		Copy Show

```
1 {
2   "droneplans": [
3     {
4       "waypoints": null,
5       "planned_start_time": 1712815200,
6       "actual_start_time": null,
7       "planned_stop_time": 1712822400,
8       "internal_id": null,
9       "requested_area": {
10        "type": "Polygon",
11        "coordinates": [
12          [
13            [
14              11.938019,
```



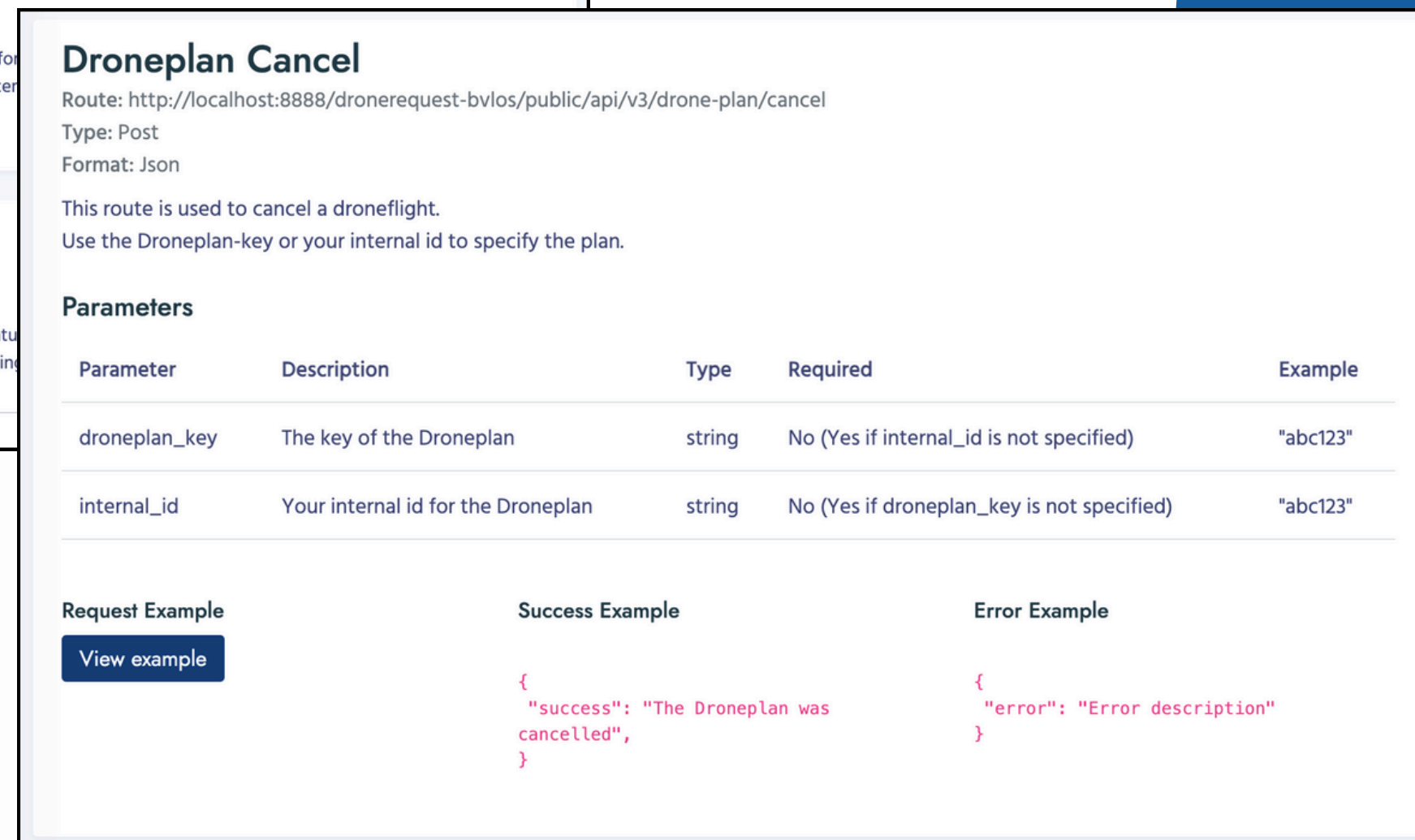
Comprehensive yet simple API



The screenshot shows the 'Api Documentation V3' page. It features a sidebar with navigation links: Main (Home, My Droneplans, My Drones, Settings, Logout), API (Api Documentation, Message history), and Admin (Users, All Droneplans). The main content area includes an 'Introduction' section with the API base URL and a 'Download Postman Examples' button. Below that is a 'What is new in V3?' section with a bulleted list of updates. The 'Workflow' section is partially visible, showing the '/drone-plan' endpoint.

