



AI-Based Unmanned Traffic Management System

**UTM Best Practices – Drone Enable 2022**



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# Agenda



Airwayz Background

The INDI UTM Pilot

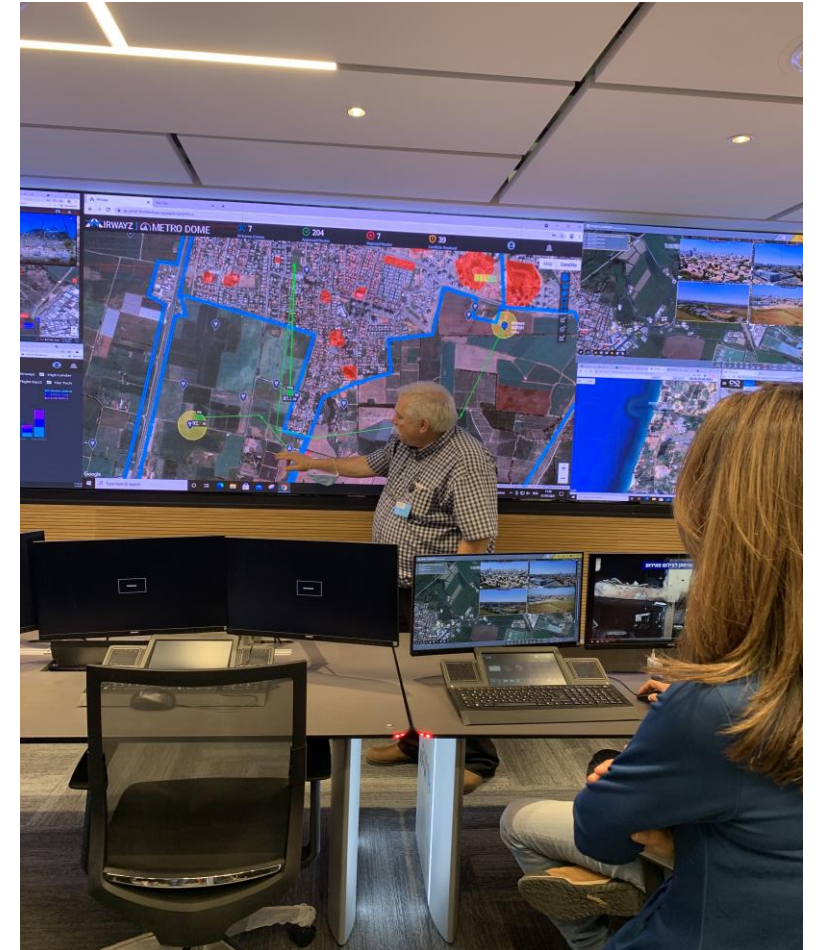
Case Study 1: Manned & Unmanned

Case Study 2: Dynamic Capacity

Case Study 3: The Tel Aviv Marathon

Port of Rotterdam U-Space Upcoming Project

Summary



# About Airwayz



- Founded in 2018 by 3 Israeli Air-Force Aircrew
- Focus on developing Advanced & scalable UTM Technology
- Leading the Israeli National Drone Initiative (INDI) – Global Largest UTM Pilot
- Upcoming commercial Deployment of scalable UTM ('U-Space') in Port of Rotterdam, Netherlands





# WIRWAYZ

## AI-Based Dynamic UTM

EMERGENCY



UNKNOWN



DELIVERY



POLICE



MEDIC



POLICE



DELIVERY



MEDIC



# AI-Based UTM

Enable Diverse of Aerial Fleets to perform optimal flights in Minimum time and high Safety

Using AI-engine for the highest efficiency of a dynamic airspace management

Commercial Scalability by Maximizing the Airspace Capacity usage



# INDI UTM Pilot main stats



Airwayz role as a main UTM\USSP,  
focusing on U-Space Mandatory services & Advanced Services

