

Fremtidens system for luftromsovervåkning – ubemannet og bemannet luftfart

Green Flyway 2019-06-05

indra



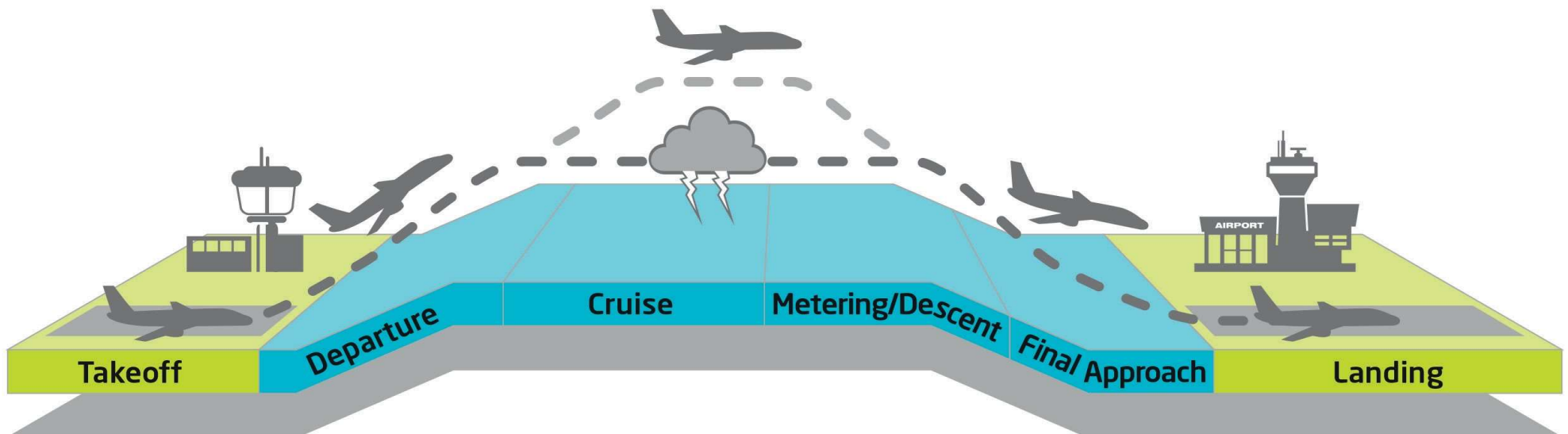
Juni 2019

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100 years with ATM solutions



GAREX® VCCS Communication

NORMARC® ILS & Nav aids

InNOVA™ ATM Tower Systems

Applikasjoner for droner



Agriculture



Mobility &
Transport



Logistics &
Delivery



Emergencies
& Security



Inspections &
Photography

Samfunnsnyttig økonomisk vekst

Drones impact on the UK economy 2030;
PWC (report highlights)

- 750.000 drones in the European skies in 2030
- 76 000 drones in the UK skies
- 628 000 jobs in the drone economy
- £42bn increase in GDP

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Daniel K. Elwell, Acting Administrator, FAA;
July 15, 2018

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Her er noen
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om