Clear documentation with samples and a complete Postman file.

All version changes clearly marked.



This block provides a detailed view of the 'Droneplan Cancel' endpoint. It includes the route, type, and format. A description explains its use. A table lists parameters with their descriptions, types, and requirements. Below the table, there are sections for 'Request Example' (with a 'View example' button), 'Success Example' (showing a JSON response with a success message), and 'Error Example' (showing a JSON response with an error description).

Droneplan Cancel

Route: `http://localhost:8888/dronerequest-bvlos/public/api/v3/drone-plan/cancel`
Type: Post
Format: Json

This route is used to cancel a droneflight. Use the Droneplan-key or your internal id to specify the plan.

Parameter	Description	Type	Required	Example
<code>droneplan_key</code>	The key of the Droneplan	string	No (Yes if <code>internal_id</code> is not specified)	"abc123"
<code>internal_id</code>	Your internal id for the Droneplan	string	No (Yes if <code>droneplan_key</code> is not specified)	"abc123"

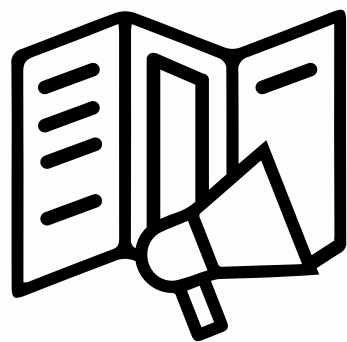
Request Example
[View example](#)

Success Example

```
{  "success": "The Droneplan was cancelled",}
```

Error Example

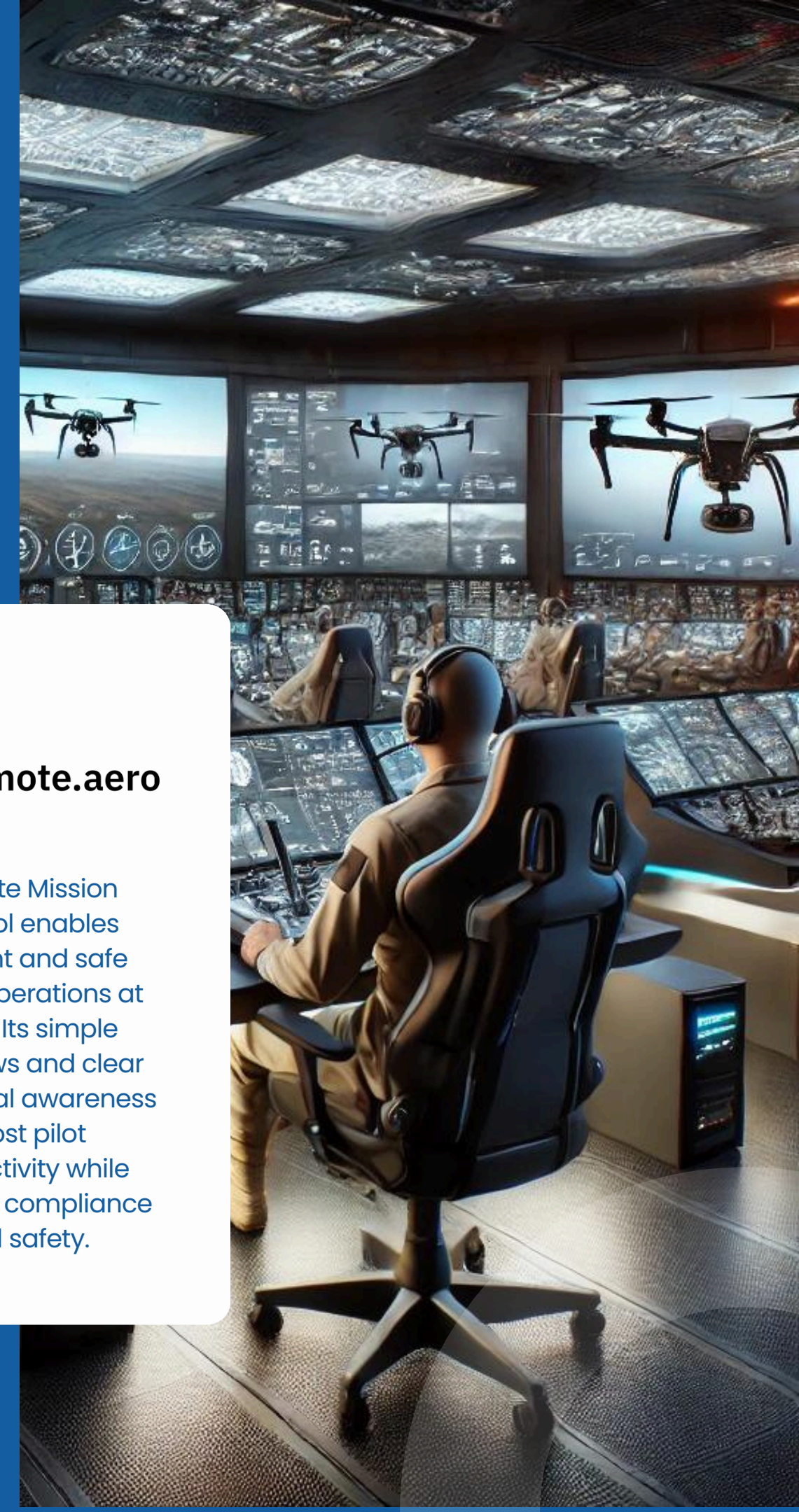
```
{  "error": "Error description"}
```