+15,00

10

+40

0

UAS Operators

Drones

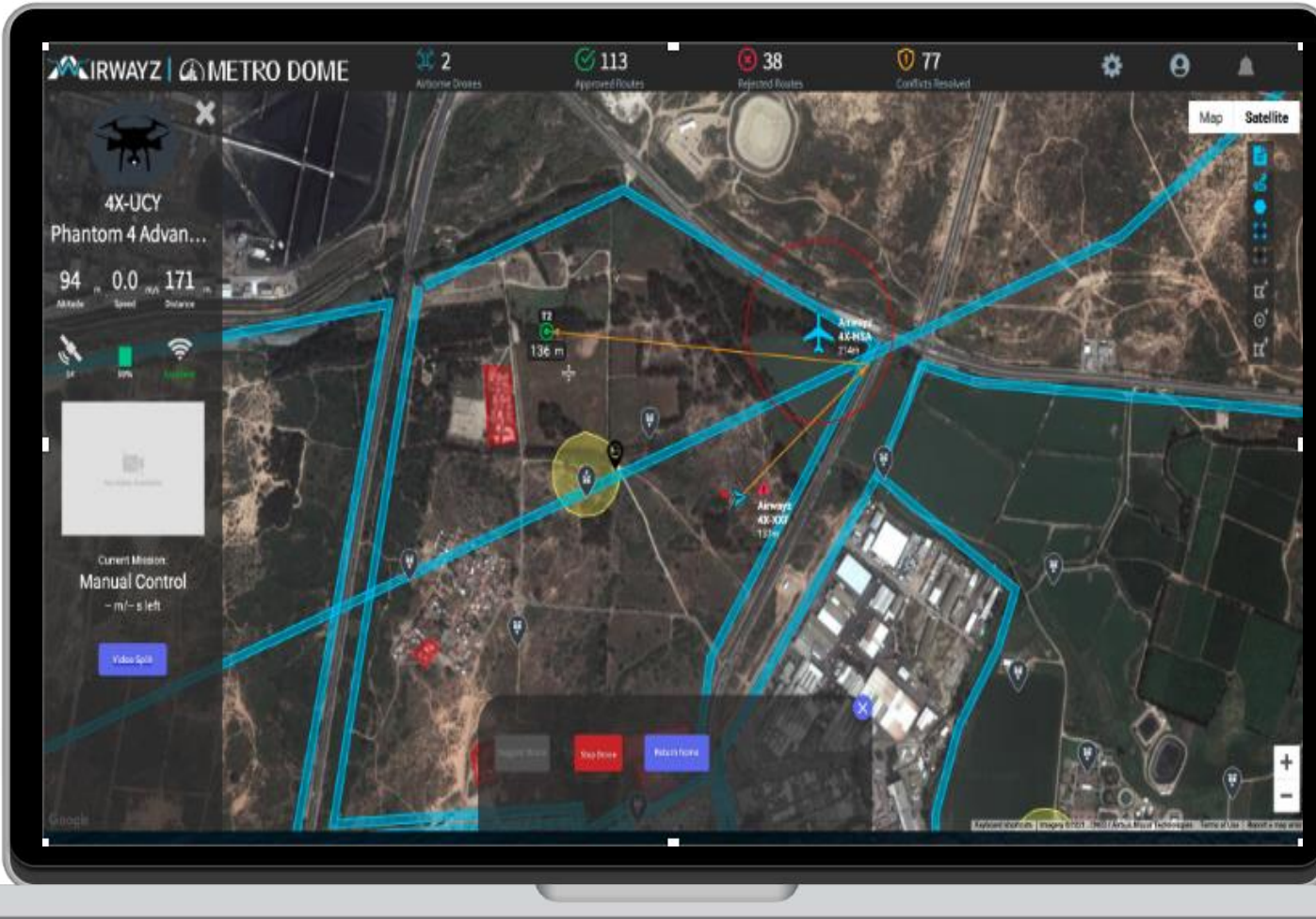
flights

- Up to 500 flights per day
- Strategic & tactical Conflict detection & resolution
- De-Conflict with Manned Traffic
- Dynamic integration with 3<sup>rd</sup> party providers, such as Drone radar, Geo information, weather, etc.
- Capacity analysis & Data-driven analysis
- ASTM & EU Regulation compliance



# Case study 1 – Manned & Unmanned

Testing the coexistence of manned & unmanned with several scenarios of De-confliction



