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Please note: this session is recorded!

Initiation Workshop

Interoperability of e-Conspicuity systems for GA

Ulrich Aldinger (Horváth)
Helge Mikuda (Droniq)

Cologne, 29.03.2023

Before we start…

This meeting will be recorded for documentation purpose. The recording will not be distributed or used in another context

Please switch off the camera and microphone in order to save internet bandwidth. Of course, in case you do have comments, please switch on the microphone and camera

Event though we may have more than one representative per organization in this meeting, the participation of the subsequent workshops is restricted to one person per organization

The presented slides will be distributed to all participants after the meeting

We would like to ask the experts to **do** the following things:

- Neutral, scientific work
- Fair share of speech
- Be open minded and fair

We ask the experts to **not do** the following things:

- Commercial-interest input
- Excessive presentation of own products (technical view allowed)

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We are happy to support EASA in this strategic project

EASA experience

✓ Expertise & experience present

Consultant category & years of experience

Selected Horváth & Droniq profiles

Project role

	Ulrich Aldinger	Maximilian Barnes	Helge Mikuda	Alexander Tummes	Jan-Eric Putze	Ralph Schepp
	>18 years	>1 year	>20 years	>10 years	>25 years	>25 years
	Senior Manager	Consultant	Senior Aviation Manager	Senior Aviation Manager	Senior Manager	Senior Manager
						
	Project Manager (Lead)	Project Team	Technical Lead	Project Team	SME[1]	SME[1]
	HORVÁTH	HORVÁTH	DRONIQ	DRONIQ	DRONIQ	DRONIQ
Area of Expertise: General and Commercial Aviation	✓	✓	✓	✓	✓	
Project Management & Market Assessment	✓	✓			✓	✓
Feasibility Studies / Publications	✓	✓			✓	✓
Air Traffic and Airspace Usage	✓		✓	✓	✓	
U-Space & UTM Knowledge	✓		✓	✓	✓	✓
Current e-conspicuity Systems	✓		✓	✓	✓	
Flight Safety			✓	✓	✓	✓
Network and Frequency Usage				✓		✓
Equipment Regulations				✓		
Human and Technical Constraints in Aviation			✓	✓	✓	
Legal & Regulatory					✓	✓
Stakeholder Management	✓				✓	✓

[1]SME = Subject Matter Expert

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Objectives of today’s meeting

- Provide **background** on **Horizon Europe project**
- Provide **overview** on project “**Interoperability of e-Conspicuity systems for General Aviation**”
- Clarify **involvement of participants** in project
- Provide outlook **next steps**, especially survey

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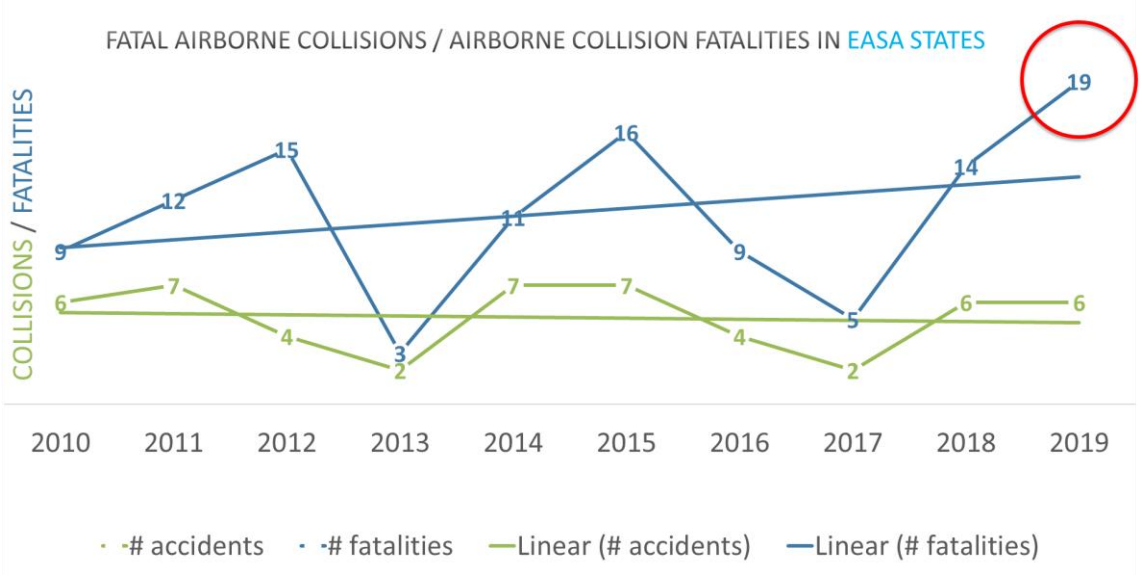
Safety data 2009 - 2019