Clear feedback and error descriptions in API responses

Control Integrations

Integrations are under way with popular command- and control (C2) platforms to further streamline the drone operator experience and interaction with the Unmanned Traffic Management (UTM) interface.



Airhub is a cloud service from the Netherlands. The platform lets operators plan, fly, and log missions of compatible drones remotely by abstracting controls over the cloud. Includes video streaming and AI for object identification.



Flightops is a cloud service from Israel. In addition to software for planning and flying drone missions, the company provides some exciting hardware solutions of their own to enhance drone operations.



ArduPilot is an open-source software suite for drones and unmanned vehicles, providing autonomous navigation, flight stabilization, and control. It's popular for its versatility and reliability in both hobbyist and professional applications



QGroundControl is open-source ground control software for drones, offering flight planning, real-time telemetry, and control, compatible with multiple autopilot systems, and providing an intuitive interface for all users.



Remote Mission Control enables efficient and safe drone operations at scale. Its simple workflows and clear situational awareness boost pilot productivity while ensuring compliance and safety.

Create droneplans

Draw polygon areas (and optionally waypoints), fill in details, or import all data from software like QGroundControl.

Everything can also be submitted via API.

POST `((path))/drone-plan`

Params Authorization Headers (13) Body Scripts Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   "planned_start_time": 1723928693,
3   "planned_stop_time": 1723928993,
4   "internal_id": "134",
5   "requested_buffer_meters": 250,
6   "endurance_minutes": 20,
7   "max_altitude_meters_amsl": 120,
8   "more_info": "My Nice Droneplan",
9   "requested_area":
10  {
11    "type": "polygon",
12    "coordinates": [
13      [
14        [11.896111, 57.691944],
15        [11.897222, 57.697778],
16        [11.947778, 57.730833],
17        [12.034444, 57.731389],
18        [11.933333, 57.643056],
19        [11.896111, 57.691944]
20      ]
21    ]
22  }
23 }
```

Body Cookies (1) Headers (13) Test Results Status: 201 Create

Pretty Raw Preview Visualize JSON

