

Safe Drone Flight

Assuring telemetry data integrity in U-space scenarios

A large, light blue, curved line that starts from the top right and sweeps down towards the bottom left, framing the content.

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1. Introduction & Context

Who was involved?

When did it take place?

Why was the research conducted?

2. Methodology

How was the research carried out?

3. Results & Conclusions

What were the results and conclusions?

Where are the gaps/future opportunities?

1. Introduction & Context



Who was involved?

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When did it take place?



Why was the research carried out?

Context



Diversification of airspace users



Surveillance data crucial for ATCO SA



Challenge



Traditional safety-assured **surveillance assets** aren't suitable for emerging users

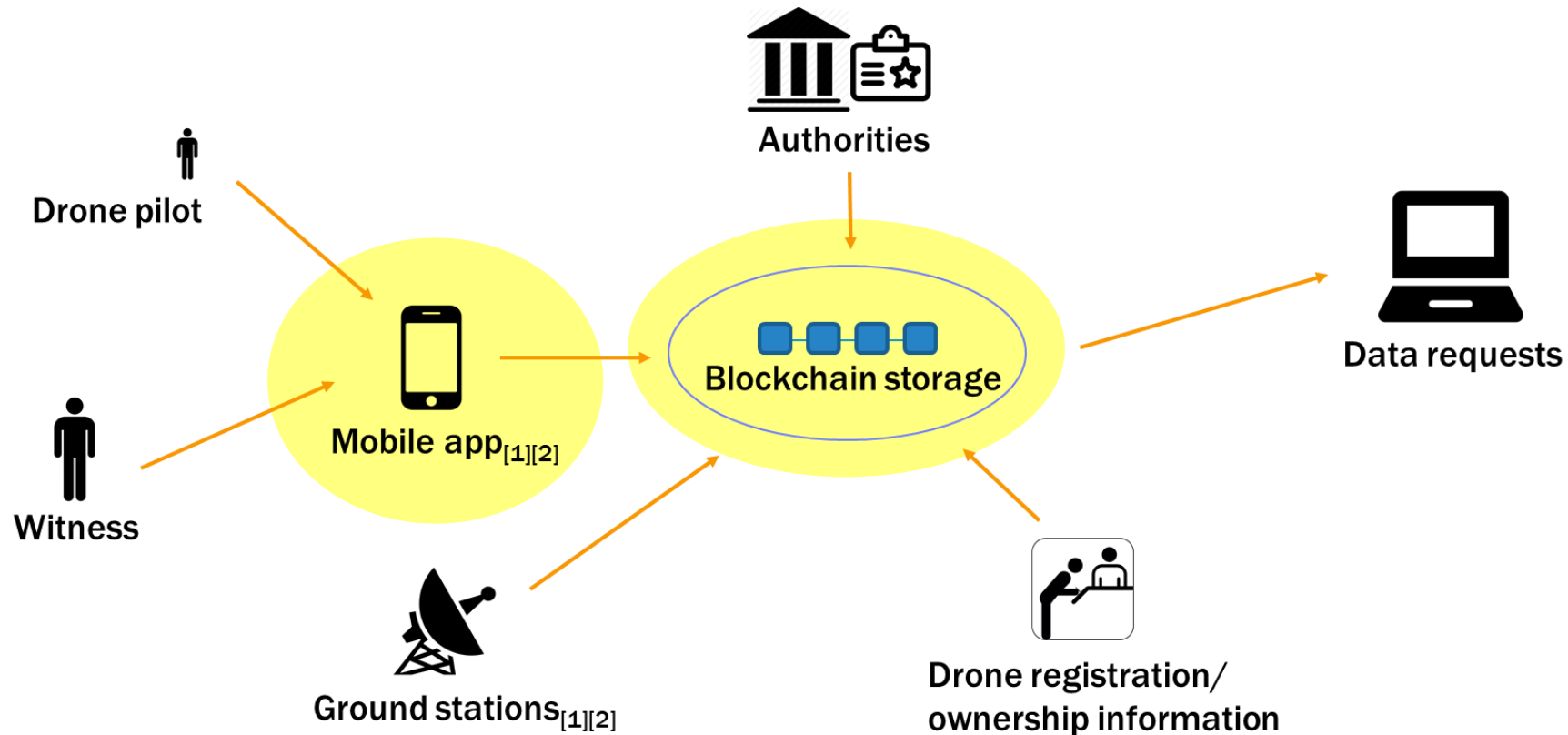


To find a solution for obtaining **safety-assured drone surveillance data**

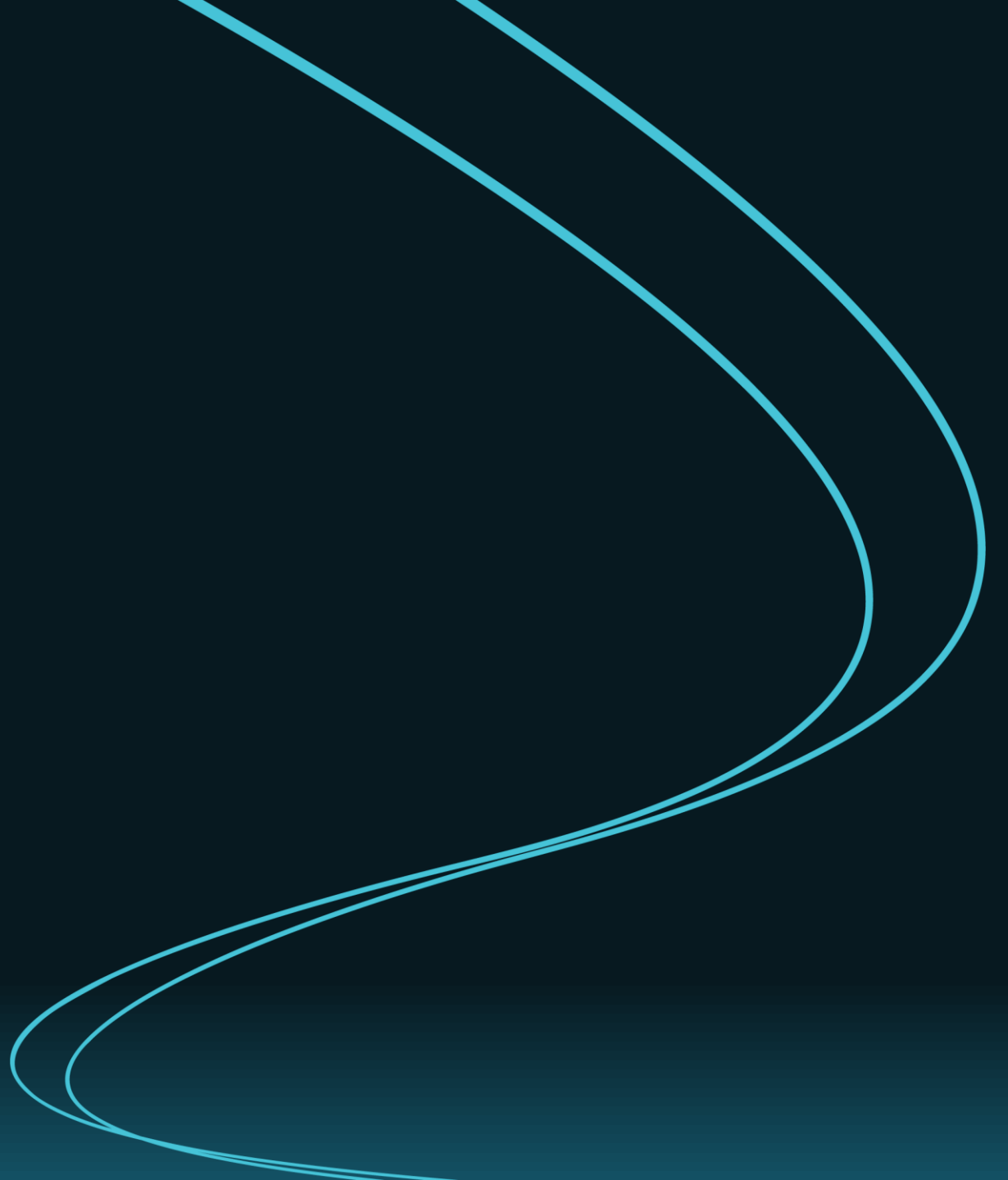
By developing a safe & secure **surveillance system** that **assures the integrity** of telemetry data from **alternative sources** (e.g. drones)

Why was the research carried out?

To mature a drone detection concept



2. Methodology



How was the research carried out?



3. Results & Conclusions



What were the results and conclusions?



