

VUTURA

Validation of U-space by Tests in Urban and Rural Areas
- The Case of Airport Air Traffic Control

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ACI Drones workshop – Oslo, 26 November 2018



U-space

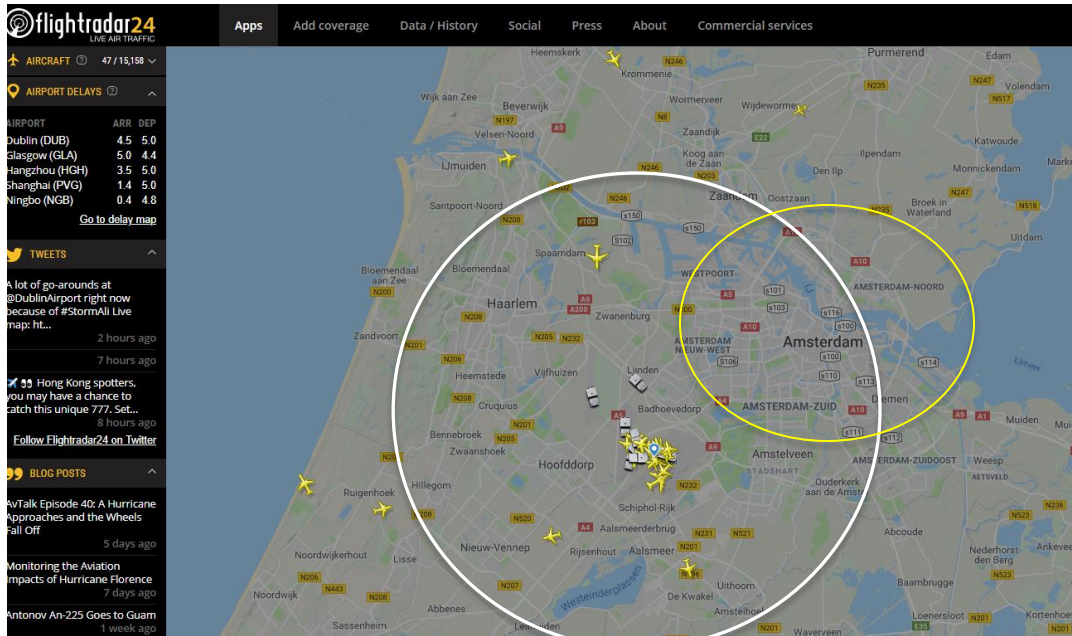


Where are the drones?

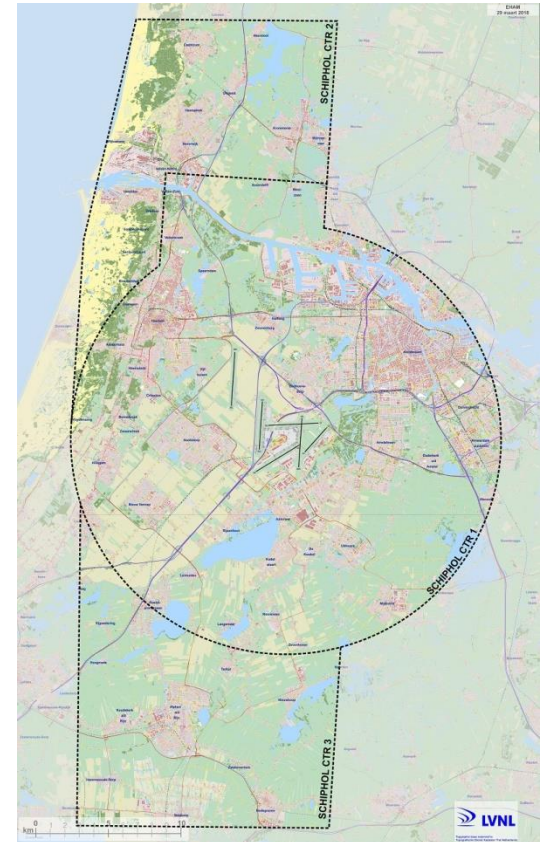


No manned aircraft over the city but flights over Amsterdam are not allowed

Amsterdam Schiphol CTR



Traffic picture of 19/09/2018
(source: Flightradar24)



Air traffic controller and drones



Will it respond to my clearances?