```
1 {
2   "success": "The plan was created",
3   "data": {
4     "droneplan_key": "1723928716-66c1108cda2d1"
5   }
6 }
```

QGroundControl

Upload your QGroundControl File (.plan file)

Välj fil Ingen fil har valts

Finish Delete last point Cancel

1.52 km Click last point to finish line.

Planned Start Time (UTC) 2024-08-17 21:07 Epoch(1723928820)

Planned Stop Time (UTC) 2024-08-17 22:37 Epoch(1723934220)

Max altitude meters amsl 120

Use internal id

Drone Jedi

Drone operator Welanders

Rules VLOS

More info

Force submit

Message log

View messages via the GUI (website) or via the API.

The log includes API errors, warnings, and traffic conflict notifications for your flights.

Time	Unix Timestamp	Message Type	Description	Related Droneplan Key	Route	Query
UTC 2024-04-15 13:22:31	1713187351	Error	0: "The planned stop time cannot be less or equal than the planned start time" 1: "The planned stop time cannot be less than or equal to the planned start time" 2: "You can not register a droneplan with a start time in the past"		/api/v2/droneplan	Show
13:16:42	1713187002	Error	0: "The collection is invalid." 1: "The collection is invalid."		/api/v2/droneplan	Show
13:16:02	1713186962	Error	0: "The collection is invalid." 1: "The collection is invalid."		/api/v2/droneplan	Show
13:12:23	1713186743	Error	0: "The format for waypoints is not correct."		/api/v2/droneplan	Show