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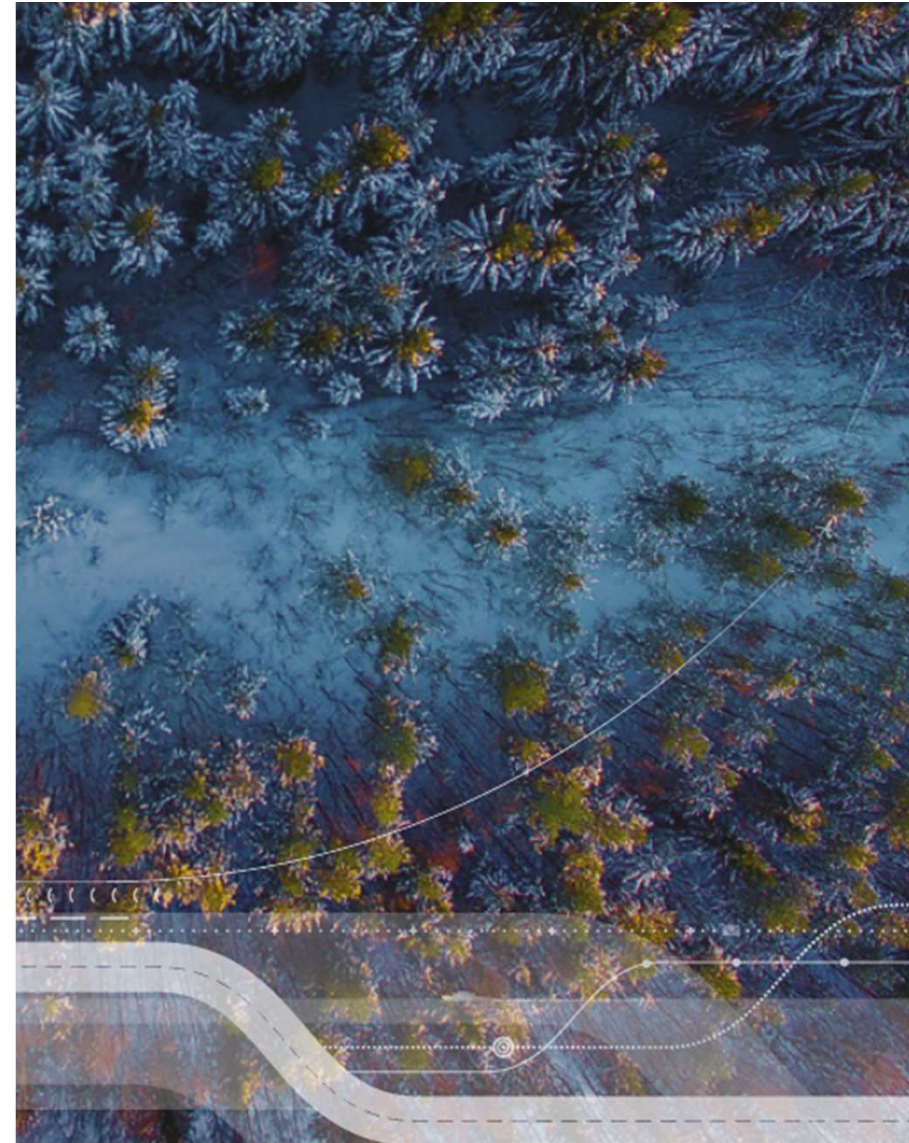
Norske nasjonale strategier og virkemidler

Norges dronestrategi; Departementene

Nasjonal transportplan 2018 - 2029

TRANSPORT 2025 er Forskningsrådets strategiske satsing på forskning og innovasjon innenfor transportområdet og omhandler veg, bane, sjø og luft

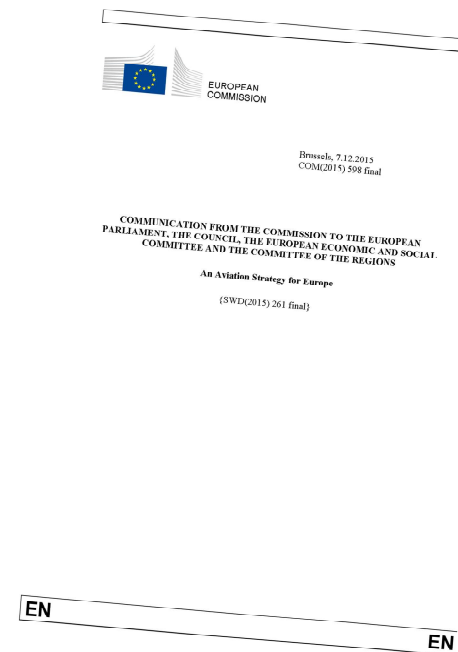
Demonstrasjonsprosjekter



EU finansierer FoU, demonstrator og utrulling

EU Aviation Strategy:

- Forslag fra EU-kommisjonen lansert desember 2015, stadfestet av Parlamentet høsten 2016
- FoU, fullverdig industrialisering og utrulling er et av fundamentene i strategien
 - "Both development and deployment activities require appropriate financial support." (side 6)
 - "enabler of growth, innovation and digitalization" (side 14)



U-Space

"U-space is an enabling framework designed to facilitate any kind of routine drone mission - even in the most congested environment - while addressing an appropriate interface with manned aviation and air traffic control, ensuring safe and secure access to airspace for drones." (Slightly rewritten from SESAR JU - EU)

- U-Space - EU initiative for digitalization and automation of high volume drone traffic
- Roadmap for specific services making U-Space operationally possible
- Interoperability with ATC
- Participation from all stakeholders



Drone users/operators:

Offer fair, flexible & open access to the airspace
Open up drone services market



Citizens:

Offer new & innovative services
Ensure safe & secure drone operations
Safeguard privacy & ensure environmental protection
(noise & visual pollution)



Regulatory authorities:

Maintain control over airspace
Ensure privacy, safety, security & environmental protection
Enforce registration & identification of drones
Protect safety & security critical areas