## Scenario Background

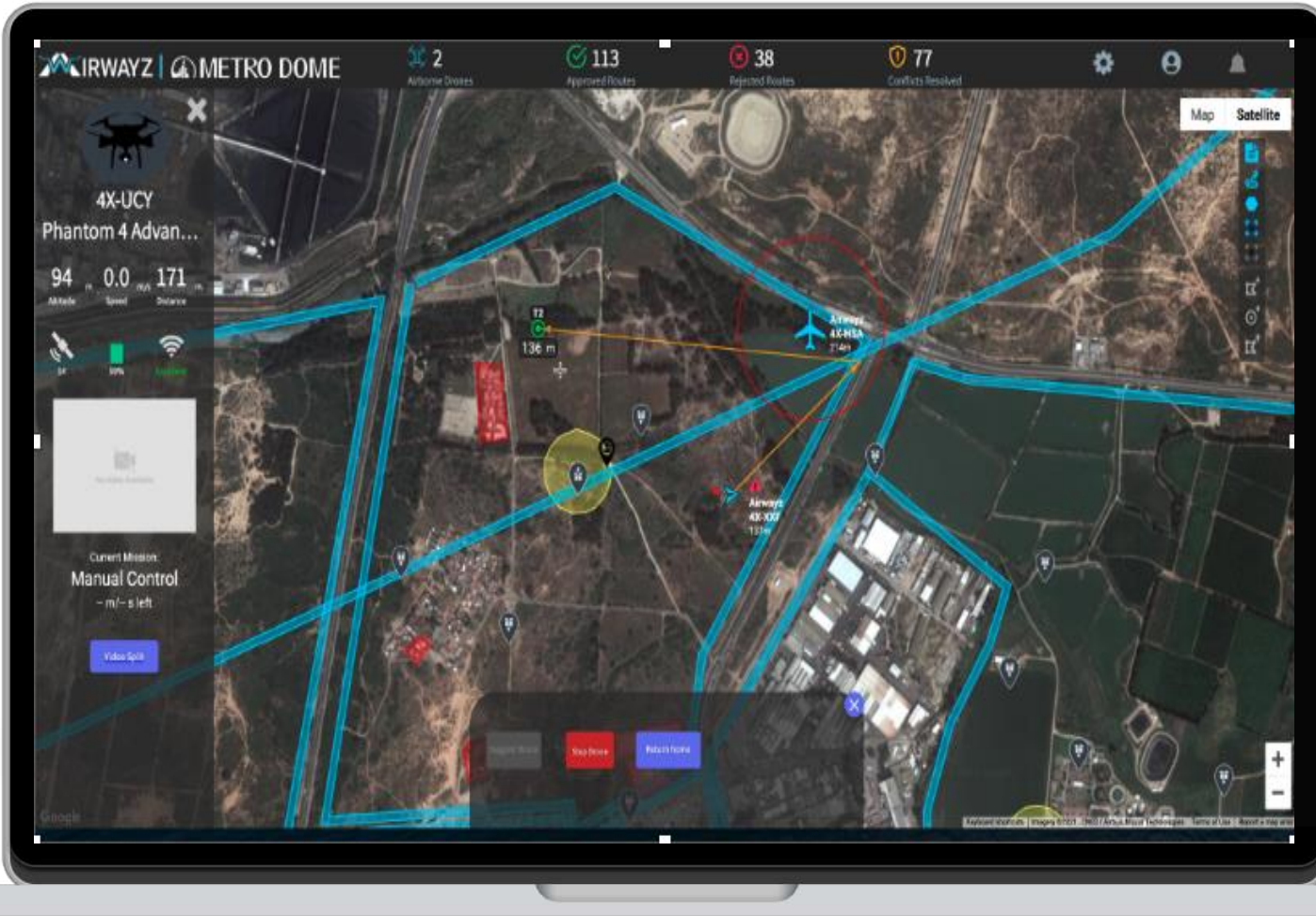
- Scenario: 2 delivery drones by different operators and 1 Manned Aircraft:
  - Coexistence in same operational airspace
  - Strategic & Tactical de-confliction
  - Priority via emergency, Air-Taxi..
- Analyzing Live Aircraft Data (Cellular, ATC Radar, ADSB) & comparing off alternatives
- Evaluating the potential collaboration of the Aircraft within the U-space (Known planned route vs. actual performance)



