Unmanned Traffic Management and Landings

Autonomous Aerial Vehicles Workshop

NNF, Marinteknisk Senter, NTNU

Vendela Paxal, R&D Manager, Navigation, Indra Navia AS

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NORWEGIAN TECHNOLOGY HELPING AIRCRAFT TO FLY AND LAND SAFELY ALL AROUND THE WORLD

- GAREX Communication systems
  - NORMARC Navigation systems
    - InNOVA Tower systems

- 200 employees in Asker, Norway
- Daughter company of Indra with 43 000 employees and an income of ~ 3 000 MEUR

Roots in Norway back to 1916

1916: Gustav A. Ring AS (GAREX)

1918: Norsk Marconikompani AS (NORMARC)

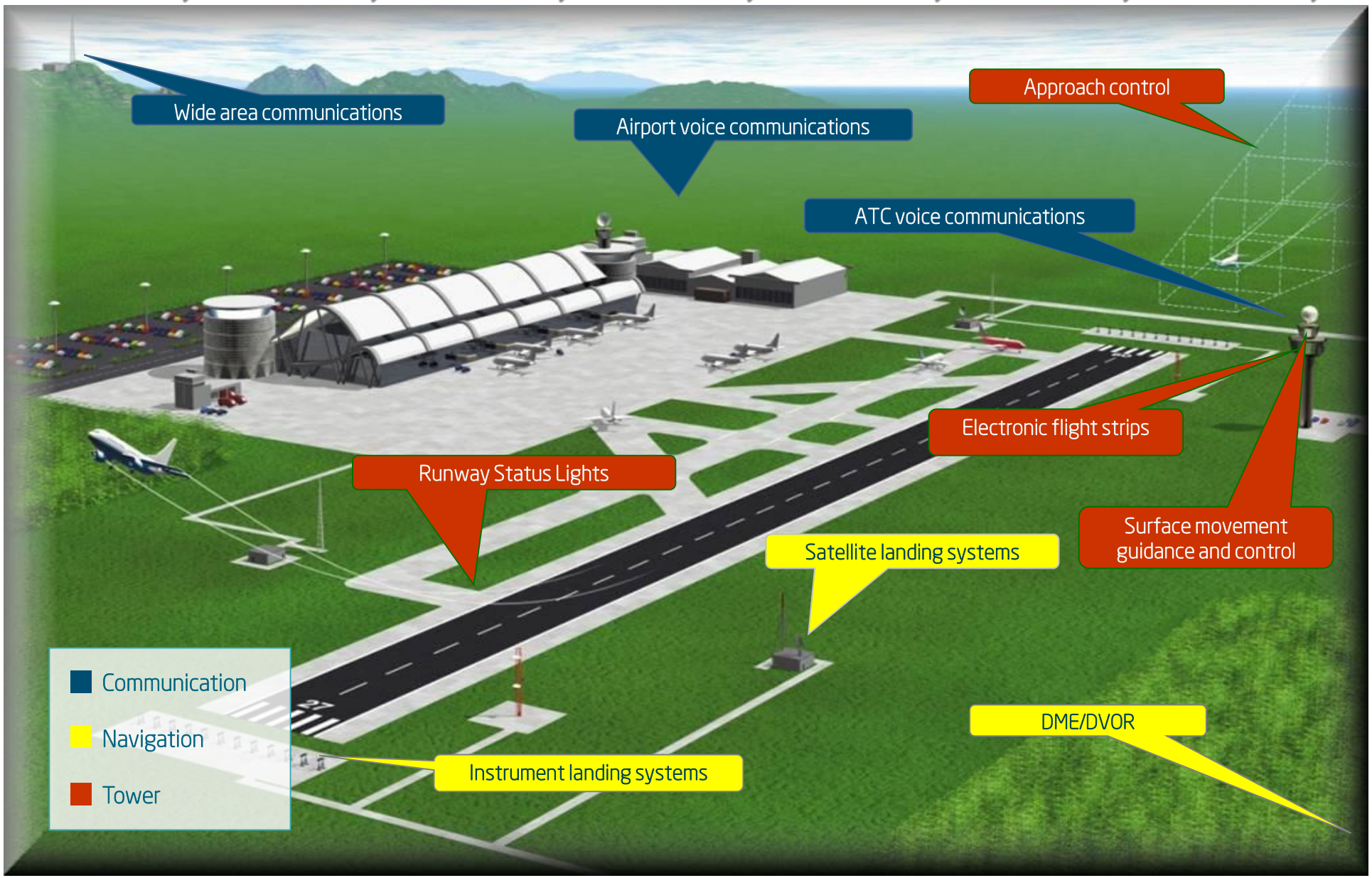
1989: ATC Division in Norcontrol

1997: merged into Navia Aviation AS

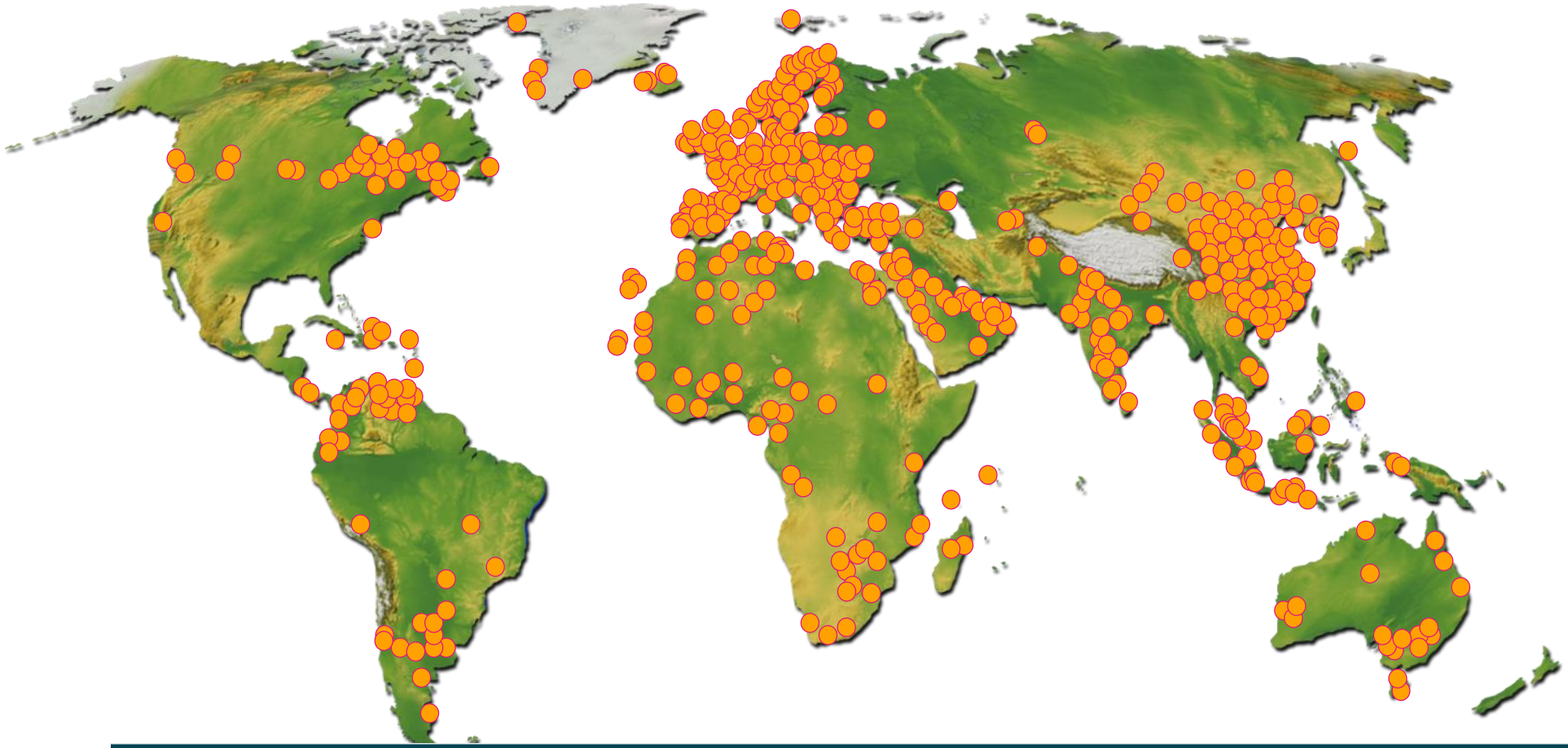
2000: Northrop Grumman
2001: Park Air Systems