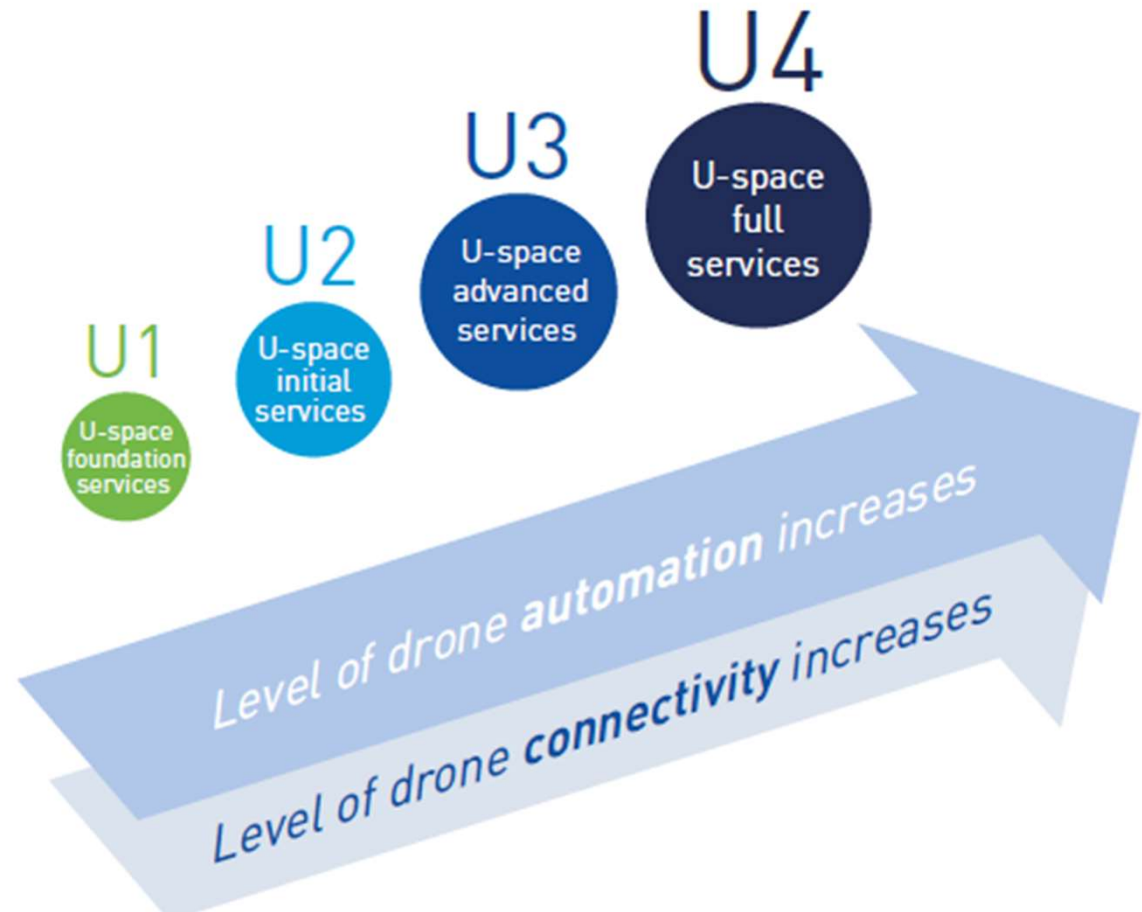


Businesses:

Enabling the development of new business models
Spurring jobs & market growth
Support move towards automation & digitalisation

U-Space Roadmap

- Planlagt evolusjon over tid
- Vil støtte økende grad av kompleksitet
- Drives frem av prosjekter i U-Space under Horizon 2020
- Kompleks og tidkrevende prosjektgjennomføring



Nøkkelprosjekter i U-Space

CORUS

- Concept of Operations for European Unmanned Traffic Management
- Stort antall interessenter deltar