60 FATAL COLLISIONS ~ 6 PER YEAR

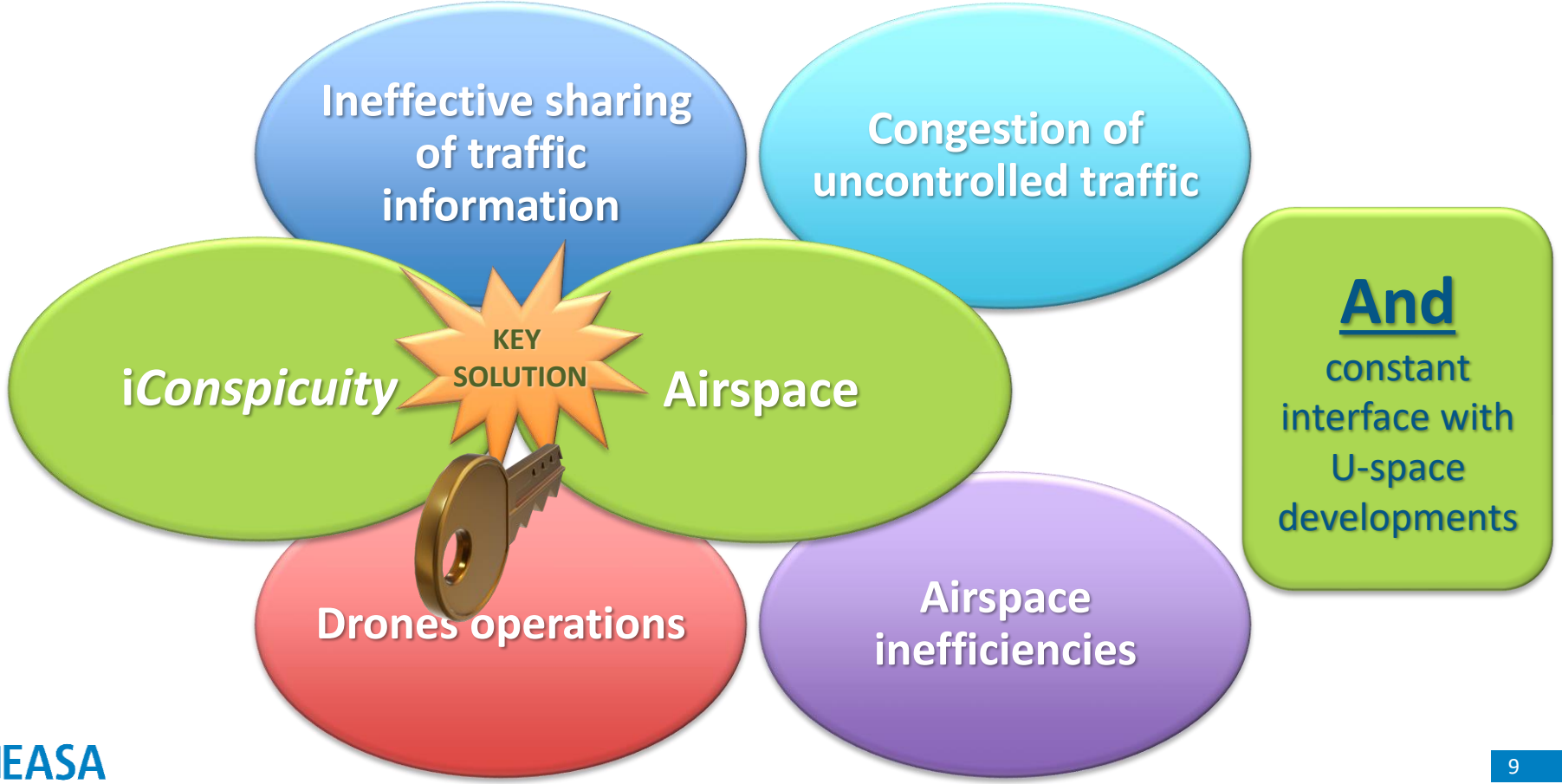
137 FATALITIES ~ 13 PER YEAR

ALL UNCONTROLLED TRAFFIC

ALL SMALL AIRCRAFT*

*MANY ROTORCRAFT

Problems and Solution Areas



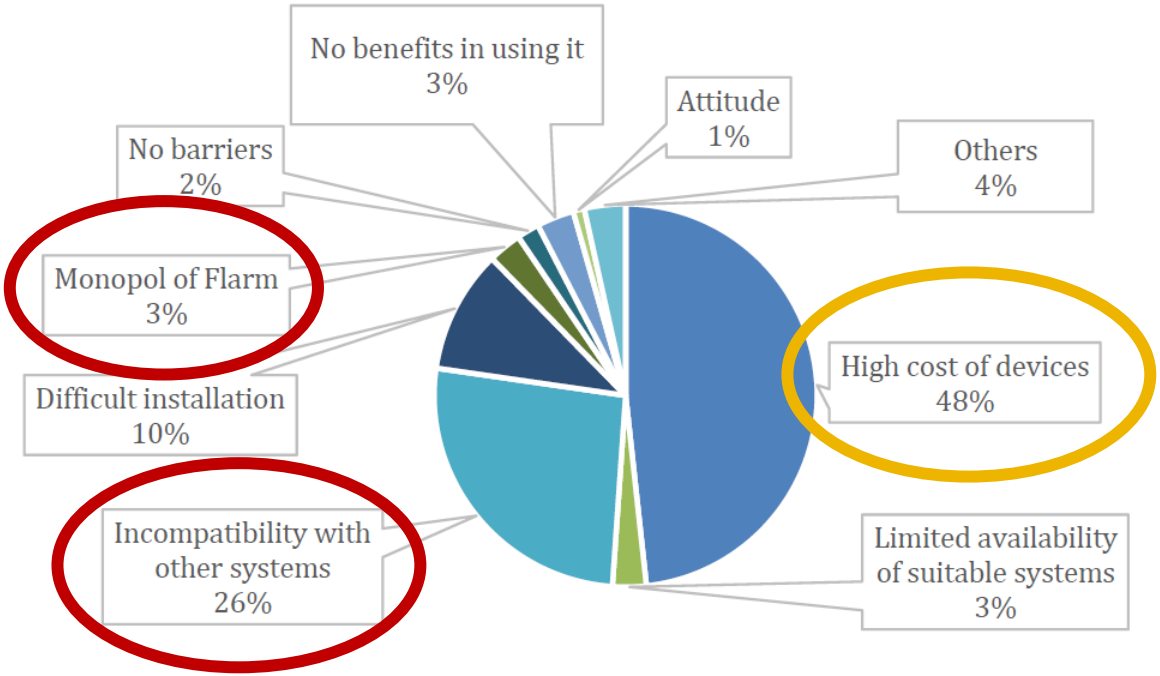