Use Cases & Scenarios

- 9 U-space use cases with nominal and non-nominal scenarios



Safety Assurance Hazard Assessments

- Deduced integrity requirements on drone telemetry data



Cybersecurity Assuring Digital Trust

- Identified security threat mitigations and requirements on future surveillance systems



Concept Maturation

- Assessed applicability and suitability of the witness and blockchain-based concept for drone surveillance

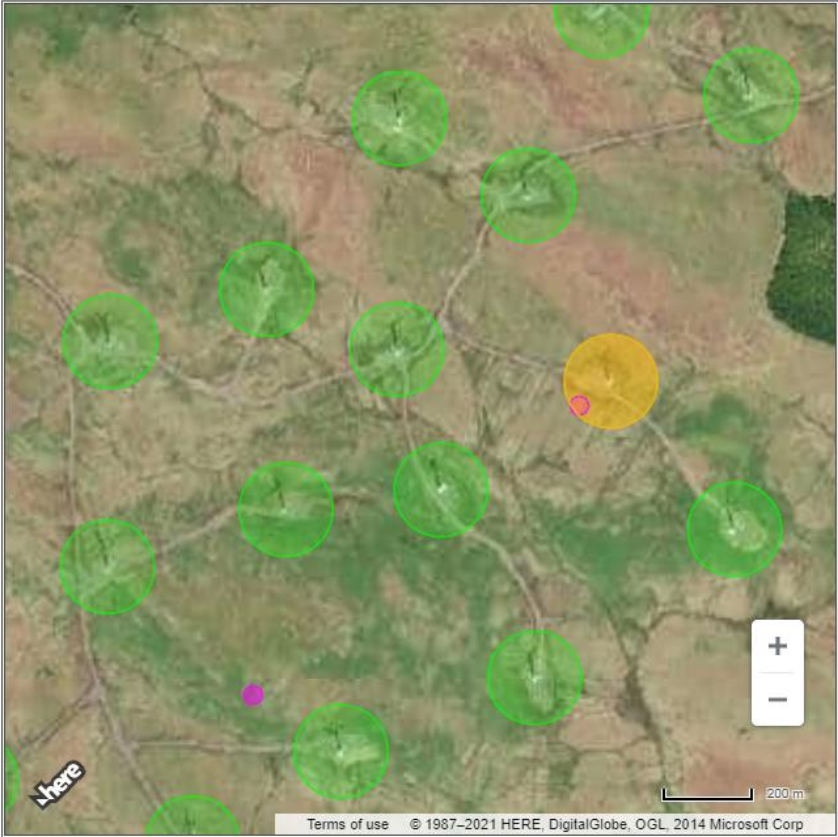


Workshops

- 2 workshops conducted, disseminating research and validating findings

What were the results and conclusions?

Drone Monitoring Platform



Contract Information

You are not required to have any ether to use the app, but you must target your account/wallet at the Rinkeby test net.

Live: ☐

Drone size:

Block range: 7858248 - 7858280

View time: 2021-01-08 10:22:17

Events After:

Events Before:

Playback controls:

Drone

Witness

Witness (detection)

Flight Corridor

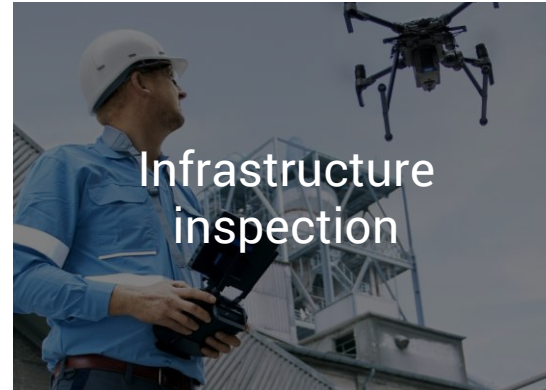
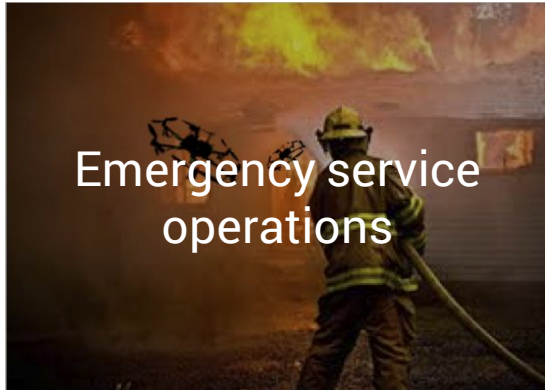
No fly zone