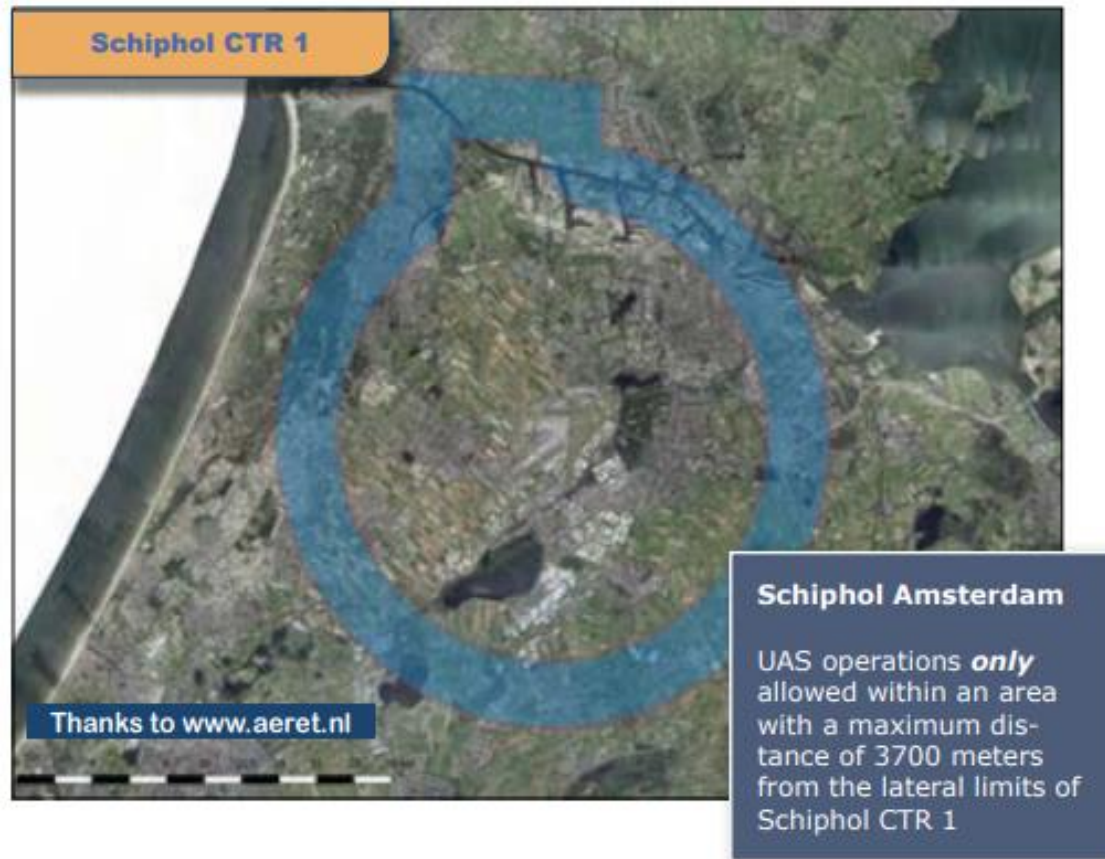
Will it fly autonomously?

How do I contact the pilot?

Will it not fall out of the sky?

What are performance characteristics?

Progress is made: Operations in the outer ring of the CTR



Requirements for flights in NL CTRs

The drone:

- The drone's mass shall not exceed 25 kg.
- The drone's speed shall not exceed 100 kts (185 km/h)
- The drone shall operate in VLOS conditions
- The drone shall be equipped with a transponder
- Two-way radio communication is required: pilot contacts ATC before and after the flight; during flight, the frequency must be monitored

You shall

The organisation:

- The operation must be described in the operator's operational handbook
- At least two crew: a pilot and an observer
- Drones need an airworthiness specification RPAS

The environment:

- No flights over congested areas (densely populated areas)
- Normal, abnormal and emergency procedures need to be established and tested