DOMUS

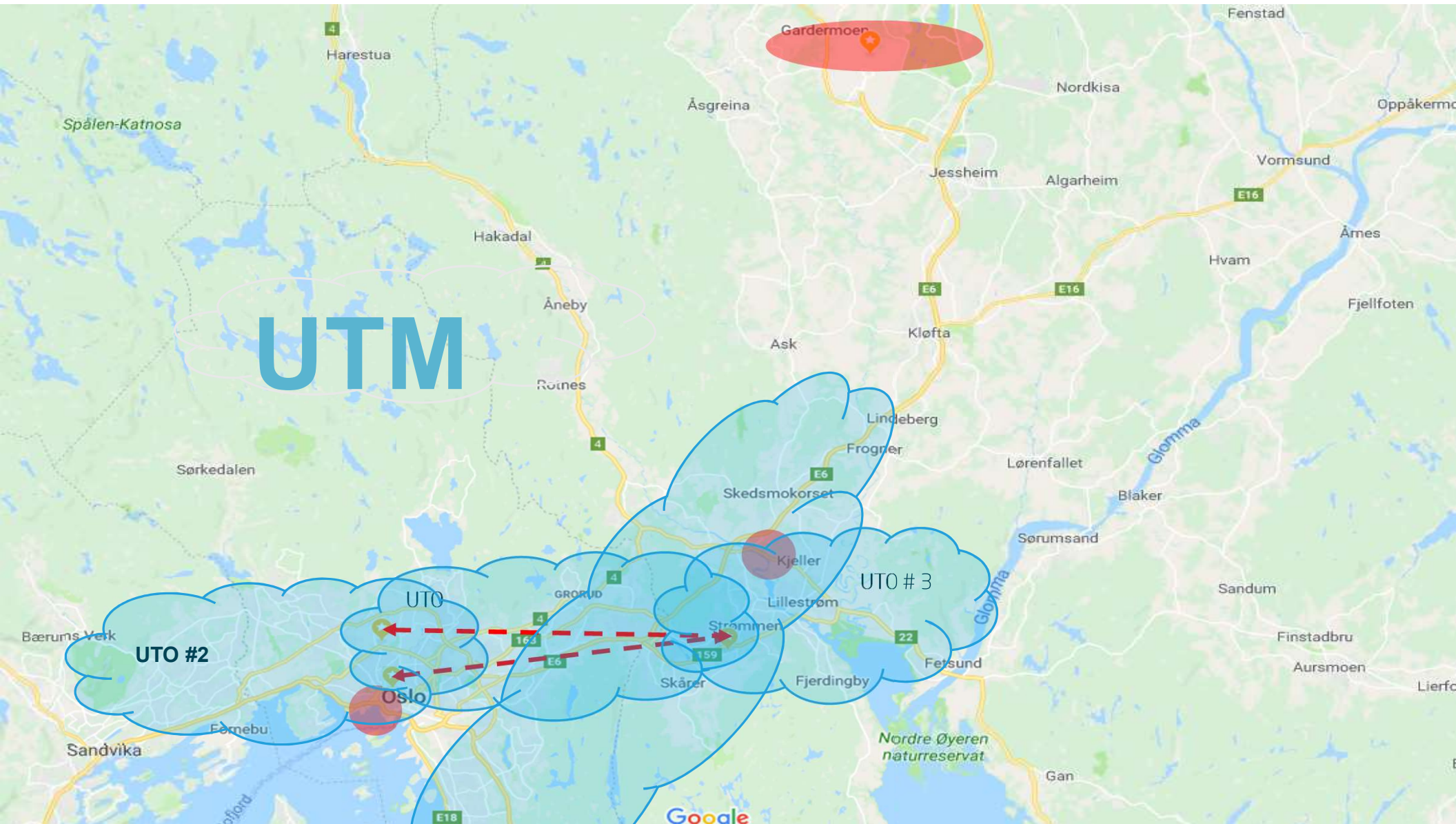
- Demonstrator for multiple tjenesteleverandører i U-Space
- Ledes av ENAIRE
- Fullt set av U2-tjenester
- U3: tactical deconfliction