Validation through EASA Pilots' Survey

→iConspicuity

30%
Interoperability

48%
High Cost

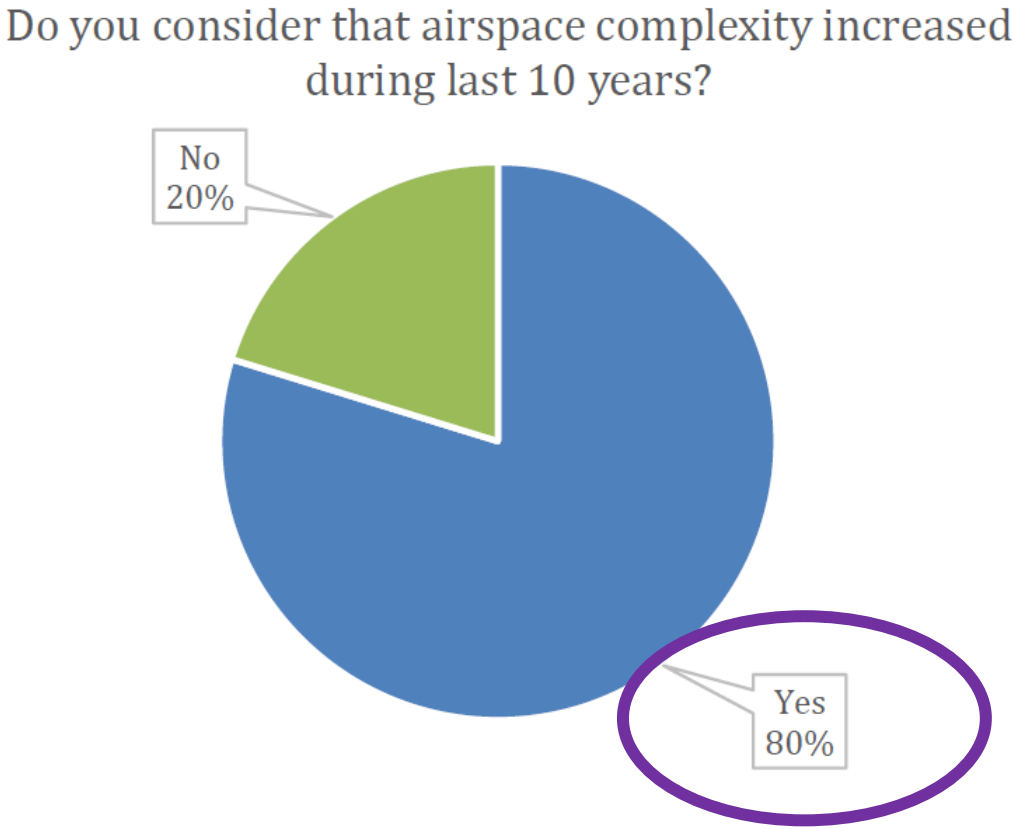
What are the main barriers in bigger uptake of traffic awareness/Anti-collision system for GA pilots?



