Niklas Nyroth

CEO Robot Aviation

Hvordan sikrer vi mulighet for BLOS-operasjoner i ukontrollert luftrom?

ROBOT AVIATION

- Norwegian company, HQ at Eggemoen Aviation & Technology Park, subsidiary in Linköping - Sweden
- Develop & Manufacture Unmanned Aerial Systems for commercial, governmental and military customers
- Enabler of Monitoring, Communications, Data Collections and Emergency Response solutions by drones
- 2022: Focus on SAR, Maritime Surveillance and solutions for Allied Forces

UAS PLATFORMS

SkyRobot FX10 - Electric, hand launched, fixed wing UAS.
Wingspan: 2m, Endurance: 2,5h, Range: +30km, MTOW: 6.5kg
EO/IR payload (custom payload options)

SkyRobot FX20 - Electric, catapult launched, fixed wing UAS.
Wingspan: 3m, Endurance: 4h, Range: 60km, MTOW: 13kg
EO/IR payload (custom payload options)

SkyRobot FX450 - Internal combustion engine, runway launched/ recovered, fixed wing UAS.
Wingspan: 7,2m, Endurance: 20h, Range: 200km LOS (2'500km SAT-Com), MTOW: 250kg
Payload: EO/IR, multispectral, hyperspectral. radar, communication equipment.

SkyRobot FX-Y - Electric, 6-Rotor VTOL UAS
(specially designed for Norwegian armed forces project)
Endurance: +40min, MTOW: 15kg, Payload: 5kg

SkyView – GCS Software
Intuitive, safe control station software based on NATO Stanag 4586 compliance and full modularity – multi vehicle control

Some of our customers..

BOEING

WEIR

inmarsat
The mobile satellite company

TELEDYNE FLIR
Everywhereyoulook™

Agency for Defense Development

FFI Forsvarets forskningsinstitutt

THALES

KONGSBERG GEOSPATIAL

SAGEM

ADASI
شركة أبوظبي الإستثمارية للأنظمة الذاتية
Abu Dhabi Autonomous Systems Investments

NetworkRail

QINETIQ

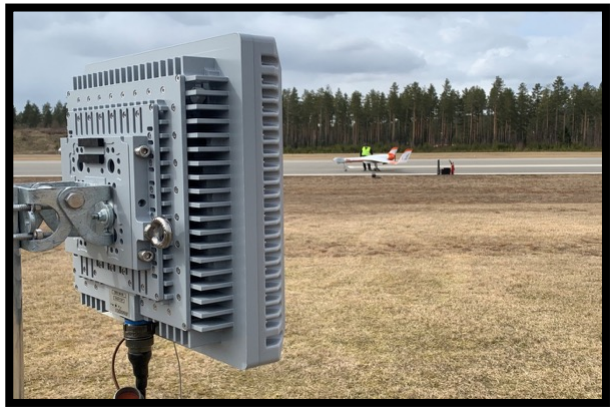
LG

20< countries

4 continents

SKYROBOT ™

What we do…



For whom we do it..

