U Space -
Enabling Societal Acceptance?

Drones Symposium– Dublin
30th May 2019

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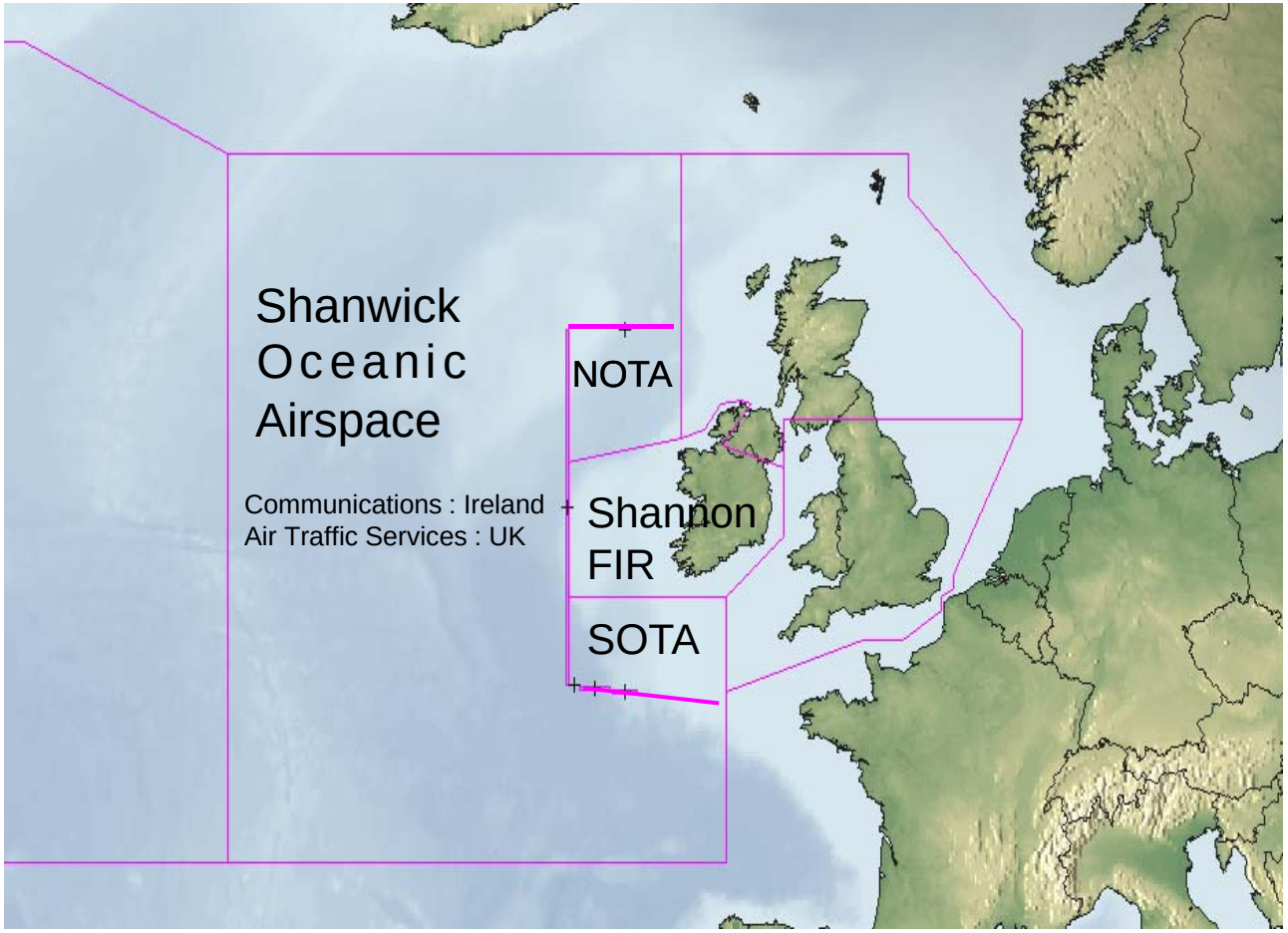