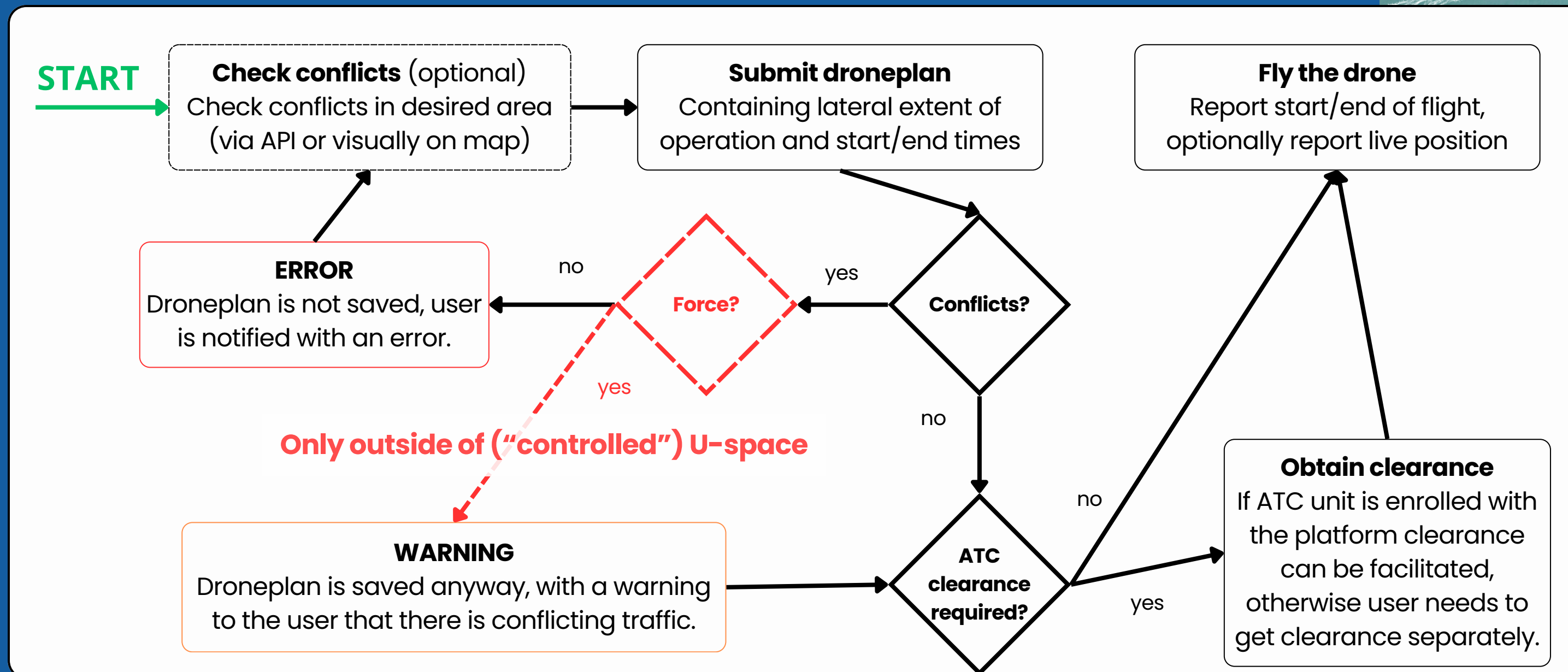
```
1 {
2   "messages": [
3     {
4       "time": 1712852964,
5       "message_type": 3,
6       "description": [
7         "The time between the recorded position and time of report is greater than 3 seconds, check for delays in the system."
8       ],
9       "route": "/api/v2/drone-position",
10      "query": {
11        "lat": 57.694629,
12        "lng": 11.930573,
13        "droneplan_key": "1712851867-66180b9bd06e4",
14        "heading_degrees": 90,
15        "altitude_meters_amsl": 120,
16        "time_position_generated": 1712852946,
17        "ground_speed_meters_second": 3
18      },
19      "droneplan_key": "1712851867-66180b9bd06e4"
20    }
21  ]
22 }
```

Subscribe to alerts (for example by email) for all messages or specific types, like warnings.



Workflow

Sweden, our testing ground, currently lacks established U-space and therefore Dronerequest operates solely on information exchange, features for granting or denying flight authorizations are not in use.



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Dronerequest Platform Overview



CISP domain

If Dronerequest is deployed only as USSP, these databases are populated through the designated CISP



Dronerequest Airspace database & API



Dronerequest commons database & API



Dronerequest manned air traffic database & API