Validation through EASA Pilots' Survey

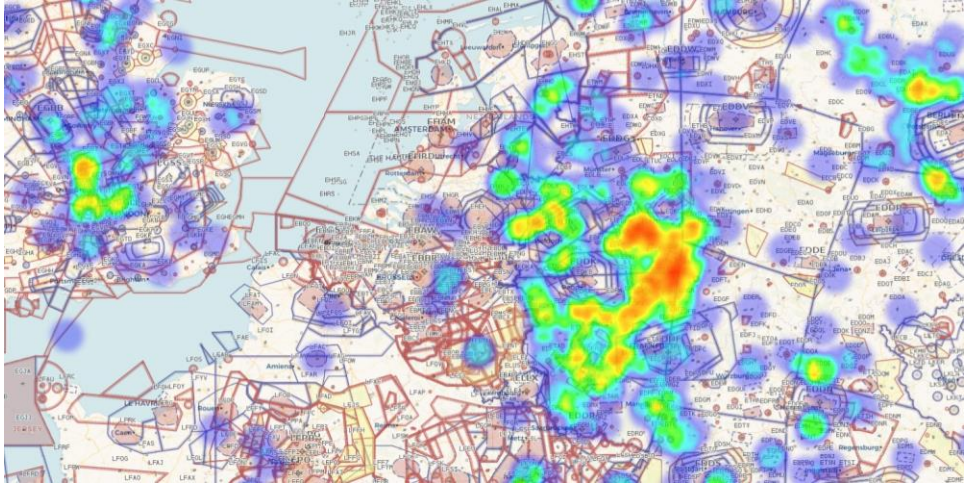
→Airspace

80%
Increased Complexity



U-space

A set of *'new services'* and *'specific procedures'* designed **to support** safe, efficient and secure **access to airspace for** large numbers of **drones *without airspace segregation*** for the sole use of drones