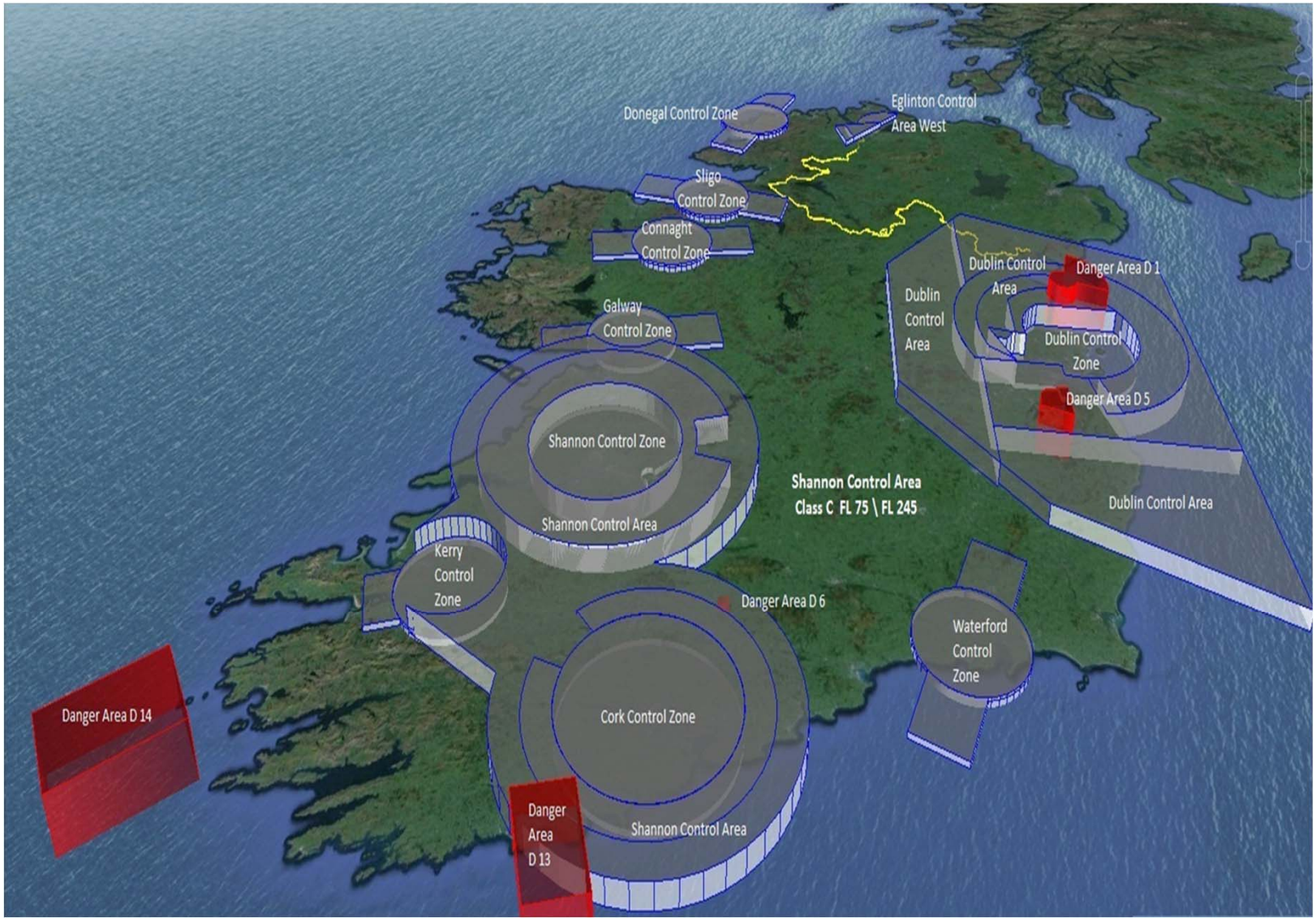
Safety Regulation Division
Irish Aviation Authority

IAA Airspace Responsibility



IAA Airspace Responsibility



Safety Regulation Division

Our Department…..