# Case study 1 – Manned & Unmanned



Testing the coexistence of manned & unmanned with several scenarios of De-confliction



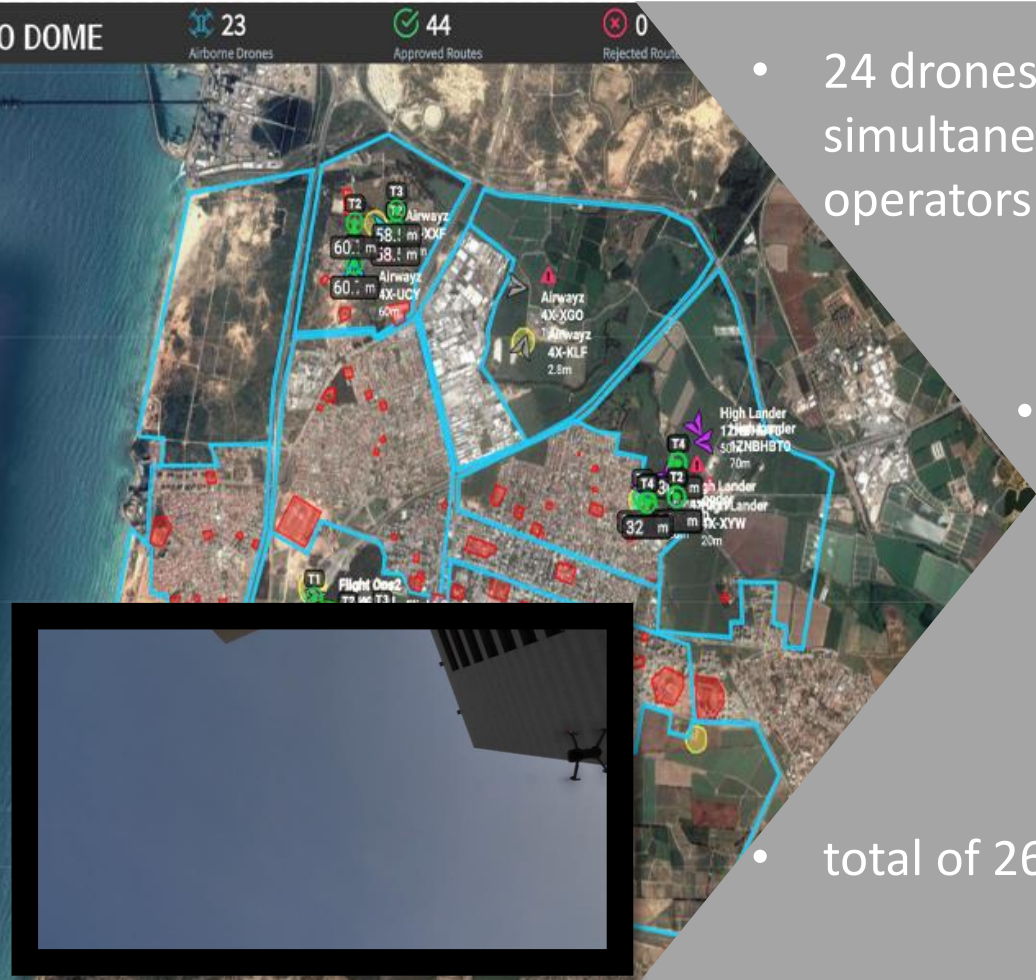
## Lessons Learned

1. Maintained the calculated separation in all the test scenarios
2. Cellular broadcast suffice for separation, based on network coverage analysis
3. Vehicle Participation in the U-Space Network is mandatory for coexistence
4. Tactical De-conflict
  - Different levels of de-conflict suggestions is needed
  - Ability of the UAS operator to comply

# Case study 2 – Dynamic Capacity



Examining capabilities of managing capacity of several operators with Multiple vehicles simultaneously for proof of commercial scalability



- 24 drones flying simultaneously by 8 operators in 3 sq mi
- 2 live drones + 54 simulated drones for 'Max capacity'
- total of 2681 sorties