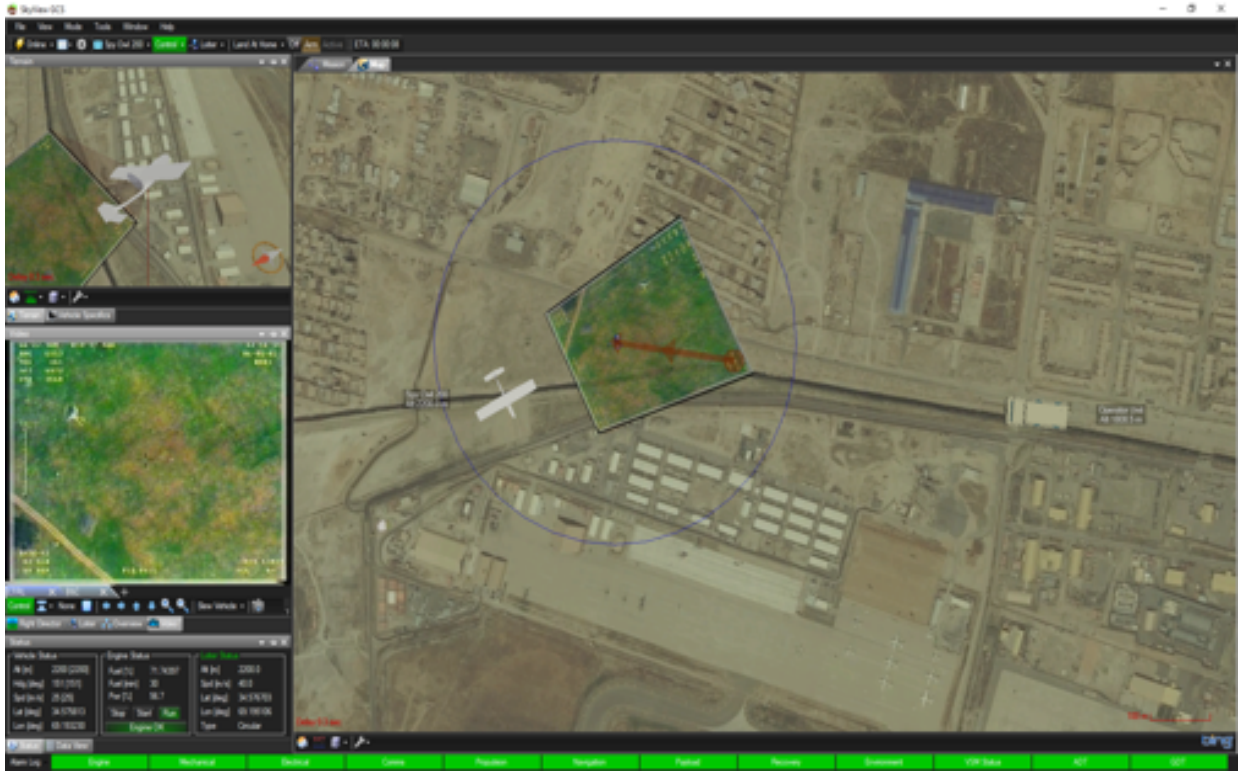
- **Unmanned systems**
- Custom payloads
- **Software**
- UAS services
- Operational & maintenance training
- Implementation to organisations

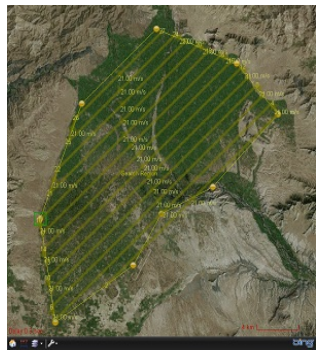
- ISR – Missions Intelligence, Surveillance, Reconnaissance (armed forces, police, special forces, navy ect.)
- Emergency response and rescue missions
- Border monitoring
- Maritime traffic monitoring
- Critical infrastructure monitoring
- Logistics missions
- Communication Relay

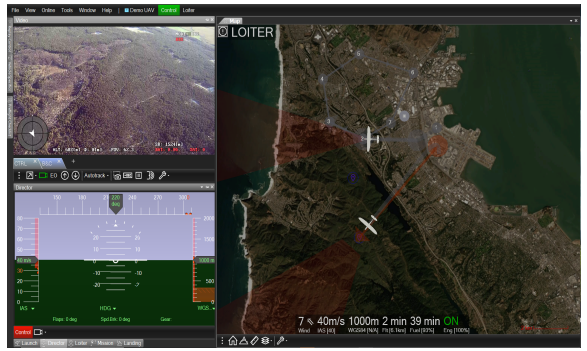
SKYROBOT ™ SkyView - SOFTWARE

ROBOT AVIATION

- NATO-STANAG 4586 compliant – shared command and control of UAS
- **Control MULTIPLE unmanned vehicles, including fixed wings, helicopters, ground vehicles and remote cameras**
- Easy to use point & click mission planning
- **Fly & No-Fly Zones**
- **Full maps, elevation data & transponder/ anti-collision support.**
- Convoy/on-the-move operations
- Built inDatalink Analysis tool







SKYROBOT ™ - *GCS*

ROBOT AVIATION

- 13” screen
- Joystick for manual control
- Portable – 14kg
- Built in Omni antenna
- 8 hour battery