Safety Regulation of;

- Airspace infrastructure (Control Areas/Zones, SIDS, STARS, Restricted Areas, etc.)
- Service Provider Organisations (ATC, etc.)
- Safety Performance Monitoring (Occurrences, investigation, trends, etc)
- Personnel Licensing and Training

IAA Approach to Drone Regulation

Communicate

Legislate

Educate

Enforce

However a safe and effective system to manage drones in airspace is required

Manned Aviation – Principles

Manned Aviation –

- flying in a metal tube
- 7.5 miles above the ground
- 950 km/hr
- ….having a coffee

Essential Principles for Air Traffic Services

a) Prevent collisions between aircraft;

b) Prevent collisions between aircraft on the manoeuvring area and obstructions on that area;

c) Expedite and maintain an orderly flow of air traffic;

d) Provide advice and information useful for the safe and efficient conduct of flights;

e) Notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Unmanned Aviation – Principles

Equivalent Essential Principles for Unmanned Traffic Management Services;

a) Prevent collisions between drones;
b) Prevent collisions between drones and manned aircraft
c) Expedite and maintain an orderly flow of drones

d) Provide advice and information useful for the safe and efficient conduct of flights;
e) Notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

Proposed Solution…….U Space

U – Space
What is it?

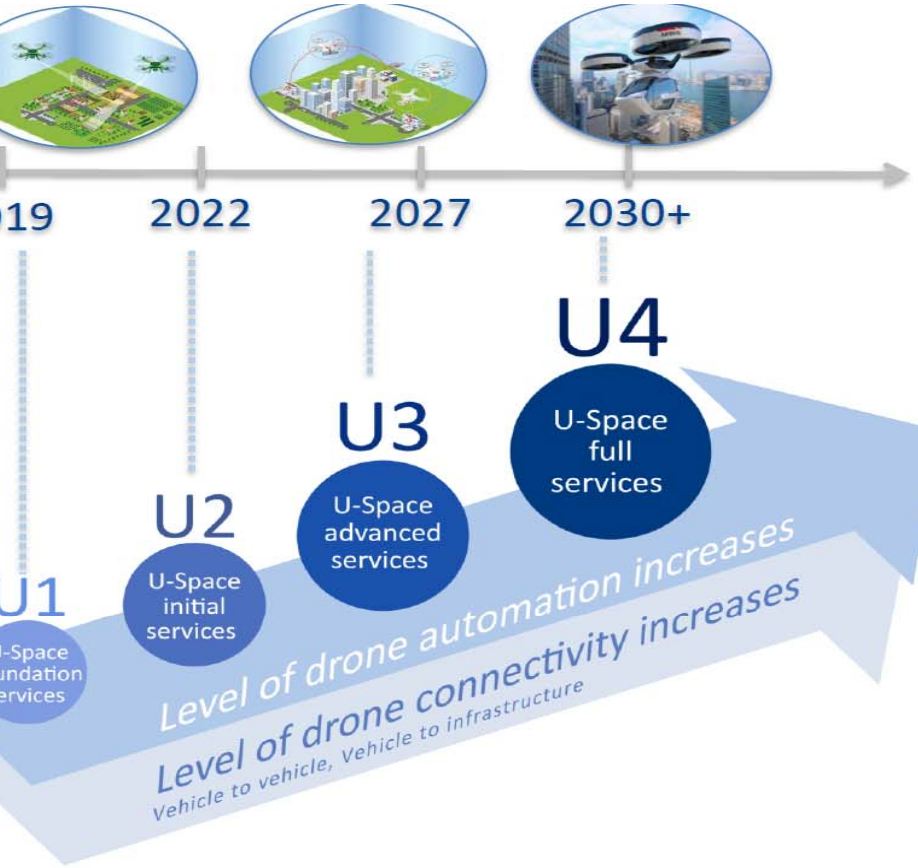
- The European Commission wants to develop the drone services market and is therefore creating an enabling regulatory framework.
- Two drone regulations set out requirements for drones (what classes of drones – what quality requirements, etc.) and drone operations (what are the conditions to fly a drone – what operational envelope, etc.),
- In order to make longer distance drone operations possible, drones need to be identified and tracked.
- U-space is the digital system that would keep such operations safe, secure and green.
- "…. *a digital system delivering a set of automated functions, services and procedures to ensure safe, secure, sustainable and efficient aircraft operations in a specific volume of airspace",*