2008: Northrop Grumman Park Air Systems AS

2012: Indra Navia AS



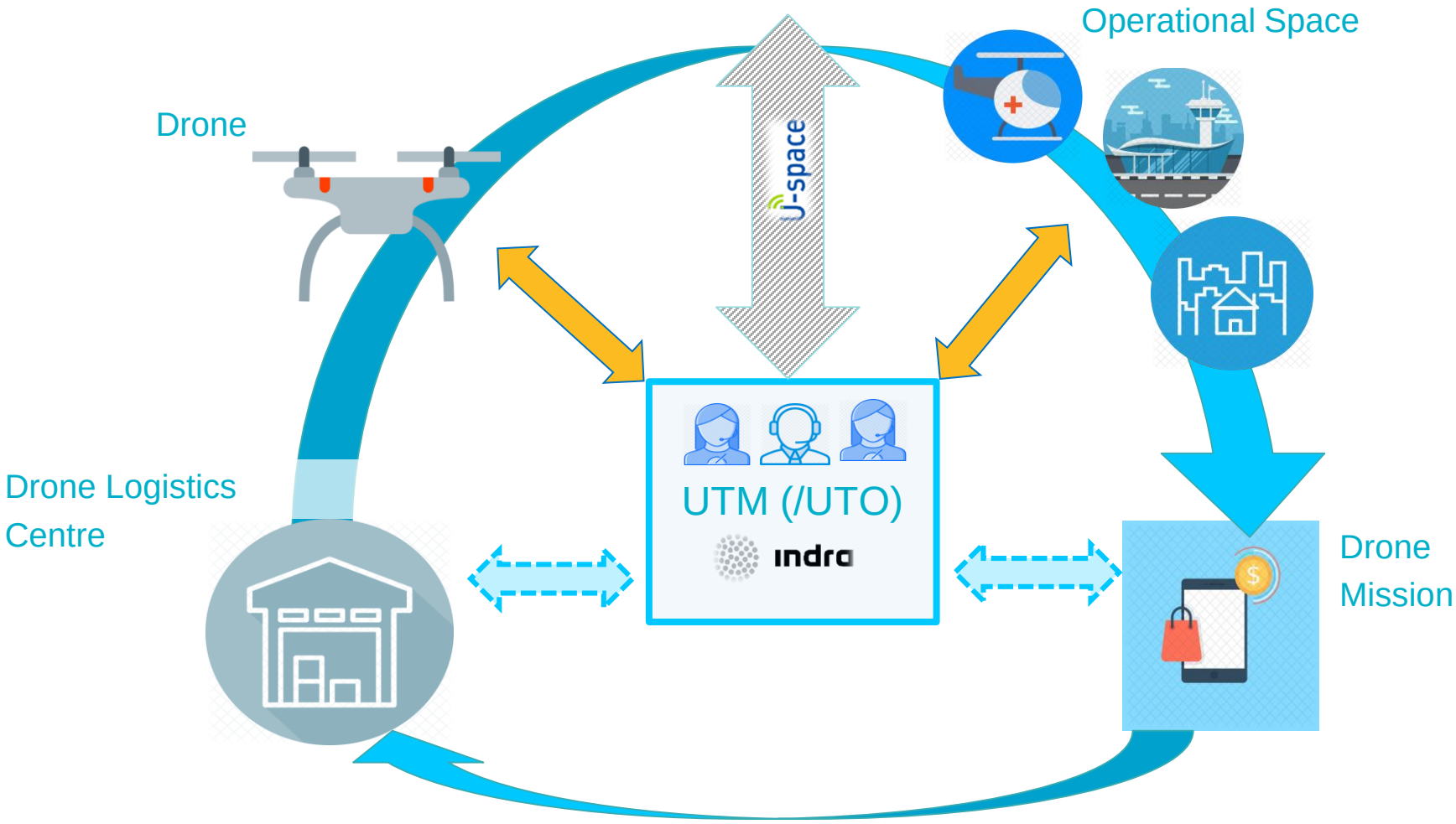
Indra Navia – Worldwide

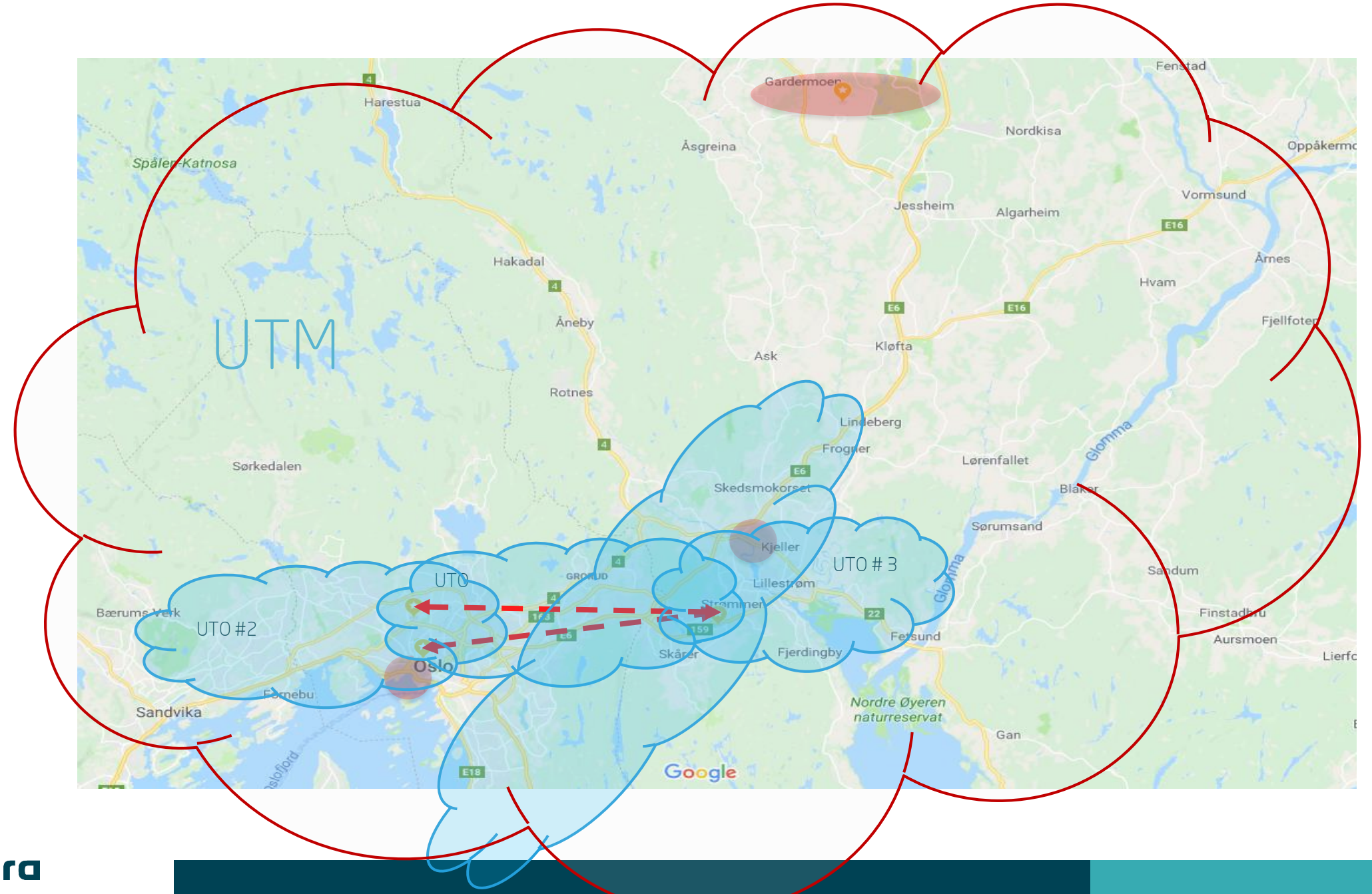


Indra Navia has systems at 1200 airports in 120 countries

Remote Tower

Indra in UTM