UTM

=

Unmanned Traffic

Management



UTM

Gardermoen

UTO #2

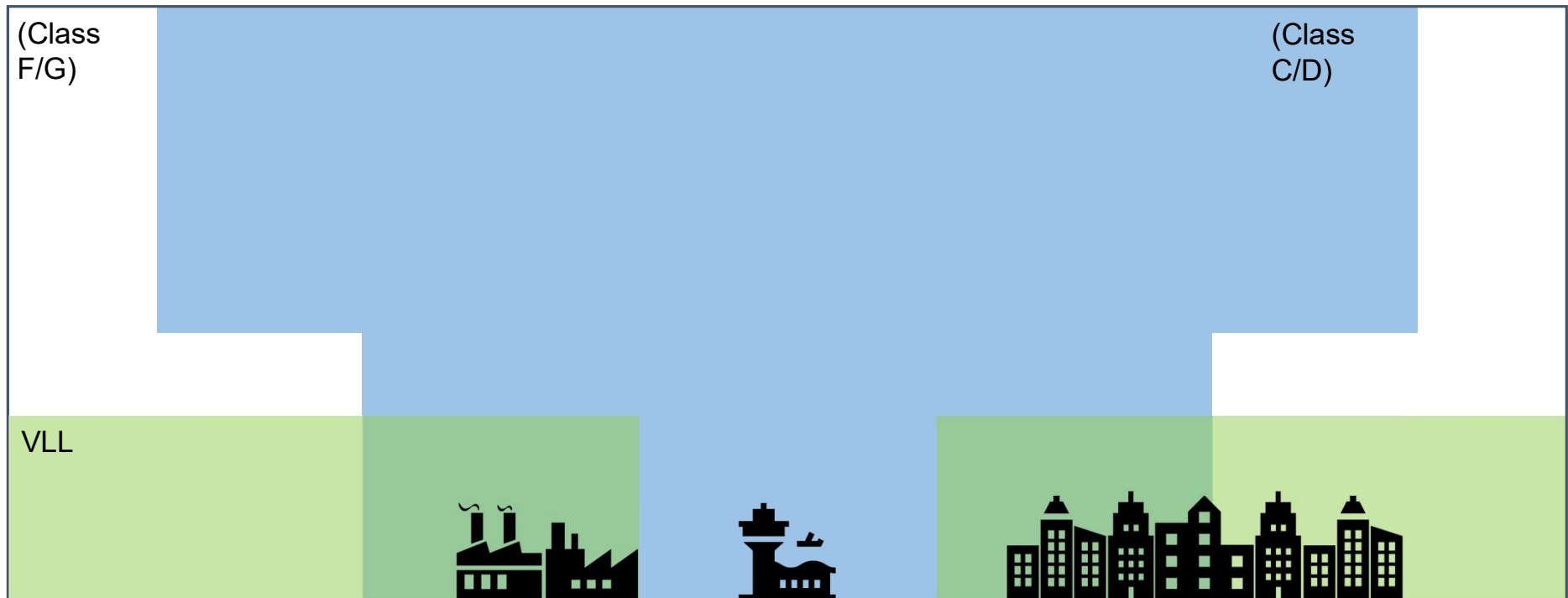
UTO

Oslo

UTO #3

Google

Interoperabilitet mellom ATM og UTM



- Very Low Level Airspace (VLL) – 500 ft / 150 m kan overlappe klasse C/D
- På sikt vil effektiv bruk av UAV kreve ny klassifisering og prioritering av kontrollert luftrom
- På kort horisont vil integrasjon ATM-UTM være avgjørende

Drone CRASHES into Boeing 737 passenger jet coming in for landing



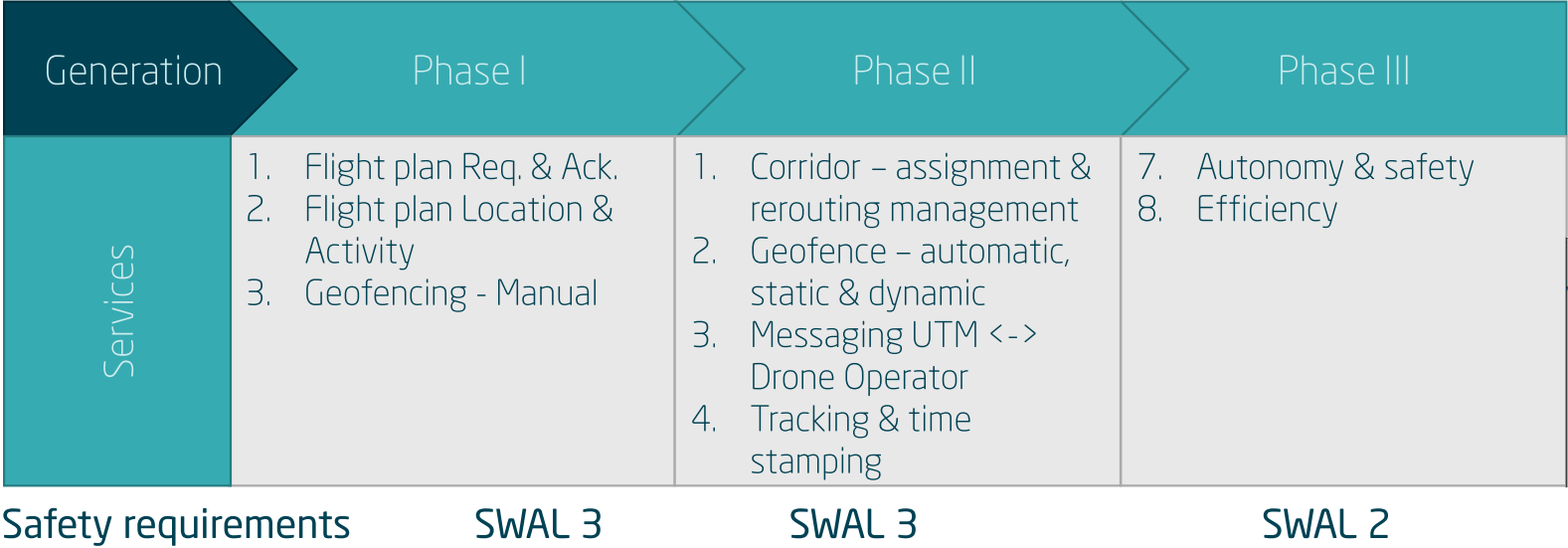
Safety concern!