Results up to now

About 150 flights have been performed in CTRs of four Dutch airports

No problems reported

Concept

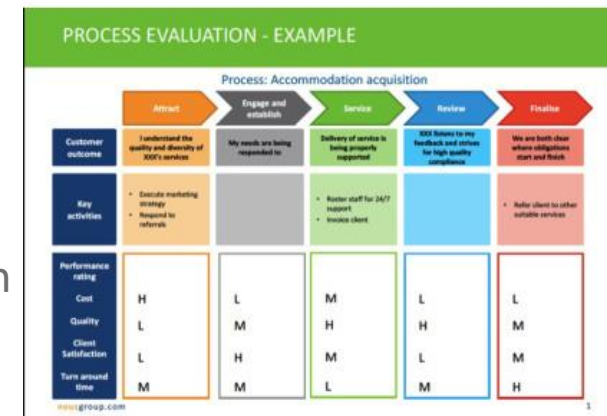
- Basic principle is to regard drones the same as manned aviation

Issues

- Disturbed communication (long distance & low altitude)
- Little R/T experience from drone-pilots
- ATCo considers these “far away” flights additional burden

Equipment

- Mostly transponders, but without is currently also allowed
- Necessary when flying in areas where manned traffic can be expected





VUTURA

Drones in the CTR of a controlled airport



Founding Members



EUROPEAN UNION



EUROCONTROL

VUTURA = Validation of U-Space by Tests in Urban and Rural Areas

Project members are NLR (Coordinator), TUDelft, Municipality of Enschede, UAVI, AirHub, LVNL, Unifly, AirMap, UniSphere, Robor Electronics



City of  Enschede



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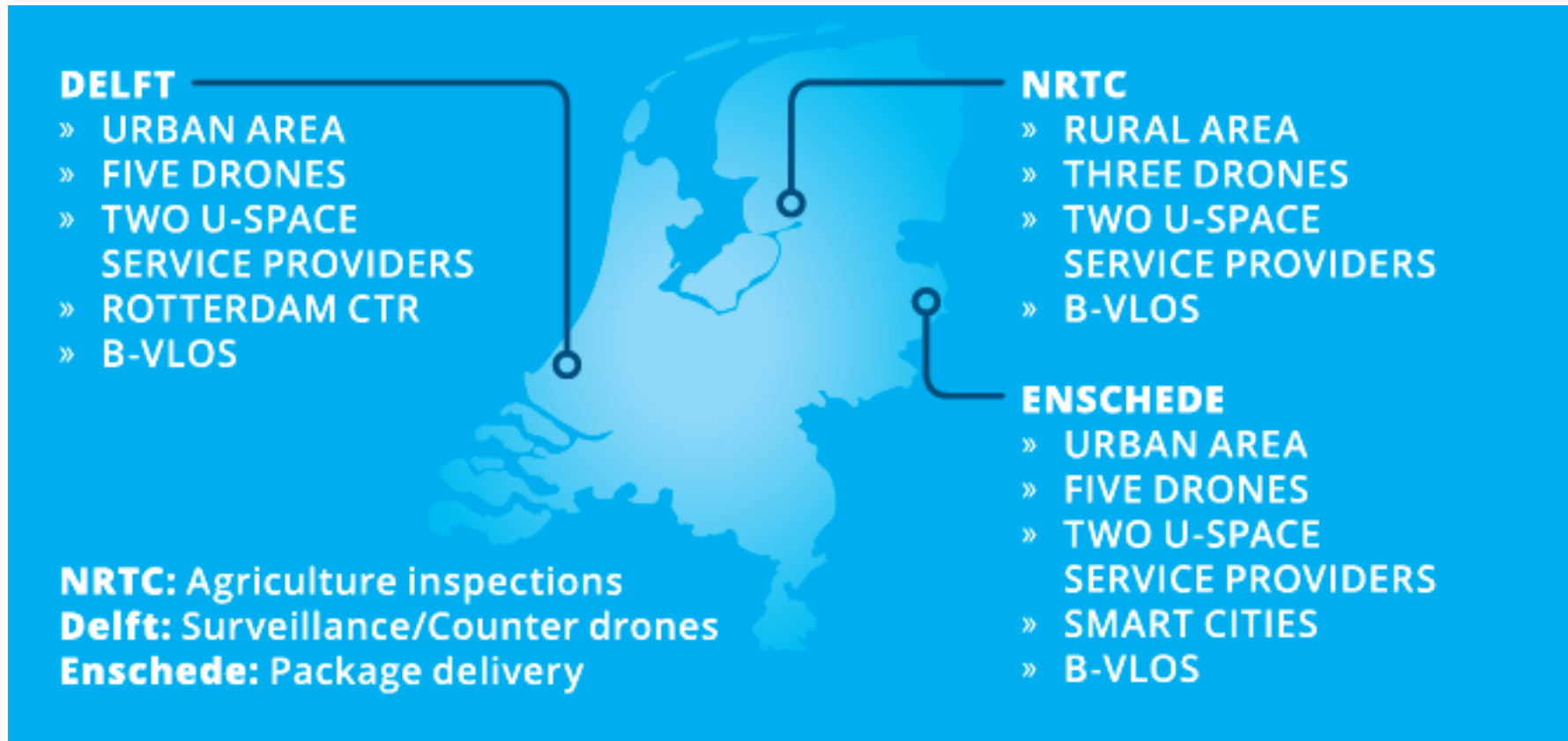
AIRMAP