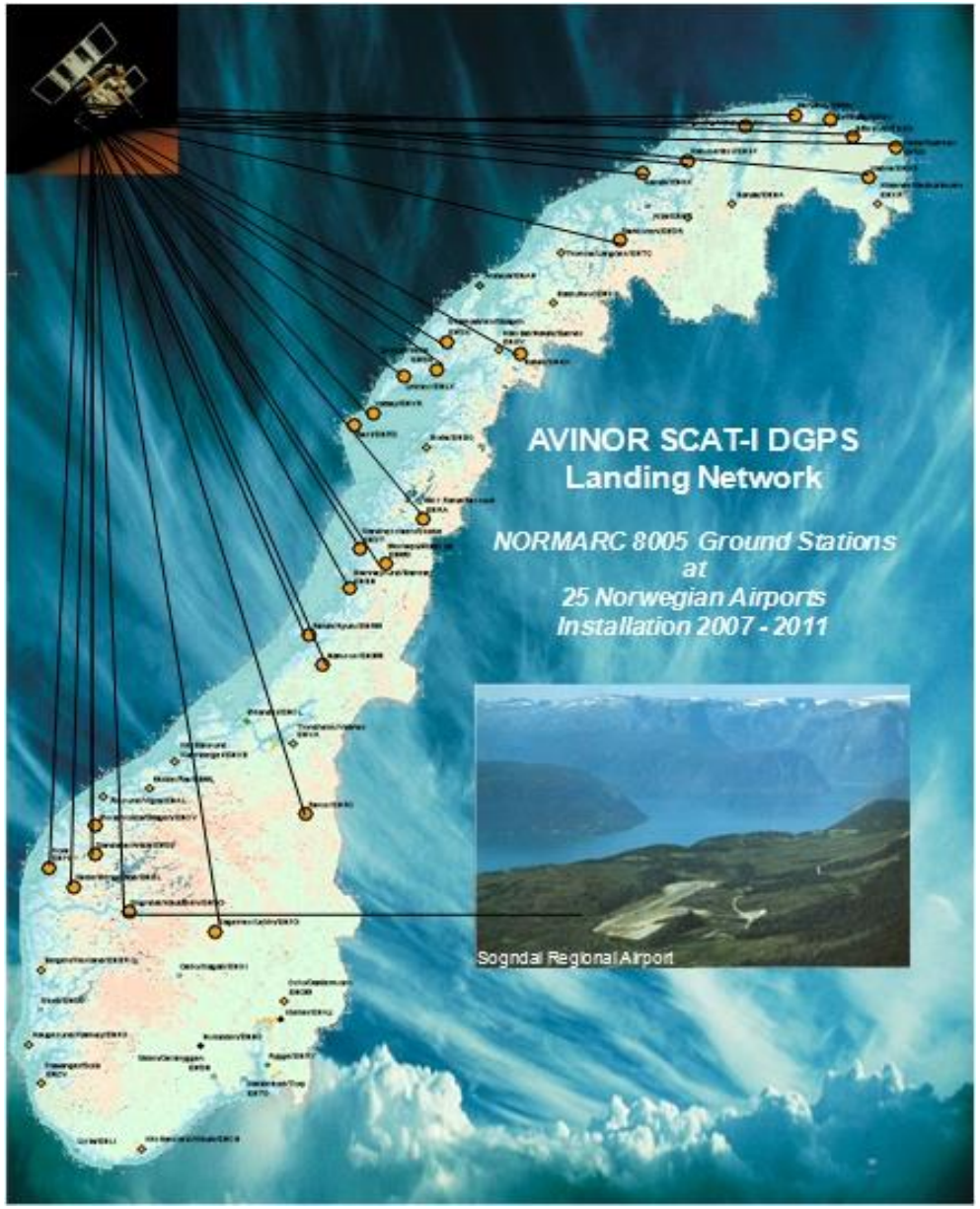

Operational Space
Drone
U-space
Drone Logistics Centre
UTM (/UTO)
indra
Drone Mission


UTM
UTO
UTO #2
UTO # 3
Gardermoen
Harestua
Åsgreina
Nordkisa
Spåle-Katnosa
Jessheim
Algarheim
Vormsund
Hakadal
Åneby
Ask
Kløfta
Rotnes
Hvam
Årnes
Fjellfoten
Lindeberg
Frogner
Lørenfallet
Glomma
Sørkedalen
Skedsmokorset
Blaker
Sørumsand
Kjeller
Lillestrøm
Strømmen
Sandum
Finstadhru
Aursmoen
Bærums Verk
Fetsund
Fjerdingby
Skårer
Oslo
Fornebu
Sandvika
Nordre Øyeren naturreservat
Gan
Google