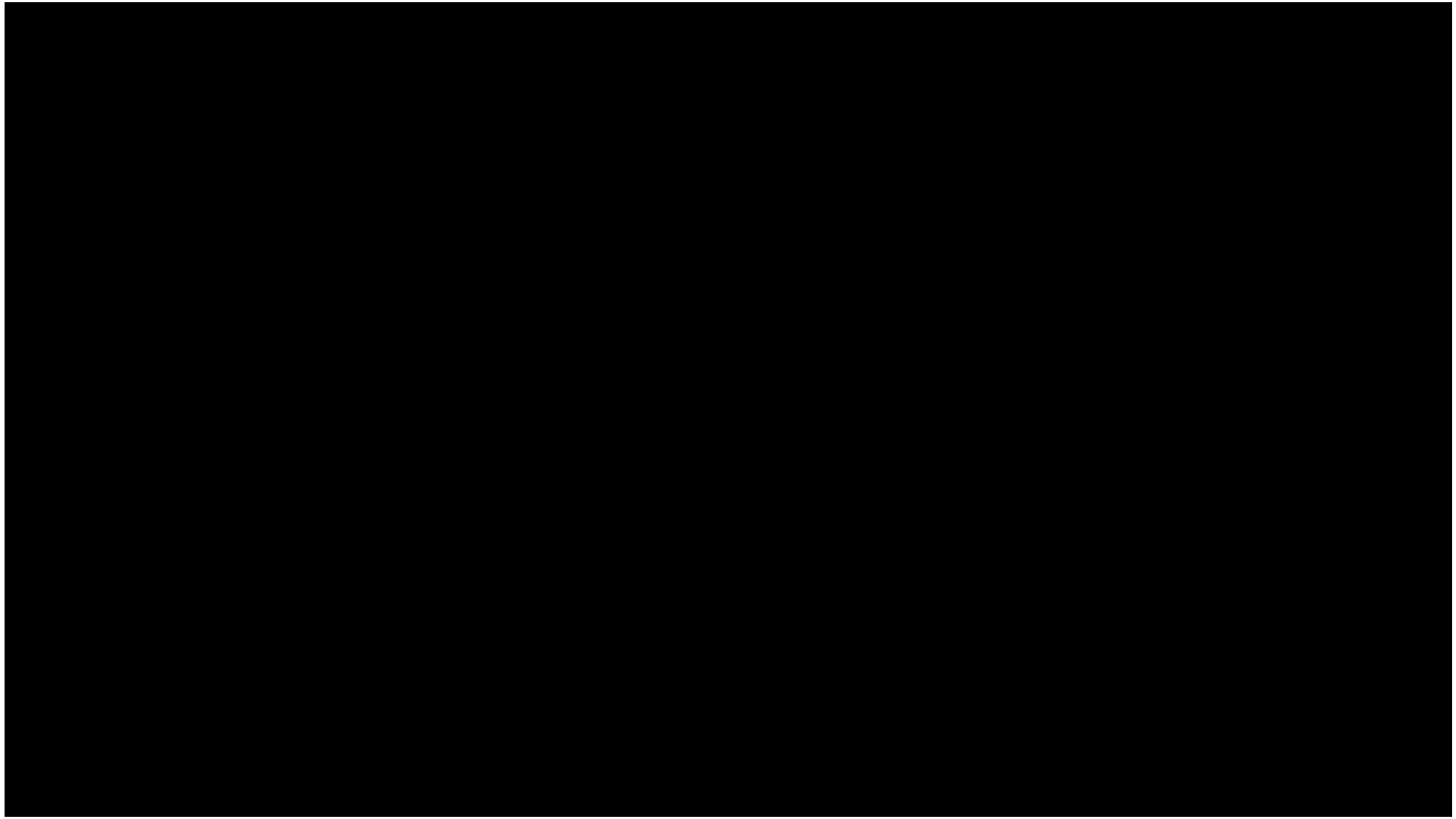
- 13” screen
- External joystick
- Mobile – 4kg
- IP65 (dust & water resistant)
- 14 hour battery