U Space - Implementation

- U-Space regulation will be separate from the existing ATM regulation
  - Digital nature of U-space and
  - To grant fair access to drone operators in a cost-effective manner through a competitive U-space services market.
- Member States will define volume of airspace where U-space services would be provided.
- local authorities part of discussion
  - Ensure integration in the urban and regional environment.

U Space – The Services

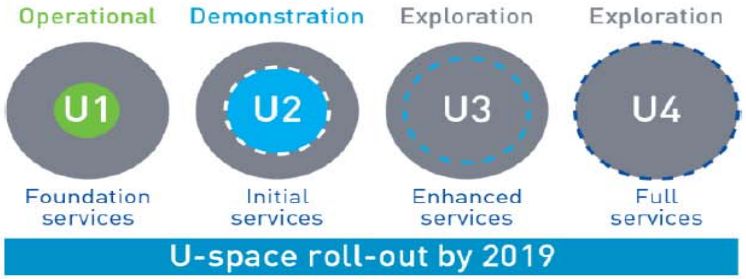
- Common U Space services defined
- Certification of some service providers
  - Based on risk, which services do not require certification and oversight of member states.
- Enforcement providing for States to take action against providers and operators.
- Proposed services include;
  - Communication,
  - Registration,
  - Identification,
  - Geo-awareness,
  - Airspace authorisation,
  - Rule awareness service,
  - Tracking
  - Flight planning.



U-space

IAA

U-space in 2019



U1 Foundation
- e-registration
- e-identification
- geofencing

U2 Initial
- planning & approval
- tracking
- airspace dynamic information
- procedural interface with ATC