Dronerequest Terrain database & API

USSP domain



Dronerequest sync services Database & API



Dronerequest core database



Dronerequest PRO database



Dronerequest Conflicts database & API



Dronerequest private cloud server cluster

User interfaces



Dronerequest mobile app



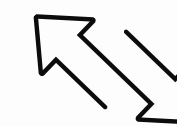
Dronerequest Tower (ATC) interface



Dronerequest PRO web app & API



Police & Rescue interface



Drone operators' systems connecting through API

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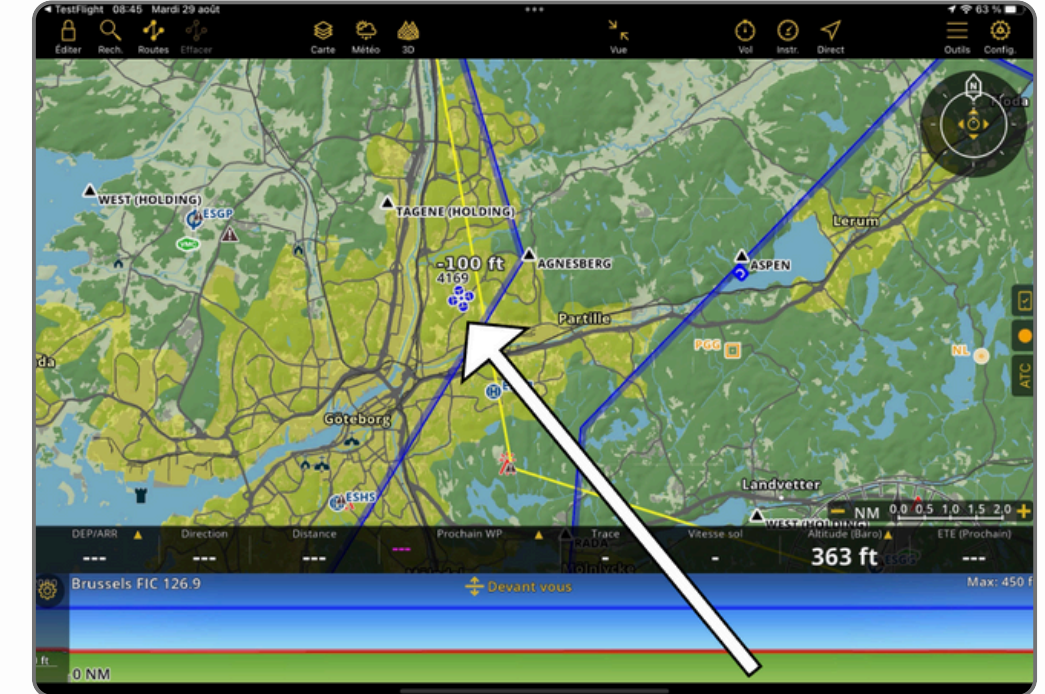
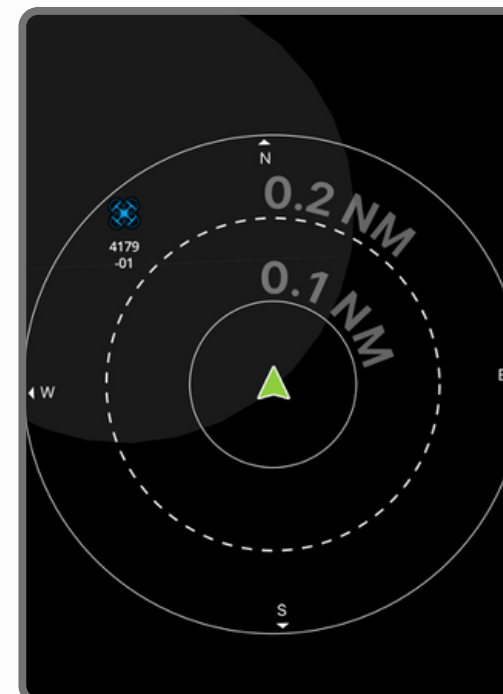
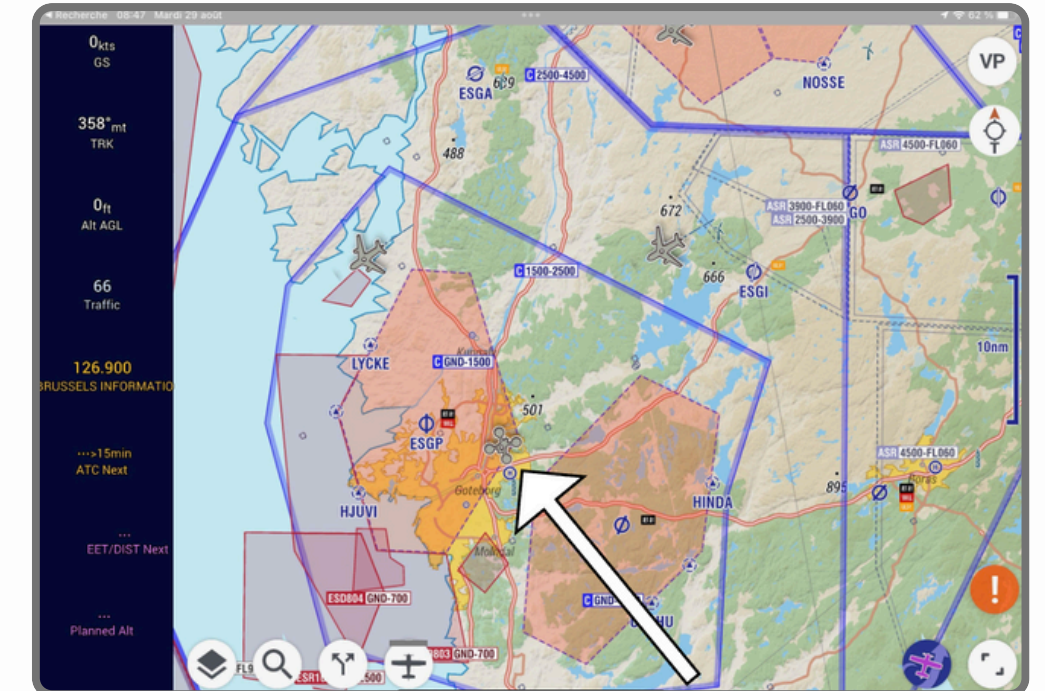
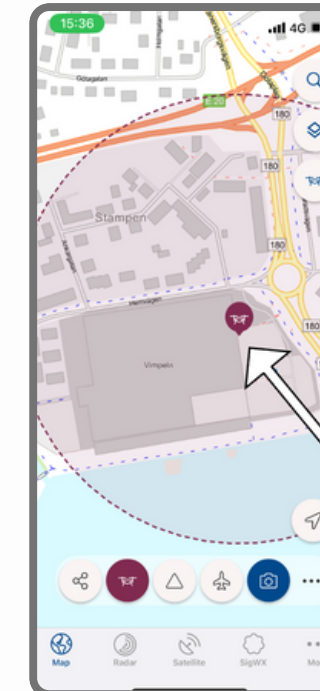
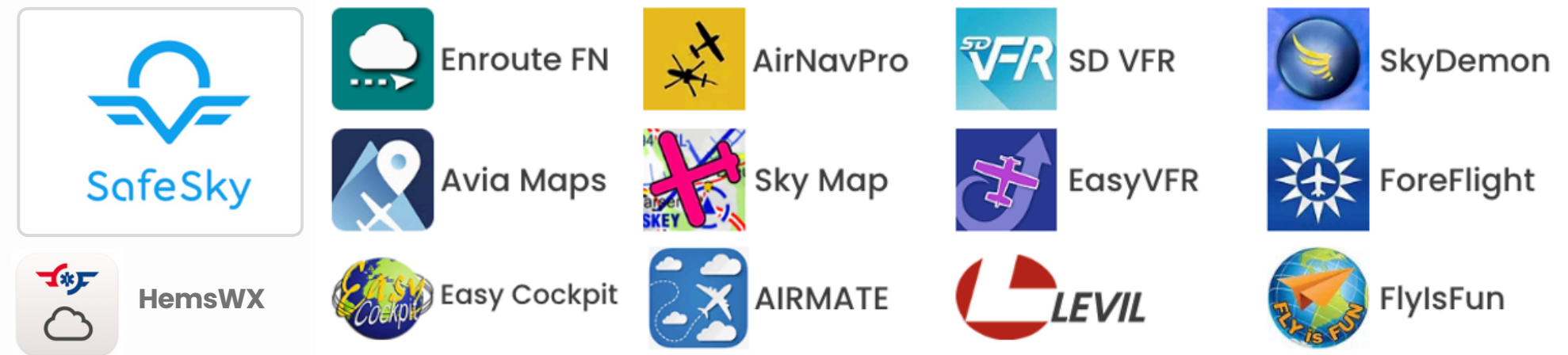


External sharing

When you submit data on a drone flight in Dronerequest, the relevant information is shared with select third-party platforms and apps.

This **enhances flight safety** by providing means for crews of manned aircraft (such as VFR pilots, **ambulance** or **search-and-rescue** helicopters) to see your drone in advance.

This is particularly helpful for low-level operations where air traffic is not typically expected.

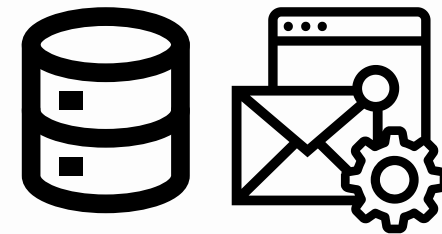


Inclusive

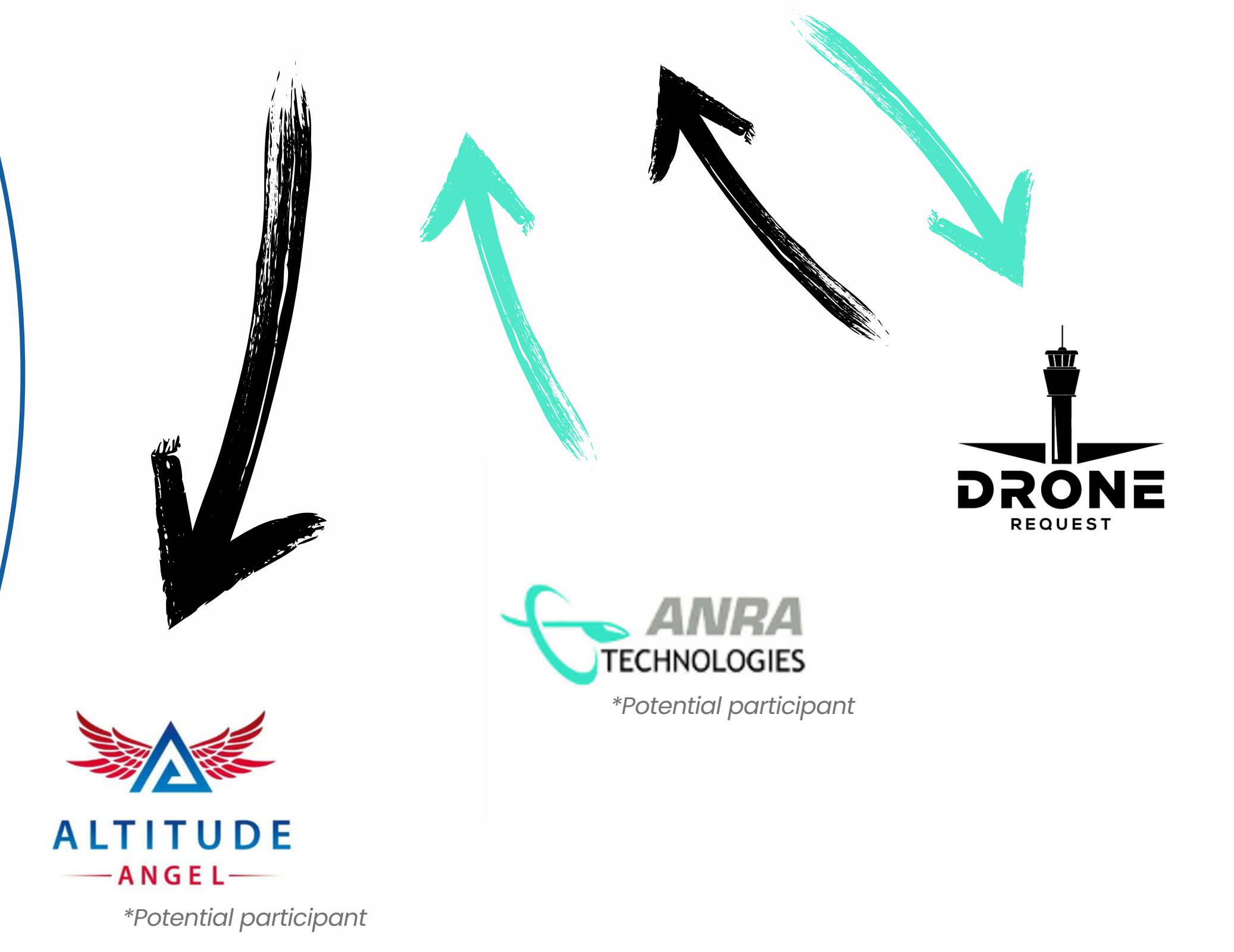