US Military Drone Crashed into Cargo Plane

Neo UTM Roadmap

Diversified SW service layers

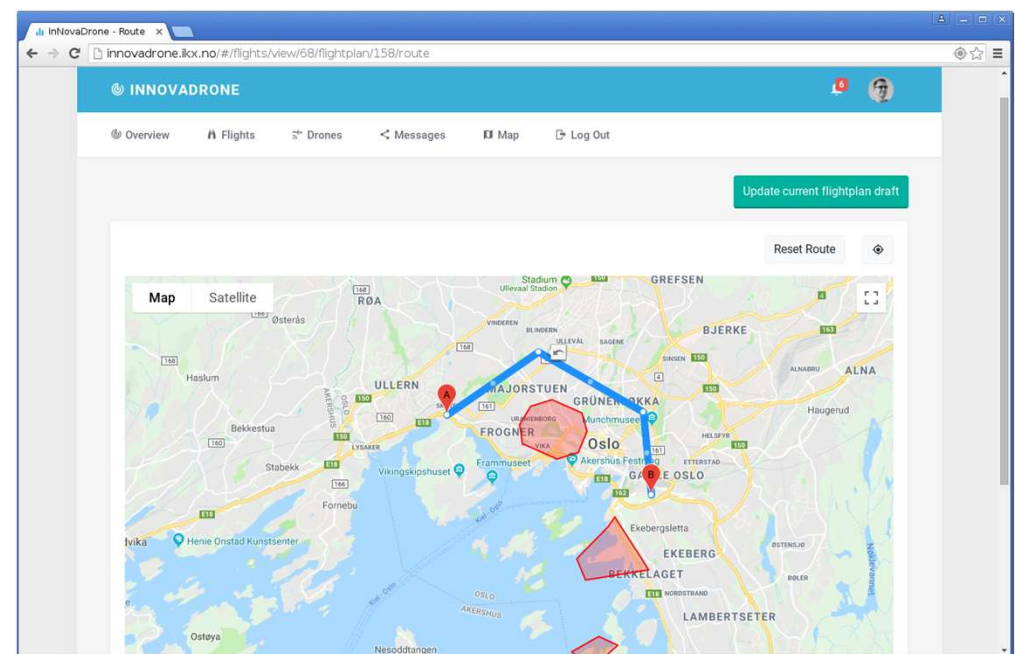
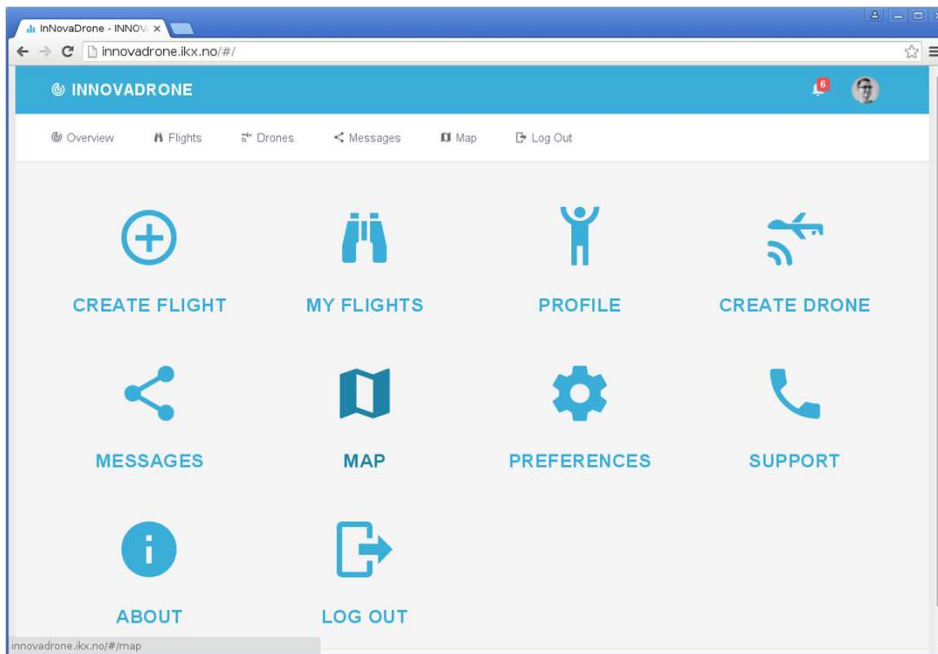