- 10” screen
- Joystick for manual control
- Ultra mobile – 1,2kg
- IP65 (dust & water resistant)
- 4 hour battery

Supporting Customers - Network Rail BVLOS – U.K

- **Selected FX10 for its maturity and proven BVLOS history**
- **Equipped with Transponder, Pilot eye and redundant data-link system**
- **Operated by SkyView GCS**
- **Executed during COVID, order, delivery, training, support over Teams!**
- **Coordinated effort**

Britain's longest BVLOS drone flight – FX10



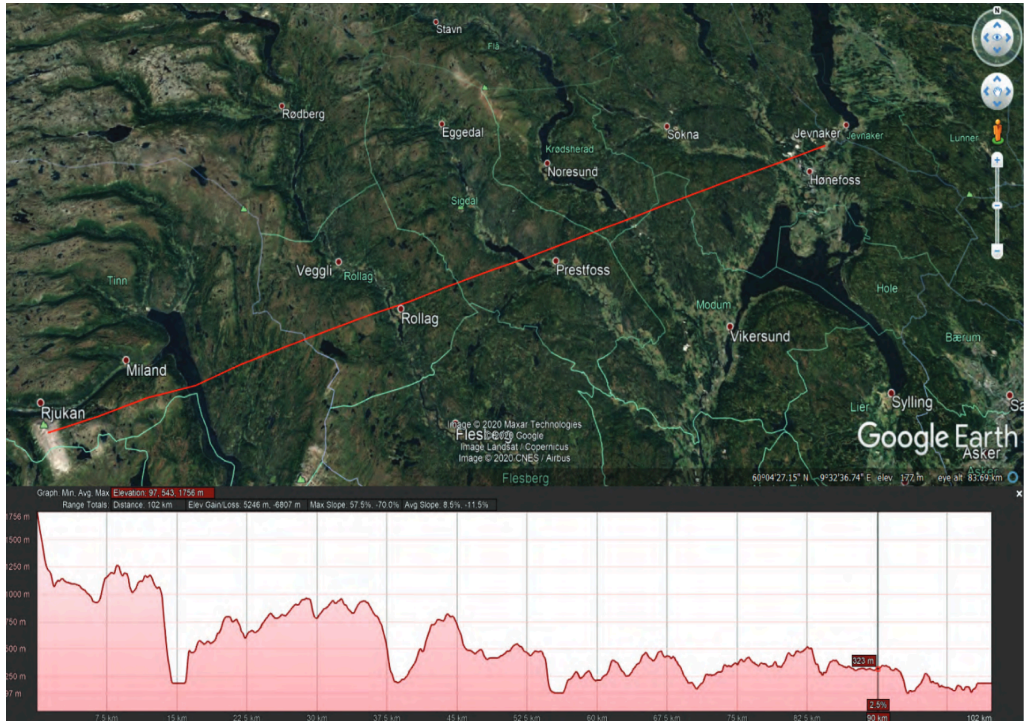
Verifying technology – Long Range Datalink system - Radionor

LONG RANGE DATA-LINK SYSTEM EXTEND SMALL UAV CAPABILITIES

Objective for demontration of a 100 km range field test in non-line-of-sight conditions

Norway's geography arises a great challenge for UAV operations due to its mountainous terrain blocking radio line of sight for beyond visual line of sight (BVLOS) flight operations. The main objective of this test is to provide a solution for this problem using Radionor's Radio network consisting of long range phased array radio technology together with Robot Aviation's FX10 hand-launched fixed wing platform.

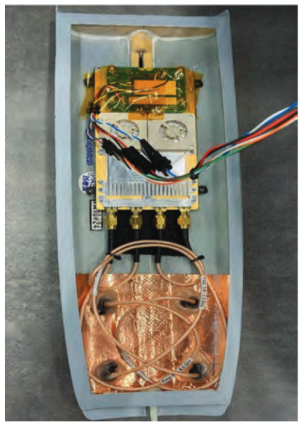
Gaustatoppen is a mountain in Norway located at coordinates 59.851473, 8.655659 with an elevation of 1756 meter above main sea level (MSL). This point has a Radionor with 4 pcs. CRE2-189 that provides a long range ground station with 360-degree coverage. The aircraft had a light weight CRE2-144-LW installed and the FX10 system used the wireless IP connectivity by the CRE2-144-LW radio unit for command and control, monitoring and video streaming. The FX10 aircraft also demonstrated the capability to roam from the local ground station at Eggemoen at take-off and landing to the long range connection to the ground station at Gaustatoppen mountain during flight.