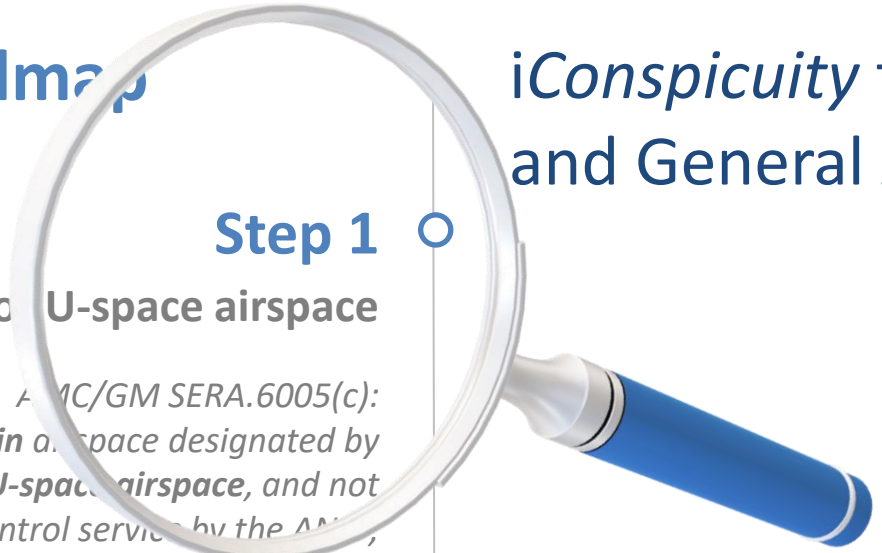


iConspicuity

*'**in-flight capability**'* to transmit position and/or to receive, process and display information (other aircraft, airspace, weather, support to navigation …) in a real time with the objective ***to enhance pilots' situational awareness***

High Level Roadmap

i*Conspicuity* for Rotorcraft and General Aviation



Step 1

Propose a solution for U-space airspace

AMC/GM SERA.6005(c):
Manned aircraft operating in** airspace designated by the competent authority as a **U-space airspace**, and not provided with an air traffic control service by the ANSP, shall continuously make themselves **electronically conspicuous to** the **U-space service providers

Step 2

Build on the U-space solution

Expand the functionalities and **address the GA and Rotorcraft conspicuity issue generally**, **including** the possibility to use the information broadcasted **for Flight Information Service**

Constraints & Boundaries

Development of AMC/GM to SERA.6005(c) by Q4 2021

Aircraft (manned)

- **Affordability** (to end users)
- **Technology available now** (aviation & other)
- **Single device policy**
- Simple installations
- Enable airborne collision risk mitigation for manned aircraft

USSP

- **Minimum necessary position** information (incl. from 3rd parties)
- **Affordable infrastructure** (ideally compatible with UAS needs)
- Minimum performance meeting U-space objectives

Resources

- Existing international standards (aviation & other)
- **Pan-European applicability**
- ITU regulated spectrum
- **Machine readable**
- **Open standards** (non-proprietary or free of royalties)

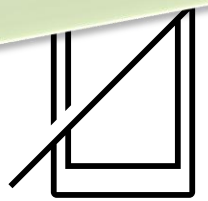
Suitable for urban and low level environments

Contributors

Mobile Telephony Feasibility Study

Aerial Mobile Telephony is possible in Europe !

CEPT/ECC Decision (22)07 of 18 November 2022
on harmonised technical conditions for the usage of aerial UE for communications based on LTE and 5G NR in the bands 703-733 MHz, 832-862 MHz, 880-915 MHz, 1710-1785 MHz, 1920-1980 MHz, 2500-2570 MHz and 2570-2620 MHz harmonised for MFCN



Legal certainty for aerial use

Standardization
(frequencies, services, roaming …)

Smartphones / Dedicated devices

Introducing ADS-L

- **Minimum standard** for making manned aircraft in U-space conspicuous to USSPs
- **Principle: “-L” is for “Light”**
  - Compatible with **low-cost devices** and **mobile telephones**
  - **GNSS-based** parameters
  - Derived from **ADS-B** and **simplified**
- Should support possible **future applications** (traffic awareness)

Means of Transmission

ADS-B Out (1090 MHz)

For certified aircraft, using the **existing certified technology** already installed on board

ADS-L (SRD-860)

Non-certified devices transmitting at low power on the licence-free band SRD-860, in compliance with ADS-L specifications

ADS-L (Mobile telephony)

Mobile telephony application transmitting in compliance with ADS-L specifications

2022

2023

EASA

Non Installed Equipment

Should **comply with** applicable **air operations requirements**

(e.g. CAT.GEN.MPA.140, NCC.GEN.130, NCO.GEN.125, SPO.GEN.130 or equivalent national AIR OPS requirements)

Signal Obscuration

Equipment should be set up on board the aircraft **to limit its obscuration** by the airframe, human body, or other structures and at the same time **maximize ground visibility of the transmitting antennas**.