Safe, secure, green drone operations that also respect privacy

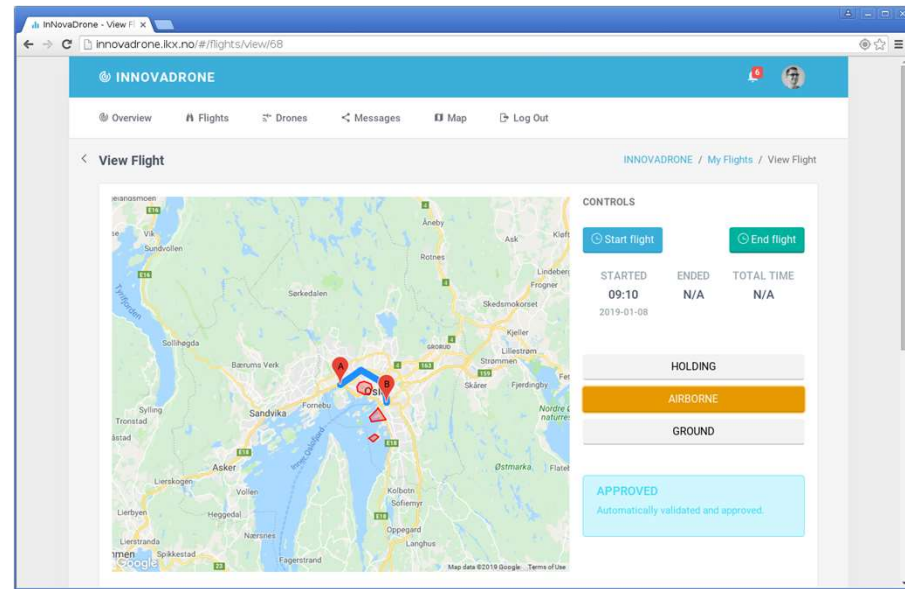
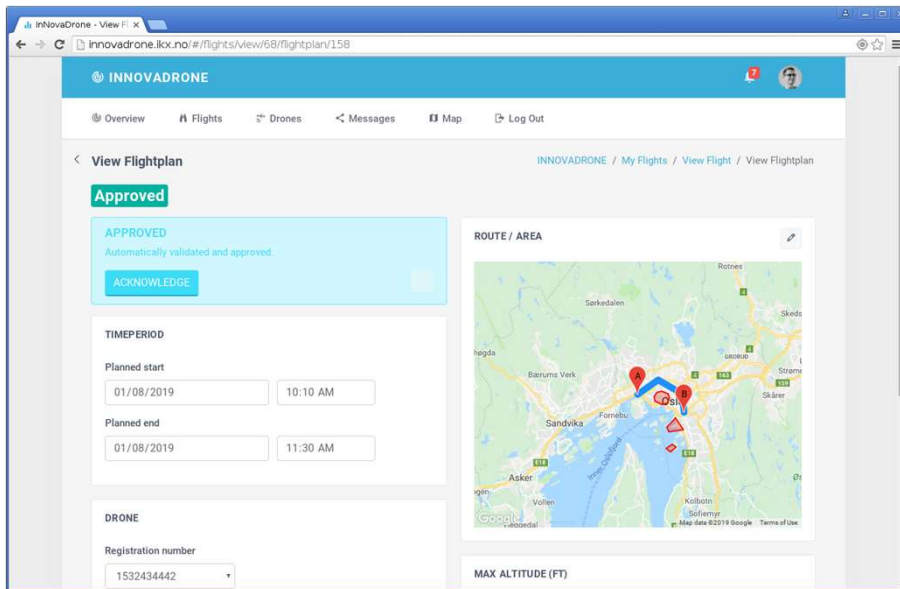
Level and System : different scales of level

CNS/ATM	CNS/ATM	Aeronautical embedded software	other domains (nuclear, railway...)
ESARR, SAM	ED109/ DO278	ED128/ DO178B	IEC 61508, EN 50128...
ECxx			
SWAL 1	AL 1	A	SIL 4
	AL 2	B	SIL 3
SWAL 2	AL 3	C	SIL 2
SWAL 3	AL 4		
SWAL 4	AL 5	D	SIL 1
	AL 6	E	

App – interface to ATM



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UTM – interface at ATM

The screenshot displays the UTM (Unmanned Traffic Management) interface at an Air Traffic Management (ATM) station. The interface is divided into two main sections: a list of active drones on the left and a map of the flight area on the right.