Long Range Datalink system

This test flight campain successfully evaluated the objective of the experiment and concludes that it is possible to do FX10 UAV operations none-line-of-sight at 101 km range from a ground station using the Radionor phased array technology. The IP capability in the FX10 UAV and Skyview flight control software and the capability to roam between ground stations demonstrated capability of conducting long range flights over rural areas and complying to regulations to maintain command and control of the vehicle and video feed from the sensor all the time.

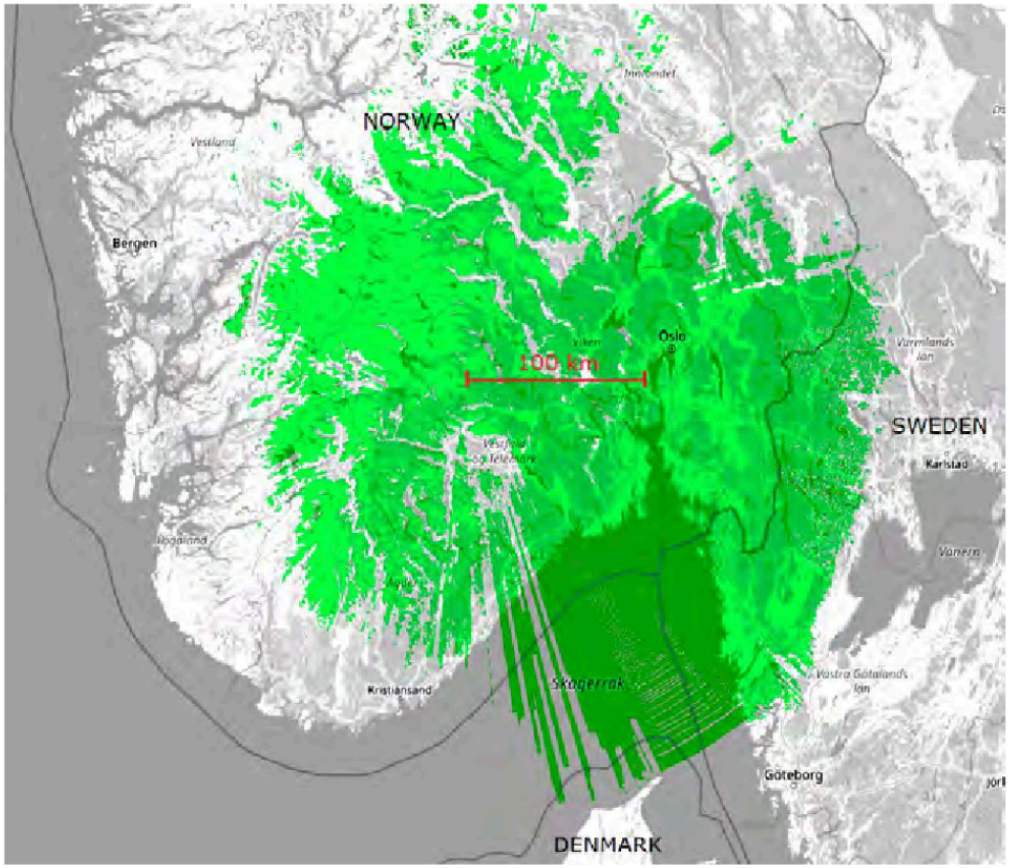
This also brings the opportunity to take off in one location and land in another location and continue UAV mission if necessary. Similarly, if any other Radionor installation similar to the Gaustatoppen also can provide further coverage than depicted in the below figure. This is possible with Robot Aviation's current Fx10 platform with dual link capability to take off with its primary link and switch to the Radionor network and continue mission without geographical boundaries of radio line of sight.