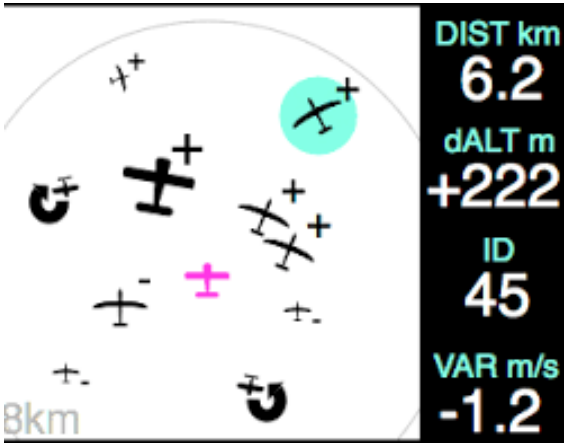
Summary – Step 1

Certified ADS-B out

- ICAO standard
- Already used
- All elements in place

SRD860

- Utilises past investments
- Affordable infrastructure
- **ADS-L 4 SRD-860** PUBLISHED



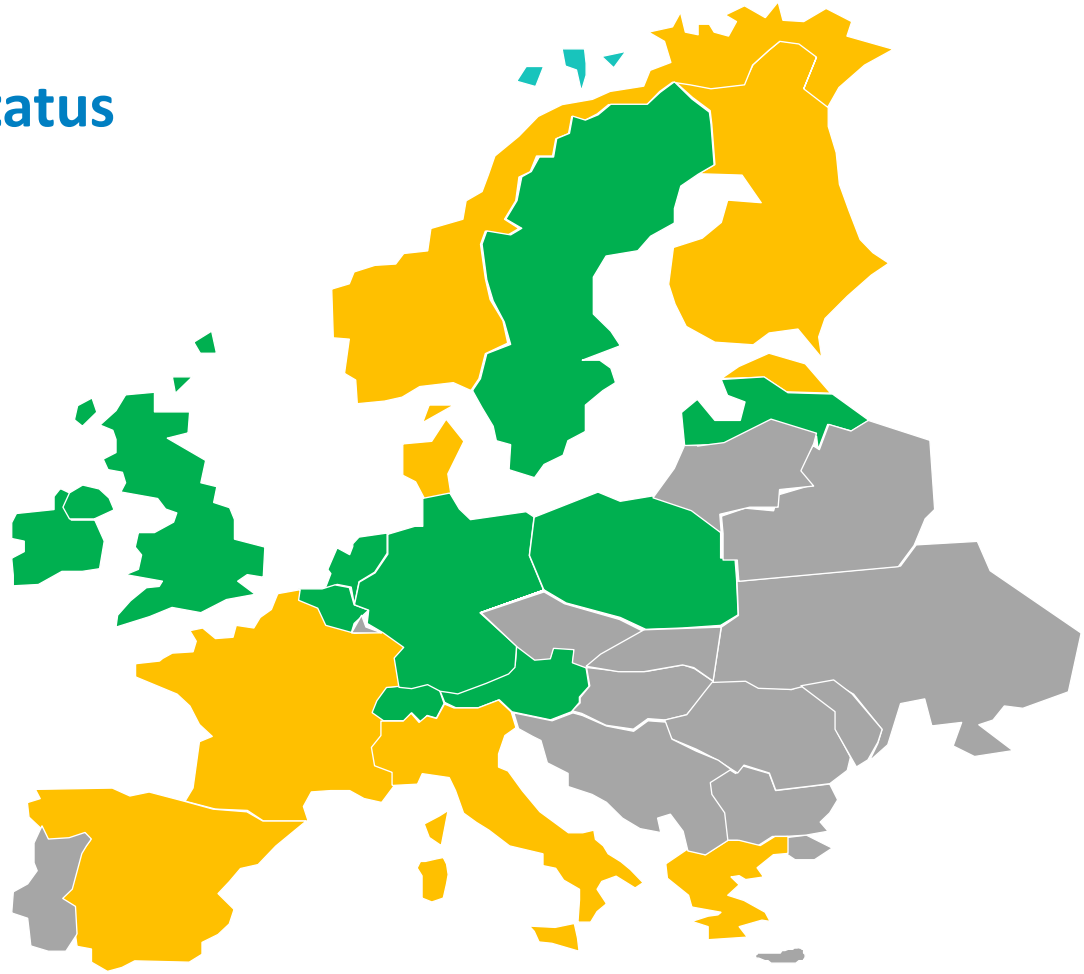
Mobile Telephony

- Existing infrastructure
- **Need for implementation**
- SOON **ADS-L 4 Mobile***

**expected in 2023*

Aerial Mobile Service Status

- Ready for commercial use
- Almost ready for deployment
- No information



High Level Roadmap

i*Conspicuity* for Rotorcraft and General Aviation

Step 1

Propose a solution for U-space airspace

AMC1 SERA.6005(c):
Manned aircraft operating in** airspace [illegible] by the competent authority as a **U-space airspace**, provided with an air traffic control service by the ANS[illegible] shall continuously make themselves **electronically conspicuous to** the **U-space service provider[illegible]