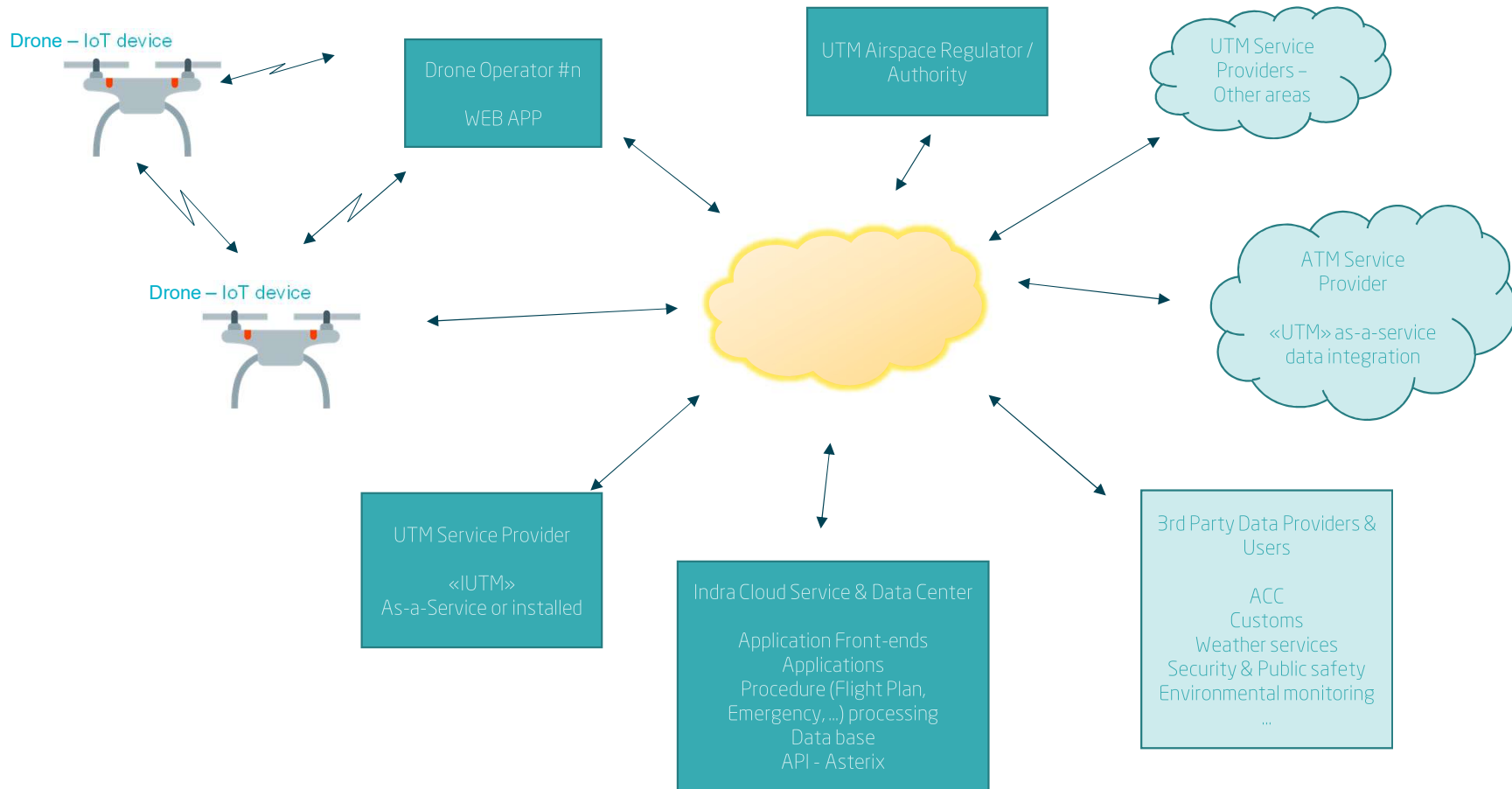
Active Drones List:

Drone ID	Status	Pilot Name	Altitude	Mode	Control
0718	REJECT	Karl Jensen	90 11 22 33	A040	Control icons
0731	REJECT	Ola Johnssen	66 30 40 33	A020	Control icons
1120	REJECT			A003	Control icons
0701	HOLD	Knut Olsen	97 23 55 63	A030	Control icons
0706	HOLD	Knut Olsen	97 23 55 63	A030	Control icons

Map Section:

The map shows a topographic view of the flight area with a green flight path. Two red boxes labeled "Not available" are visible at the top of the map. The interface also includes a "Flight Data Display" window with "Active Drones" and a "CWP Main" window. A timestamp "07:22:19" is displayed at the bottom left of the map area.

UTM Cloud Service Architecture



**“Norge har potensial til å bli et foregangsland i bruk av droner” (Norges
dronestrategi)**

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Hva med Sverige?

Oppsummering

Skandinavia, utenfor U-Space, kan agere raskt og i høy grad med samme målsetning som U-Space

Høy industriell kompetanse, der sikkerhet vil være kjernekompetanse

Vi henter kompetanse fra flysikkerhetsløsninger fra ATM for implementering av UTM med et tilstrekkelig sikkerhetsnivå for både bemannet og ubemannet flytrafikk

- Avhengig av at det finns finansierte prosjekter med bidragsytere fra regulator, ANSP, myndighetsfunksjoner og luftromsbrukere, samt
- Infrastruktur for services, cybersikkerhet, kommunikasjon og navigasjon

indra

At the core

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