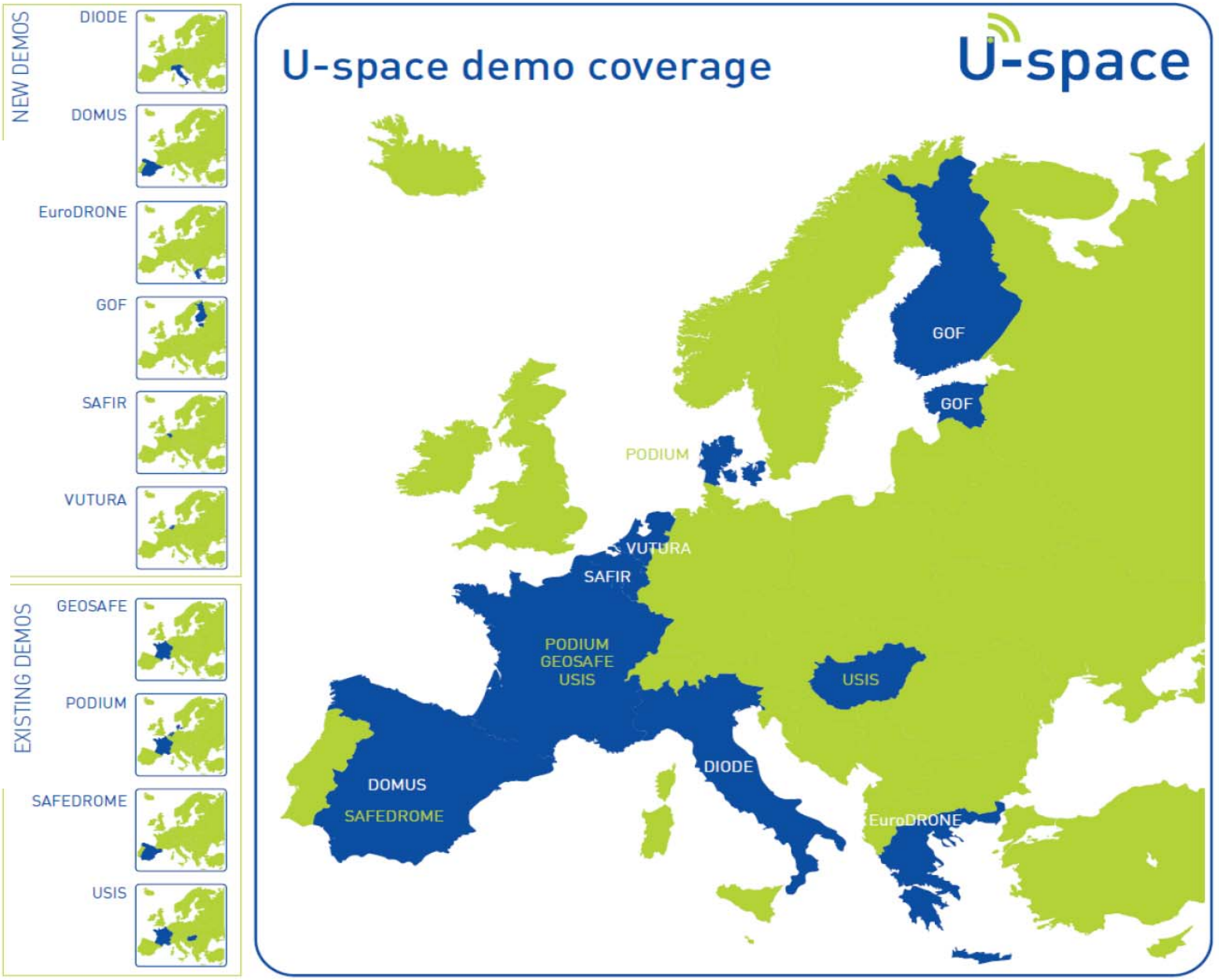
U3 Enhanced
- capacity management
- assistance for conflict detection

U4 Full
- integrated interfaces with manned aviation
- additional new services

SESAR JOINT UNDERTAKING

Demonstrations in:

- Finland
- Estonia
- Denmark
- Netherlands
- Belgium
- France
- Hungary
- Italy
- Spain
- Greece



eoSAFE

EOfencing for Safe and Autonomous Flight in Europe

GEOSAFE

SESAR JOINT UNDERTAKING

IAA

his project is focused on the geo-fencing services and capabilities, it will establish tate of the art geo-fencing solutions from technical, operational, and regulatory erspective. The demonstration will include a number of commercially available epresentative geo-fencing solutions and will assess drone behaviours in different ituations.

he demonstration will take place in France

Key Milestones:

itial Demo Plan	12-2018
emo plan	02-2019
echnical tests	12-2018 – 02-2019
unctional flight tests	12-2018 – 04-2019
emonstration flight tests	04-2019 – 06-2019
nal demonstration	06-2019 – 09-2019
nal Study Report	10-2019

Demonstrator

U2 U3

In a few words...

This project will develop recommendations for future geo-fencing systems and service definition or standardization. This is important for EASA and standardisation bodies such as EUROCAE.

AIRPASS

Advanced Integrated RPAS Avionics Safety Suite

U2 U3 **Aircraft systems**

This project investigates on-board drone technologies that are required to implement the U-space concept.

It is about Detect And Avoid (D&A) systems for cooperative and non-cooperative traffic, auto-pilot systems as well as Communication, Navigation and Surveillance (CNS) systems.