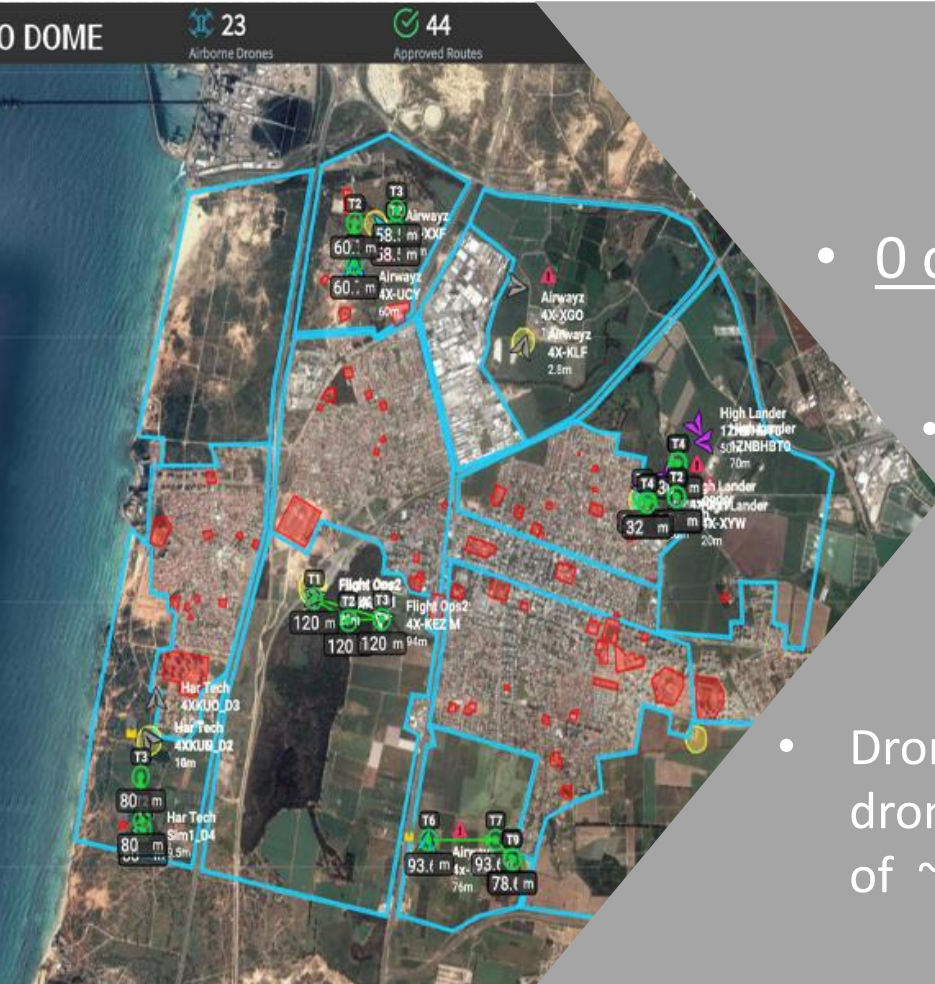
## Scenario Background

- Requesting several operators to perform multiple BVLOS flights
- Crossing destinations, each operator aiming to maximize his own number of flights
- Adding dynamic reconfiguration – restrictions and limitations in real-time

# Case study 2 – Dynamic Capacity



Examining capabilities of managing capacity of several Operators with Multiple vehicles simultaneously for proof of commercial scalability



## Results

- 0 conflicts unresolved
- Out of 2681 sorties - 71 conflicts detected in pre-planned (2.5%) and 31 during flights (1%), due to Actual Vs. Planned
- Drones' density reached is 5 drones per 0.3 sq mi, usage of ~37.5% of the airspace

## Lessons Learned

- A 'Weak player' (UTM\UAS) can impact whole airspace performance
  - ✓ Optimized route service
  - ✓ Billing per use as an optional mechanism to maintain 'fair sky usage'
- 'Man in the loop' – focus UTM Operator where his attention is needed