Landing aircraft

SCAT-I Approval Program

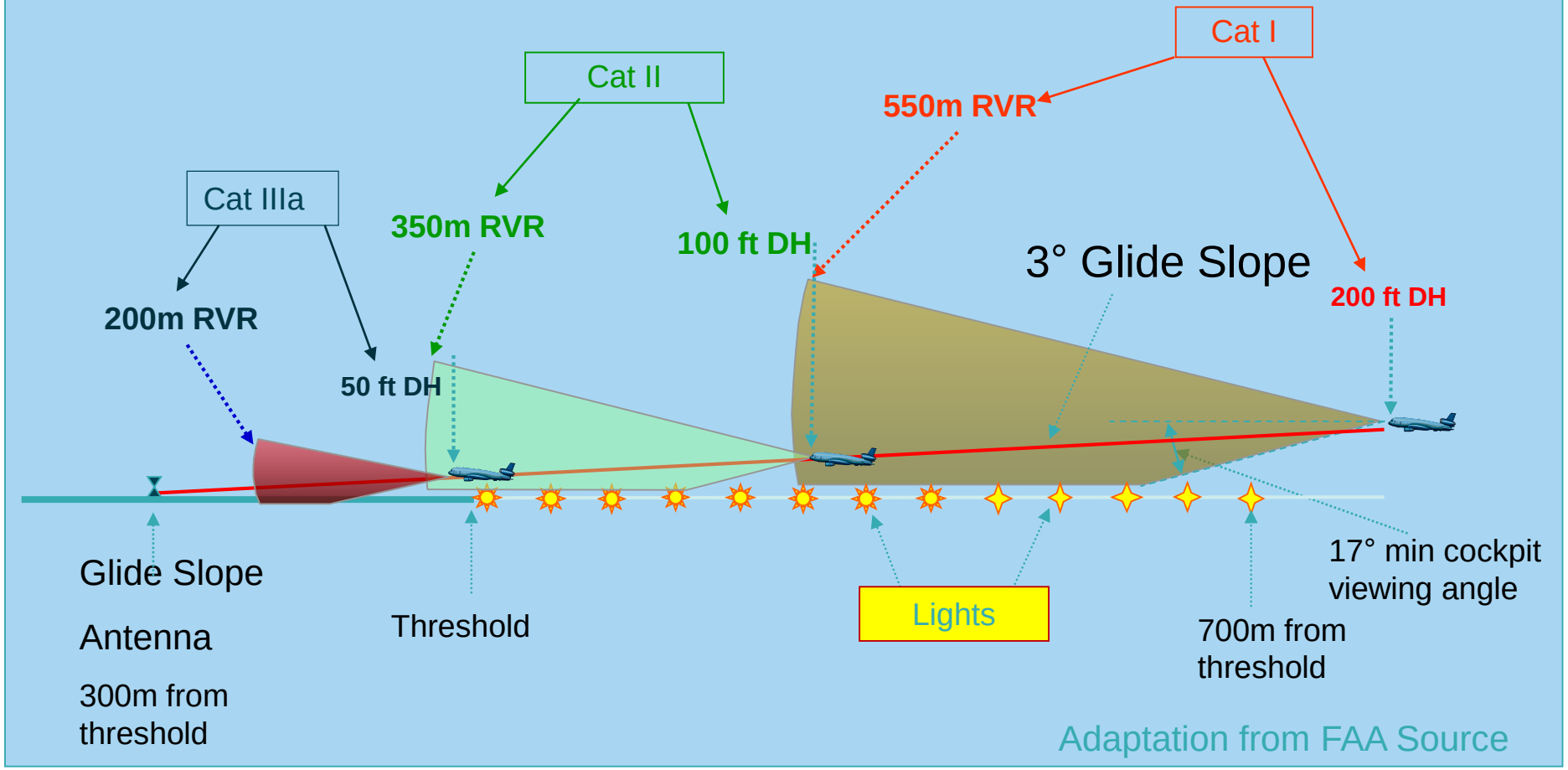
- Indra has worked with FAA from 1998 to 2004 on the GBAS SCAT-I approval program
- SDA by Norwegian CAA in 2005 and first system in operation in 2007
- Implementation of the SCAT-I system is a success in Norway
- In operation at 17 airports
- SCAT-I scheduled for operation until 2025