Step 2

Build on the U-space solution

Expand the functionalities and **address the GA and Rotorcraft conspicuity issue generally**, **including** the possibility to use the information broadcasted **for Flight Information Service**

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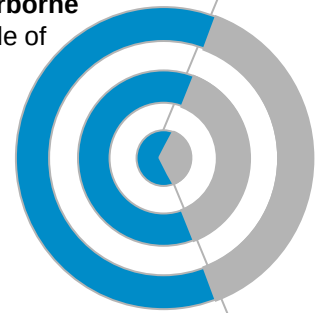
EASA seeks to analyse the interoperability of electronic conspicuity systems for General Aviation

Initial Situation

- **Flight safety** for non-commercial **airspace users** is a **key priority** in EASA's annual safety review
- EASA registered a **stable trend** of **airborne collisions** and an **increased rate** of related **fatalities** from 2009 to 2019
- Electronic conspicuity systems can **elude airborne collisions** where human vision is not capable of detecting other airspace users
- Recommendations propose the **mandatory carriage** of EC systems but they are currently **not required** for small aircraft. However, a series of **EC tools** has been **introduced** by the General Aviation **community**



- These tools are **not** always **interoperable** with each other, consequently aircraft might **not** be **detected** by each other and might not be **compatible** with electronic **conspicuity systems** for **U-Space** operators

Objective of the Project

- **Review** of **existing EC tools** from GA actors and solution developers incl. used **interoperability standards** and **capabilities**
- **Identification** and analysis of **requirements** to enable **interoperability** between **existing systems** and thereby resulting **key challenges** and **constraints**
- Development of **feasibility case studies** (min. two) incl. constraints, costs under consideration of **existing conspicuity solutions** for non-commercial airspace users
- Development of a dedicated case study with **additional benefits** for **airspace and ground users** under **consideration** of an **implemented harmonised data exchange**, e.g. for search and rescue missions
- Including **constant feedback** of key stakeholders (e.g. National Aviation Authorities, GA associations) in the project results through a **series of expert workshops**
- **Consolidation** of **results** and development of an **action plan** for the realisation of the **interoperability requirements** for EASA and key stakeholders

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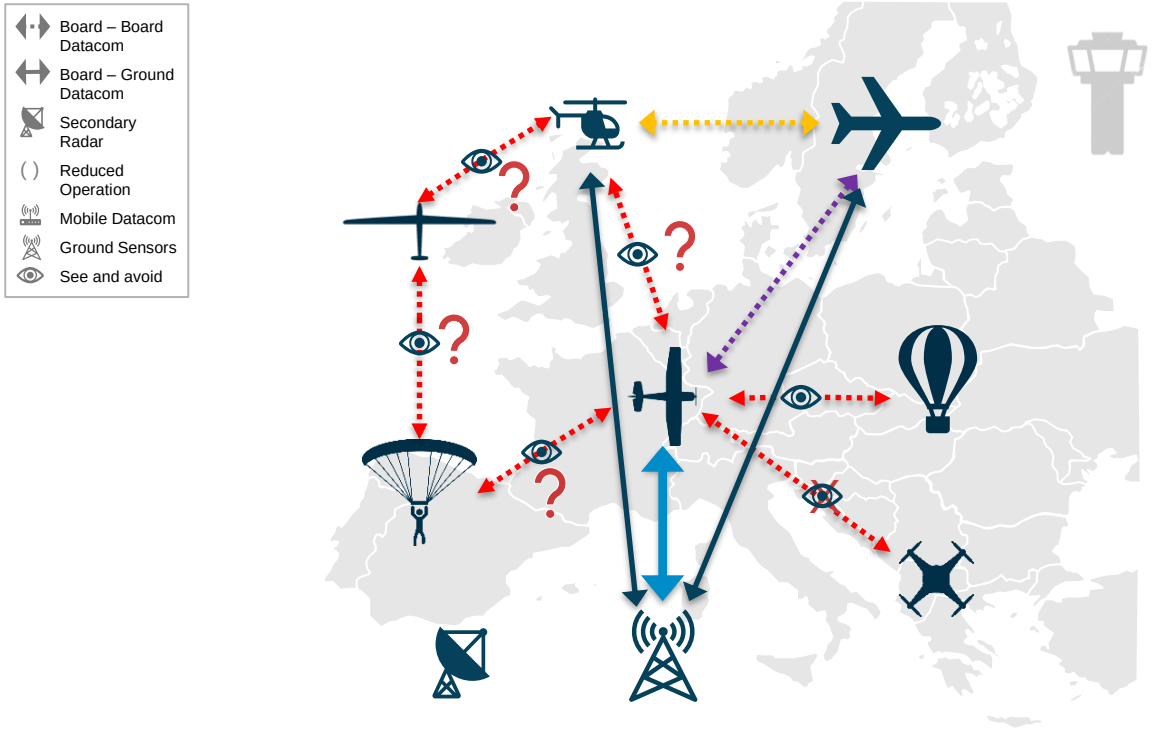
Objective of the project is to prepare a recommendation for an interoperable communication standard for aircraft