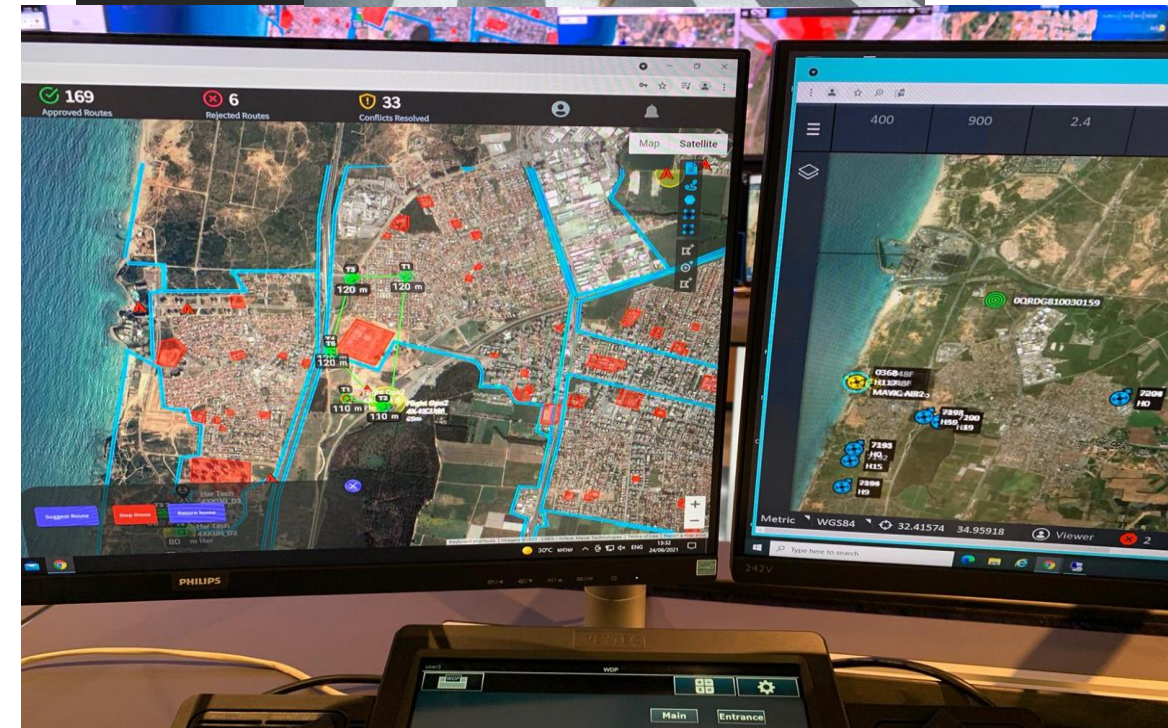
# Case study 3 – Tel Aviv Marathon



Managing joint authorities drones over overcrowded event combining a counter drone system

## Lessons learned

- A Total of 18 different drones by authorities monitored 40K runners in an area of 1 sq mi
- Counter drone system detected 6 more unauthorized consumer drones
- System de-conflicted between a police drone and an unauthorized drone
- Enables authorities to use priority for best optimized & safe operation