Key Milestones:

✓ Analysis of existing infrastructure and on-board technologies	04-2018
✓ Requirements for the on-board system concept defined	11-2018
• On-board system concept defined	05-2019
• Gap analysis of on-board system concept technologies	07-2019
• Evaluation and feasibility analysis executed	10-2019
• Recommendations finished	10-2019

In a few words...

AIRPASS develops the concept & requirements for the future on-board technologies (D&A, CNS). This will be relevant for standardisation groups and the EASA.

PROJECT INFORMATION

Coordinated by
DLR

Partners
IAI, NLR, Università degli Studi di Napoly Parthenope, SAAB, TUB, TsAGI, AVULAR BV

Framework
H2020

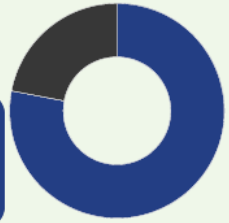
Status
Ongoing project

Start date
1 November 2017

End date
30 October 2019

Overall budget
1,264,973.75 euros

EU Contribution
986,223.75 euros



DroC2om

Drone Critical Communications

U2 U3 **Datalink**

The key objective of the DroC2om project is to contribute to the definition of integrated cellular-satellite data link specifications for UASs. Major focus is on the design and evaluation of data links based on experimental radio investigations and system simulations. The primary goal is to design a cellular-satellite system architecture concept, which ensures reliable and safe operation for remote controlled, semi-autonomous and fully autonomous small UAS.

Key Milestones:

✓ Scenarios and Requirements for C2 link	03-2018
✓ Drone radio measurement campaign	03-2018
✓ Evaluation environment for realistic simulations developed	08-2018
✓ Architecture for evaluation	08-2018
✓ Drone radio measurement campaign no. 2	12-2018
• Integrated cellular-satellite inter-system design concept defined	06-2019
• Scenario based evaluation in interactive simulation	07-2019
• Recommendations on standardisation and architecture	08-2019

In a few words...

The project is challenging the use of existing cellular and satellite infrastructure for C2 link, using live flight trials and simulation evaluation that allow the team to develop requirements for the datalink, and propose LTE/5G and satellite communication standardization.

PROJECT INFORMATION

Coordinated by
Aalborg University

Partners
ATESIO GmbH, Thales Alenia Space, Nokia Bell Labs.