Drone Reports					Witness Reports				
Time (unix epoch)	Device ID	lat	long	drones	Time (unix epoch)	Device ID	lat	long	drones
1610101424	83312360855318817	-4.469094			1610101424	52771430355307758	-4.483231		
1610101424	25408927355317467	-4.510528			1610101424	42013013455306998	-4.473321		
1610101421	83312360855318817	-4.490094			1610101424	11692515455306284	-4.494492		
1610101421	25408927355317467	-4.510528			1610101424	55594011255306393	-4.505331		
1610101418	83312360855318817	-4.469094			1610101424	353806511055308445	-4.477496		
1610101418	25408927355317467	-4.510528			1610101424	304447787255313417	-4.48029		
1610101415	83312360855318577	-4.47018			1610101424	282149036255314856	-4.48464		
1610101415	25408927355317467	-4.510528			1610101424	52087962955307381	-4.488466		
1610101412	25408927355317467	-4.510528			1610101424	93047011955310507	-4.494408		
1610101412	83312360855318284	-4.471506			1610101424	68989579155297983	-4.508367		
1610101409	25408927355317467	-4.510528			1610101424	198192871055308661	-4.499955		
1610101409	83312360855317599	-4.472832			1610101424	150870545855303223	-4.504277		
1610101406	25408927355317467	-4.510528			1610101424	17338110855308978	-4.491614		
1610101406	83312360855317698	-4.474158			1610101424	46550596455311611	-4.489119		
1610101403	25408927355317037	-4.509717			1610101424	192561133355302188	-4.499107		
1610101403	83312360855317405	-4.475484			1610101424	20495665835529998	-4.516559		
1610101400	25408927355316485	-4.508676			1610101424	148551100755307079	-4.514124		
1610101400	83312360855317112	-4.478809			1610101421	72521840855316977	-4.477813		
1610101397	83312360855316838	-4.479115			1610101421	377394335855310459	-4.484723		
1610101397	25408927355315933	-4.507636			1610101421	52771430355307758	-4.483231		
1610101394	83312360855316531	-4.477904			1610101421	42013013455306998	-4.473321		
1610101394	25408927355315382	-4.506595			1610101421	304447787255313417	-4.48029		
1610101391	25408927355314483	-4.505555			1610101421	396453061055315338	-4.472766		
1610101391	83312360855315769	-4.478385			1610101421	11692515455306284	-4.494492		
1610101388	83312360855315607	-4.478807			1610101421	93847011955310507	-4.494408		
1610101388	25408927355314278	-4.504514			1610101421	68989579155297983	-4.508367		
1610101385	83312360855314248	-4.476149			1610101421	192561133355302188	-4.499107		
1610101385	25408927355313726	-4.503473			1610101421	150870545855303223	-4.504277		
1610101382	83312360855313495	-4.479829			1610101421	52087962955307381	-4.488466		

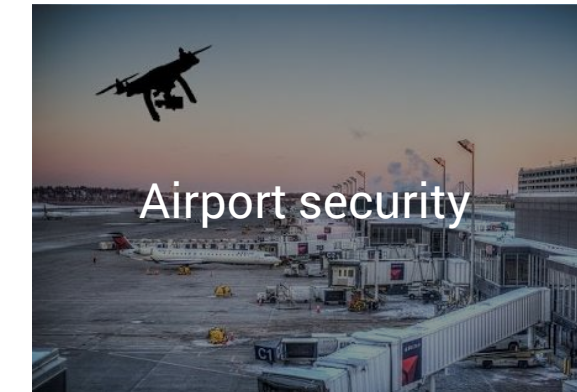
Figure 3: Screenshot of a sample of the drone telemetry data stored on the blockchain resulting from the simulation of Use Case 7.

What were the results and conclusions?

Suitable for surveillance of **short duration** operations in **lower VLL** airspace in urban environments



Combined with bigger range, stationary detectors, potentially be suitable for surveillance of:



Where are the research gaps/opportunities?



Further research to **develop the prototype**

- Develop and implement technical features identified during the course of SDF to mature the prototype
- Test industrial application through series of (small scale) validation exercises
- Refine value proposition
- Commercialisation

Integrate findings into the **NATS blueprint** on U-space data assurance

Thank you

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