Inside view of radio installation

Antenna placement on fuselage

Outside view of radio installation



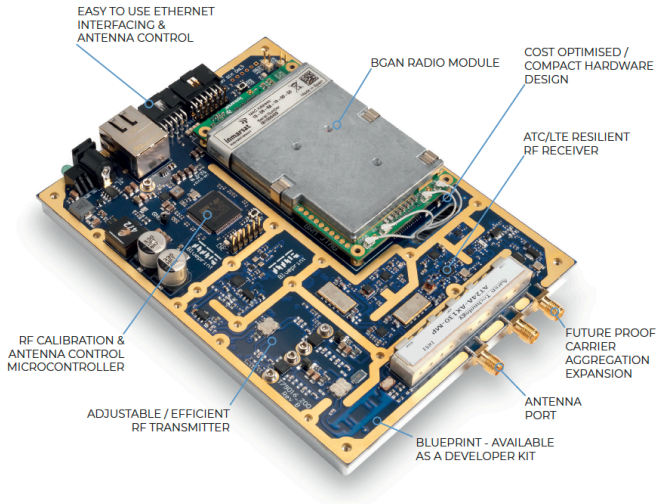
Simulated coverage area from one ground station at Gaustadtoppen when flying 400 above ground

Being part of future… - SatCom for sUAS - Project

- **ESA - Inmarsat - UAS Norway (team/cluster)**

- Integration - SatCom equipped sUAS, developed by Inmarsat for compact size.

- Enables BVLOS flights at low altitudes, utilizing the platforms full range.



Flight Trial Unit (Class 4)

https://www.cobhamaerospacecommunications.com/aircraft-satcom-systems/aircraft-satcom-antennas/low-gain-antennas-lga-class-15-200kbps/aviator-lga-3000-datasheet/docview/

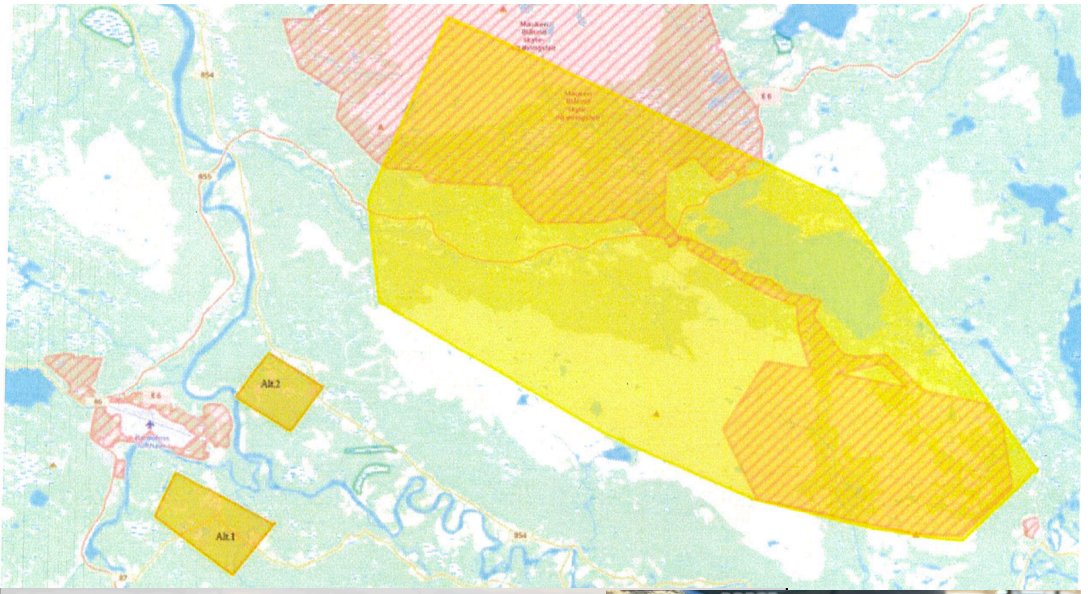
The future is supported by drones - FFI UAV Taktisk drone

FFI – ICE Worx – FX450/FX20 operations for E-bataljon, under civilian flight rules.

-FX450 demonstrated with optical payload and ''GPS-denied'' navigation capability.

-FX20 flög flertalet skarpa uppdrag med e-bataljon i kontroll av nyttolast.