UNISPHERE



VUTURA flight trials & scope



VUTURA main KPAs

VUTURA covers both

- Two USPs provide services in adjacent areas, where one drone will pass through both areas
- Two USPs provide services in the same geographical areas, where drone operators choose one of the USPs to file their flight plans

- KPA focus on interoperability
- KPA focus on safety

Important U-space aspects:

- Different technology from USPs
- Emergency flights / priorities
- Integration with ATC

U1 services	E-registration	Partially	If
	E-identification	Partially	If
	Pre-tactical geofencing	Fully	If
U1 capabilities	E-identification		If
	On-drone geofencing	Fully	If
	Security		If
	Telemetry		If
	Command & control		If
	Comm, nav and surveillance		If
	Operations management	Fully	If
U2 services	Tactical geofencing		If
	Emergency Management	Partially	If
	Strategic de-confliction	Fully	If
	Weather information	Partially	If
	Tracking	Fully	If
	Flight planning management	Partially	If
	Monitoring	Fully	If
	Traffic information		If
	Drone AIM	Partially	If
	Procedural interfaces ATC	Fully	If

VUTURA: Additional system in the Rotterdam tower

Controllers will check the new system

- Will it distract them

- What should be on the display

- How does the picture supplement the existing (radar) information

Technical requirements

- We will provide two U-space systems (Unifly and AirMap)

Interaction with drone pilot

- Two way radio communication

- Clearances for start

- Information when flights are finished



VUTURA

Aim of system in Rotterdam tower

To gain experience with U-space in the control tower

To build trust with controllers on U-space

Technical

- To establish requirements for U-space in an airport environment
- To evaluate the communication between ATC and drone-pilot/-operator

Operational

- To evaluate the controller's working position for U-space
- To evaluate working with multiple U-space providers
- To evaluate different priorities for e.g. emergency flights
- To evaluate priorities for manned aviation



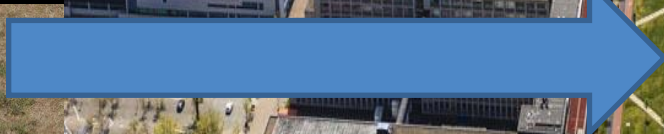
Demonstrate operations near an airport; including interaction with ATC

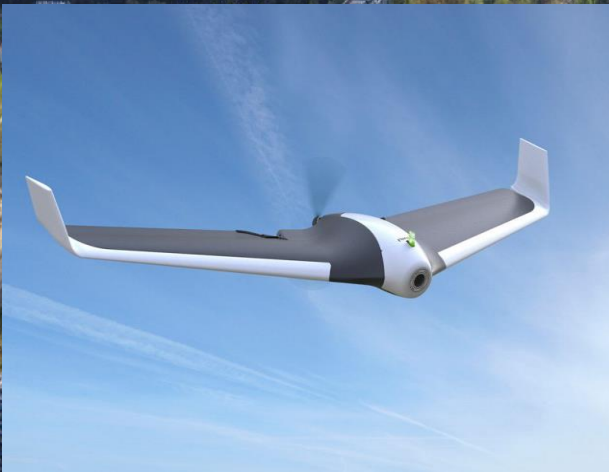
The Delft scenario in the Rotterdam CTR











VUTURA – the way forward

CHALLENGING U-SPACE SCENARIO IN ROTTERDAM CTR

Multiple U-space service providers
Priority flights

VISIT OUR DEMONSTRATION IN JULY 2019!



Thank you very much
for your attention!



U-space