Approach Categories

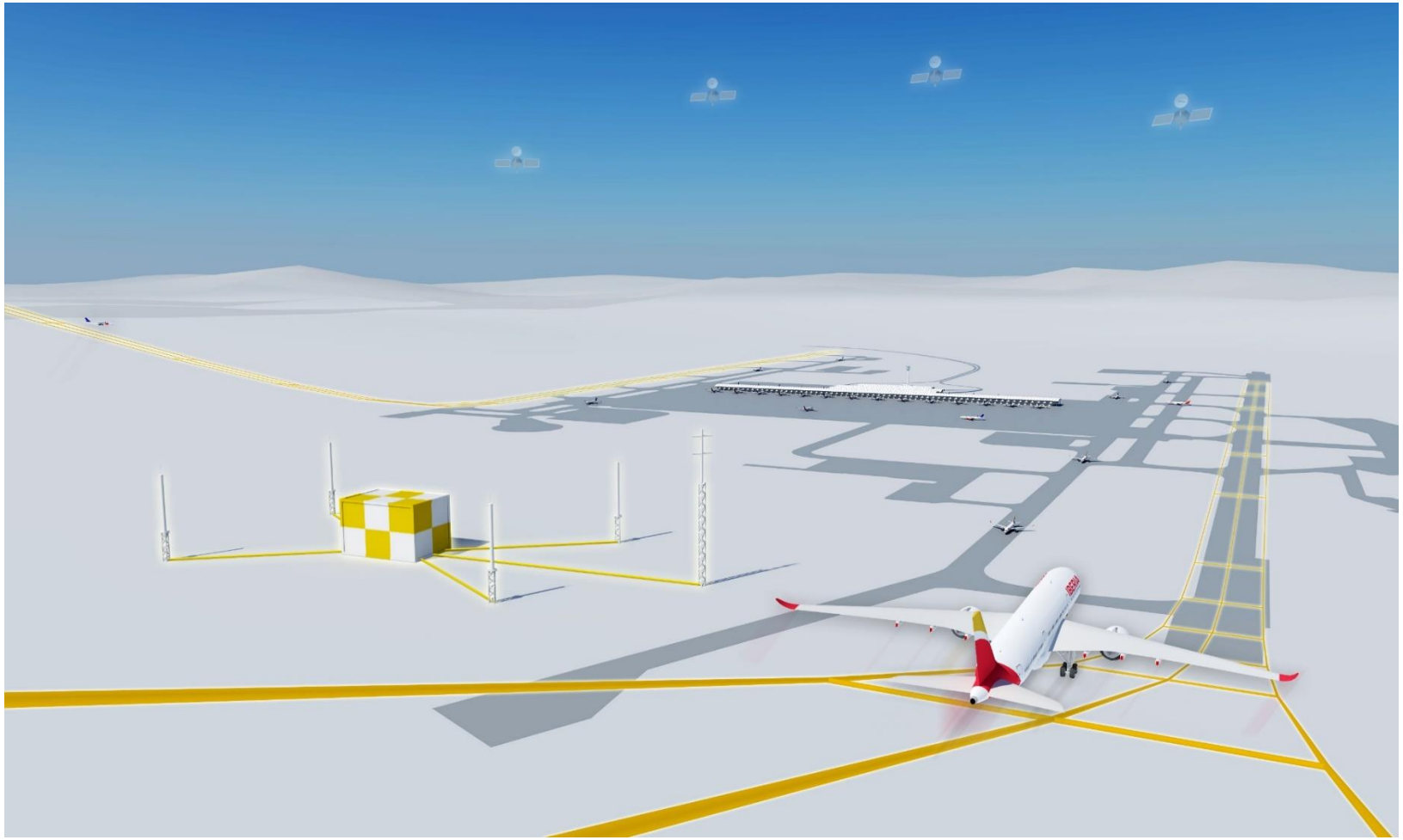
Number of PA Runway Ends:
Worldwide about 3500
Europe: CAT I: ≈ 770
CAT II: ≈ 70
CAT III: ≈ 180