Framework
H2020

Status
Ongoing project

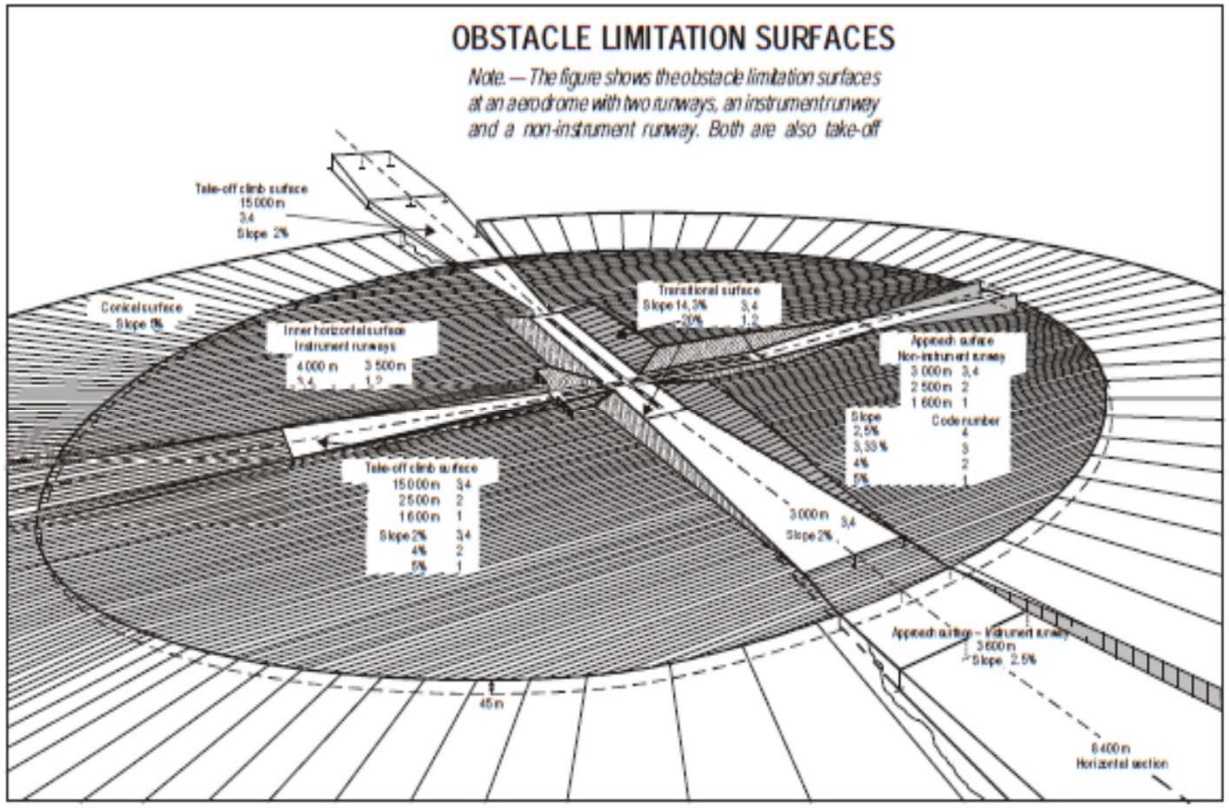
Start date
1 September 2017

End date
31 August 2019

Overall budget
1,270,542.50 euros

EU Contribution
1,270,542.50 euros

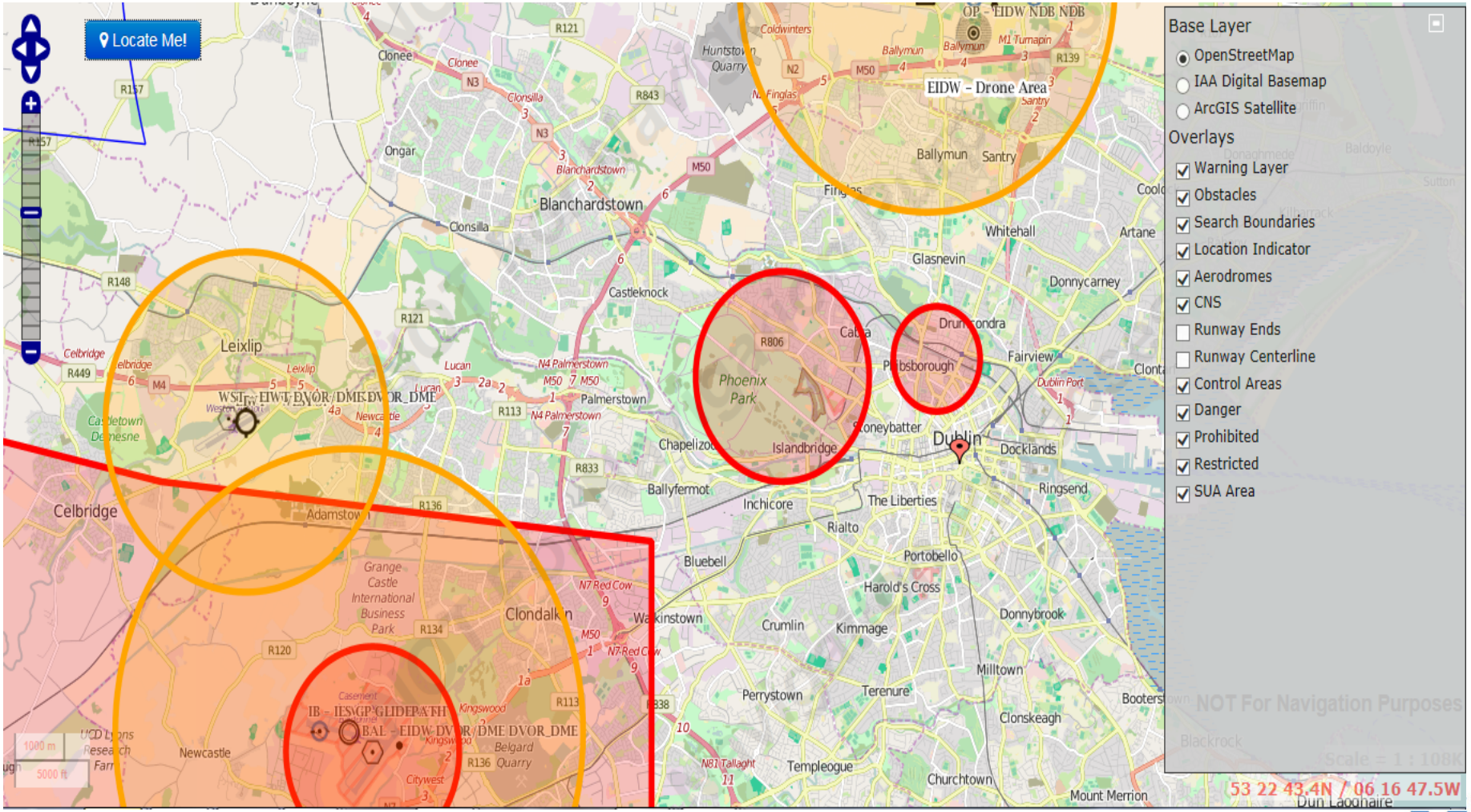
Current “No Drone Zones”