-All flight operations according to agreement established with AVIONOR, departure from Bardufoss Airport , flights in both controlled and military airspace and return to Bardufoss for landing, under same conditions as any other user of Bardufoss Airport.



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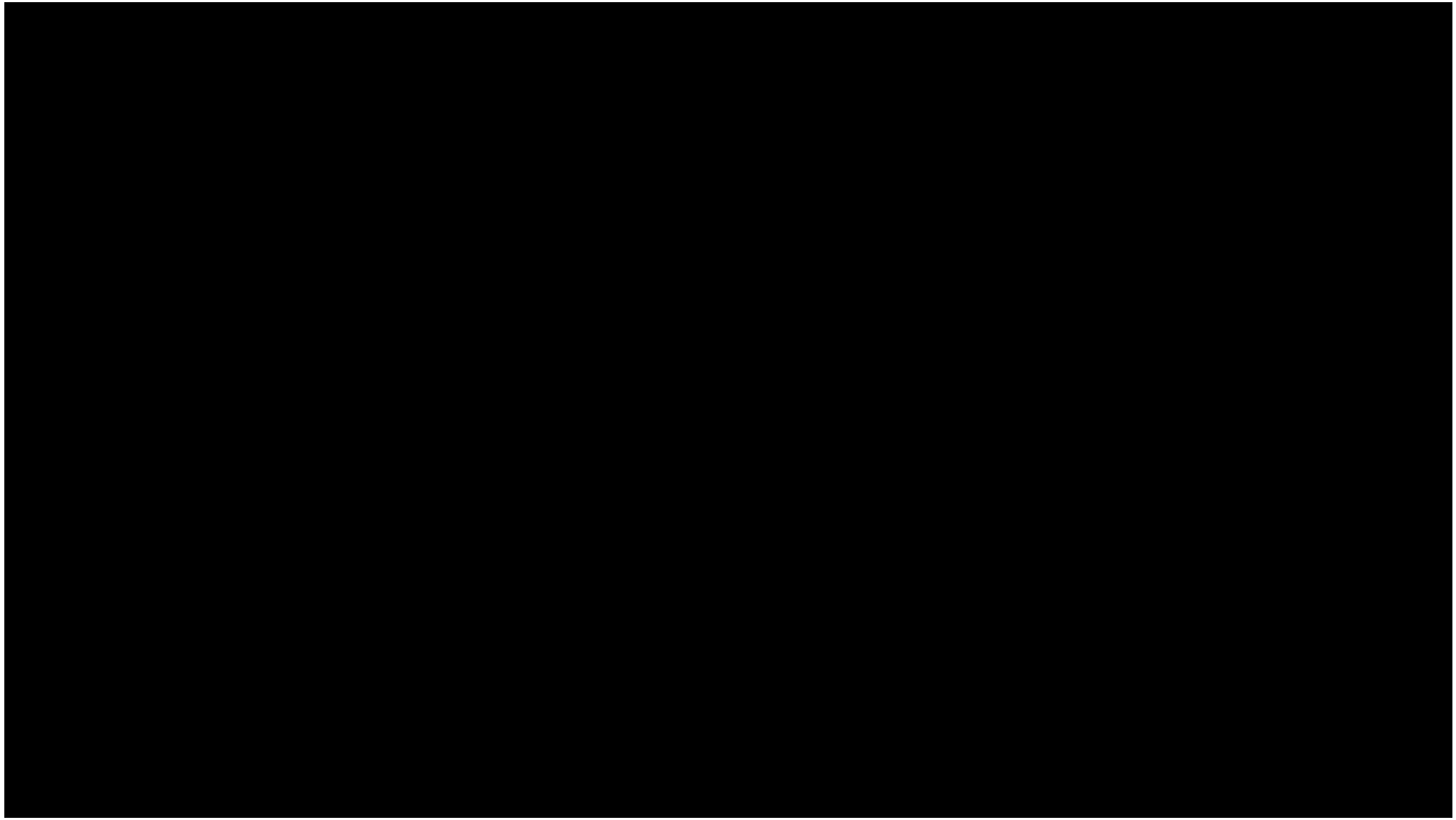
Bardufoss June 2021



Thank you!

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