- Scaled illustration

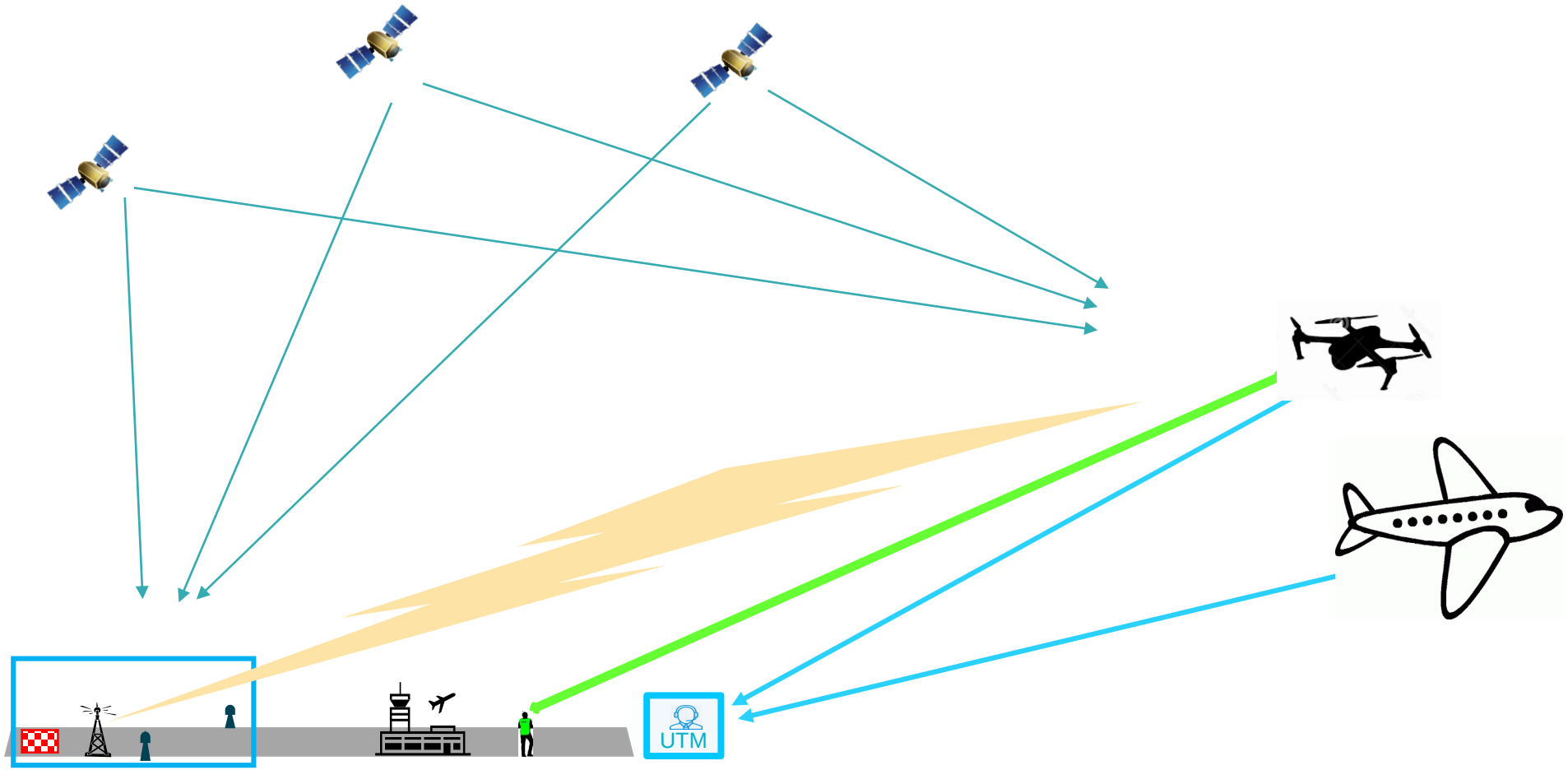


Courtesy of EUROCONTROL

General GBAS architecture – Cat I/II/III landings



Possible architecture for integration of UTM and GBAS for manned and unmanned air traffic.



indra
At the core