- **Recognize airports close to population centers**
- **ICAO Annex 14**
- **Obstacle Limitation Surfaces**
- **50 feet plus buffer**

- **Effect on Instrument Flight Procedures also Considered**

Current “No Drone Zones”



SHANNON AIRPORT

Depiction of Area defined in Aeronautical Notice U.04 Section 1.

N

Lateral Limits : The Airspace contained within a circle of a radius of 6000 metres
Centered on: 52°42'07" N, 008°55'29" W
Vertical Limits : SFC to 5000FT AMSL
Duration : 24 hours a day

LEGEND

DRONE NO FLY ZONE
SHANNON AIRPORT

SCALE 1:65,000

U Space - Issue to overcome

- How to integrate manned aviation in USPACE.
  - who provides flight information, alerting, deconfliction and collision avoidance services.
- How to avoid a disorderly fragmentation of services, given the Commissions fundamental principle of no designation of a single service provider per portion of airspace.
- How to identify and manage the effect of U Space on current Communication Navigation and Surveillance ATM infrastructure.
- How to handle State aircraft (Military / SAR / Garda) in U Space
- Ensuring a robust occurrence reporting system is in place
- The cost of establishing USPACE need to be identified and who bears the initial set up cost

U Space – Benefits

- New provisions need to be made to enable their operations and to encourage new growth
- U-space will enable drones to co-exist with manned aviation safely and efficiently, requiring:
- Effective interfaces with ATM
- quality data management
- appropriate regulation and standardization
- Education, training and qualification of all participants
- New services and service providers
- New technologies and increased automation

U Space - Benefits

- Airports are vulnerable to accidental and stupid drone operations, and also to truly malicious activities.
- Effective U-space implementation can all-but eliminate the first two, assuming:
- All stakeholders work together and agree a plan/concept
- Regulators write the right rules
- Manufacturers build correctly so that drones cannot break the rules
- Operators are trained / educated / qualified
- Data provision and sharing is standardized and effective
- Malicious activity can then be targeted effectively


DRONE SAFETY IS YOUR
RESPONSIBILITY
KNOW THE RULES BEFORE YOU FLY
REMEMBER TO REGISTER YOUR DRONE WITH THE IAA
All drones over 1kg must be registered
DRONES
IAA
SAFETY IS OUR NO.1 PRIORITY.
MAKE IT YOURS!
For more information: www.iaa.ie/drones

Thank You