Designed to elevate flight safety, Dronerequest integrates and **collaborates with other platforms** and systems, ensuring smooth coexistence even in a competitive environment.

The conflict detection system of the Dronerequest platform is **designed** to be used by **multiple applications**.

Integration is as simple as getting an API key and providing the Dronerequest conflicts database with a means to obtain your platform's essential droneplan data.



Dronerequest Conflicts database & API



Modular

Dronerequest is a platform made up of several components. You may want to put some of them or all of them to use in your region.

All components pertaining to the CISP domain can be deployed irrespective of the Dronerequest user interfaces.

CISP domain



Dronerequest Airspace database & API



Dronerequest commons database & API



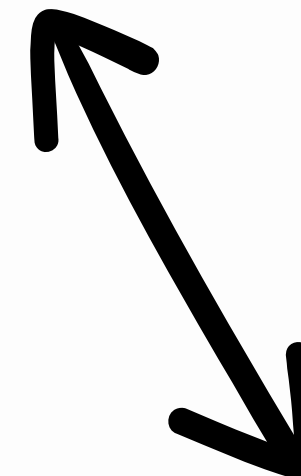
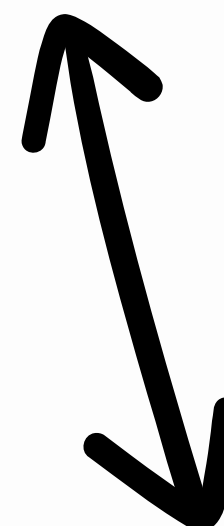
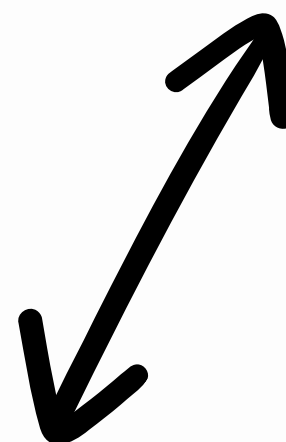
Dronerequest manned air traffic database & API



Dronerequest Terrain database & API



Dronerequest Conflicts database & API *



According to current EASA specification the conflict detection/central clearance database is NOT a CISP but a USSP responsibility.
But we think it ought to be.



**ALTITUDE
ANGEL**

Potential USSP in the region



Potential USSP in the region



Branding

Dronerequest is a registered trademark in the European Union, but “Dronerequest” is not necessarily the name of the end-user applications in your region.

The Dronerequest components may be the underlying technology, but the end-user product in your region may be **called something completely different** such as “Dronelink Aerorequest” or “Droneguide of Valoria.”



Overview

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Projects

We have joined a four-year project funded by Vinnova (Sweden's innovation agency) as a continuation of the Swedish PNK4UTM* project. Together with RISE (**Research Institute of Sweden**) we take a closer look at drone capabilities in relation to sea rescue operations.

In this project the **Naviation** team is **replacing Altitude Angel** in the UTM capacity (Dronerequest replacing Guardian) and Remote.Aero provides a proprietary C2 platform currently used for controlling the fixed-wing drones operated by the Swedish Sea Rescue Society (SSRS).

Ericsson provides measurement of actual connectivity and mobile network operators Teracom, Hi3G and Tele2 provide datalink.

* PNK4UTM was a Swedish project spanning four years of research around positioning, navigation and communication infrastructure and prerequisites for upscaling UAV operations.

VINNOVA



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ERICSSON 

TERACOM 

TELE2 





naviation

Thank you!



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