# Port of Rotterdam



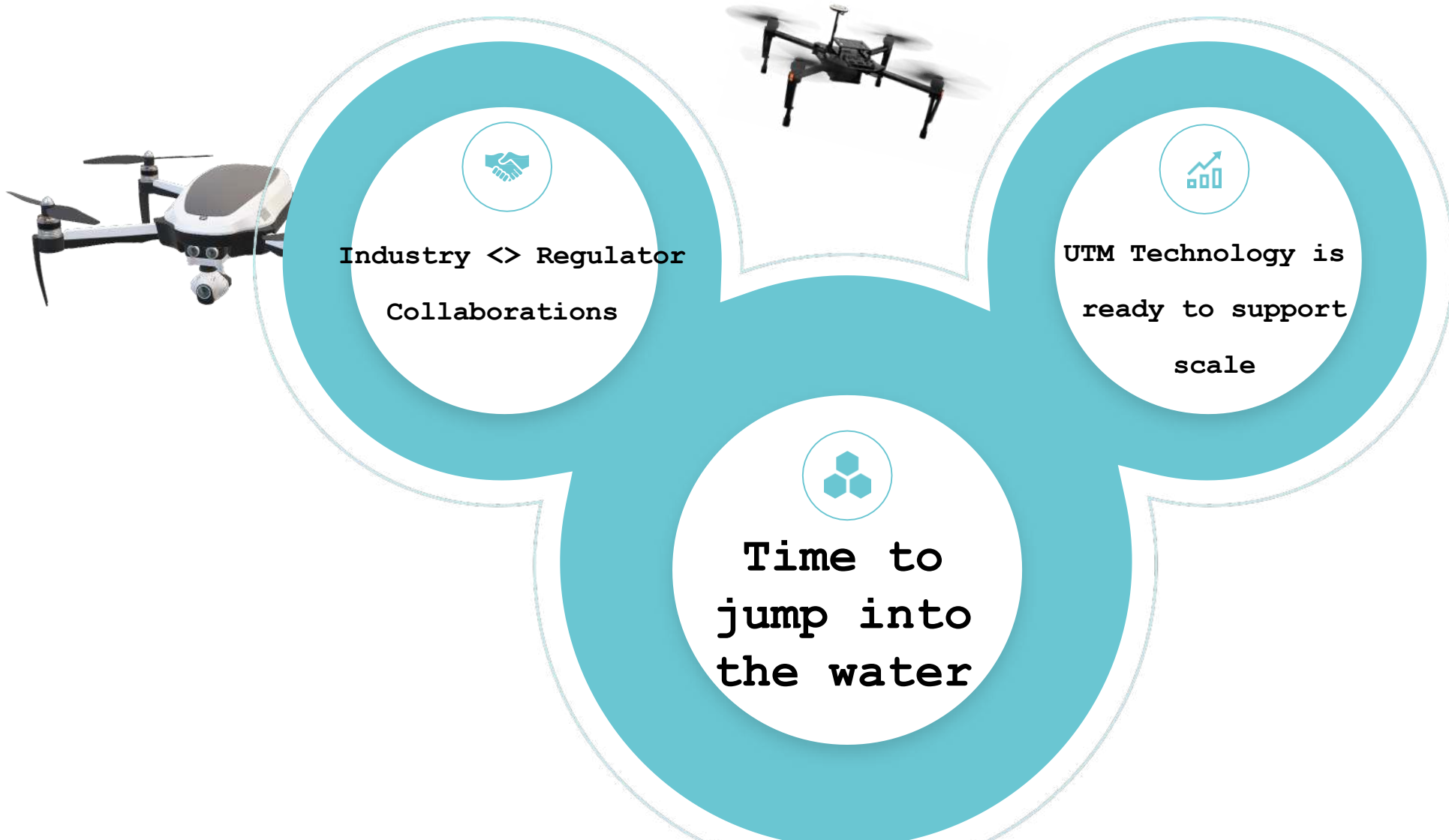
Europe first Automated Airspace for Unmanned & manned Vehicles

The screenshot displays the AIRWAYZ METRO DOME interface, which is a digital air traffic control system for drones. The interface is overlaid on a satellite map of the Port of Rotterdam. It features several key components:

- Safety:** Includes "Synchronized operations" and "Immediate actions" panels, each with a small image of a drone.
- Security:** Includes "Port patrol", "Emergency call", "Carrier inspection", and "Port-police" panels, each with a small image of a drone in operation.
- Maintenance:** Includes "Debris, trash", "Sea inspection", and "Bridges inspection" panels, each with a small image of a drone.
- Transport:** Includes a "Taxis & deliveries" panel with a small image of a drone carrying a package.

The map shows various drone flight paths and zones, with labels such as "Airwayz PH-ZZF 30m", "Airwayz PH-CZF 30m", "Airwayz PH-AKT 30m", "UtmQa3 PH-THY 20m", "UtmQa3 PH-TTY 20m", "UtmQa3 PH-DOA 20m", "UtmQa3 PH-DOK 20m", "UtmQa2 PH-DOA 20m", and "PH-CZZ 20m". There are also "inspec 5 20m" and "inspec 1 20m" labels. A large red circular area is visible on the right side of the map. In the bottom right corner, there are several "UTM Log" entries, such as "PH-ZZF Final Flight plan: approved" and "PH-AKT Final Flight plan: approved", with a timestamp of "Today at 10:42 PM".

# Summary





# Thank you

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