Current Situation



- **“See and avoid**” is the **basis** for preventing aircraft collisions in uncontrolled airspace
  → **Stable trend** of airborne collisions and increase of related fatalities over the last 10 years
- Series of **electronic devices** have been **introduced** to improve the situational **awareness** for **pilots**
  → given the diversity of these devices they are **not** always **interoperable** with each other

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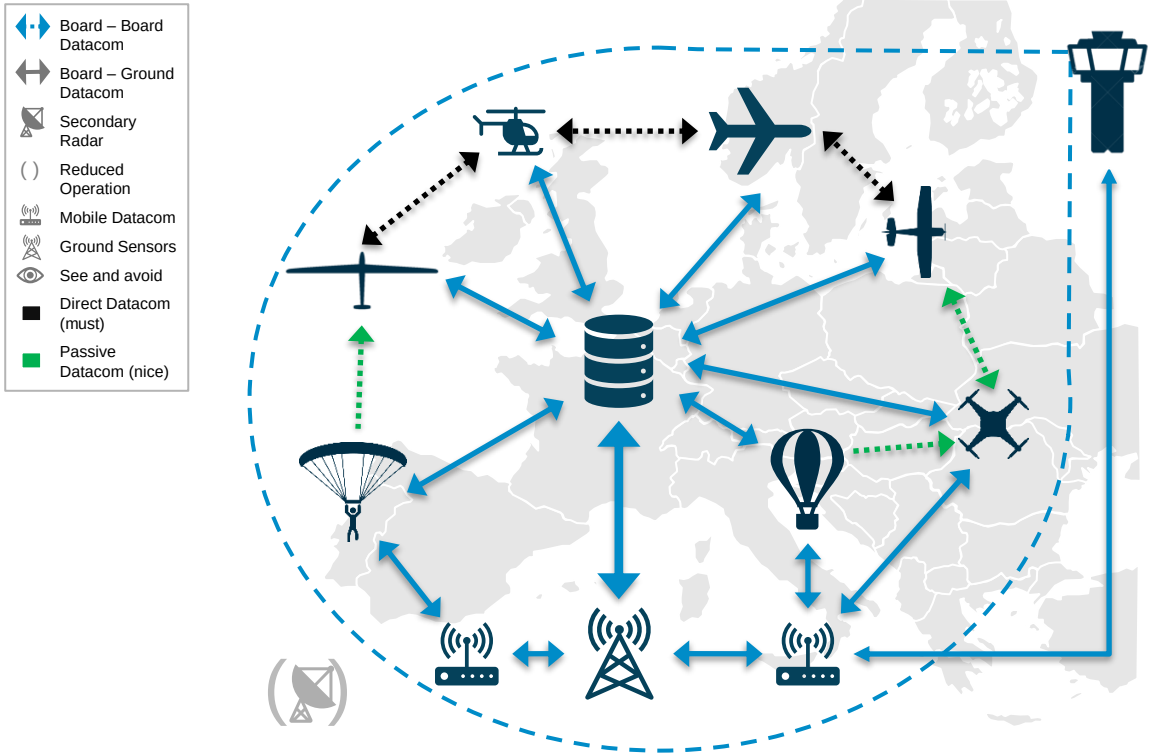
Objective of the project is to prepare a recommendation for an interoperable communication standard for aircraft

Target Picture (symbolic)



- **Standardised data communication** between aircraft and ground stations by **interoperable systems**
- Airborne **collision avoidance** for all participants in **uncontrolled airspace**
- Mandatory **carriage** of **electronic conspicuity systems** for General Aviation

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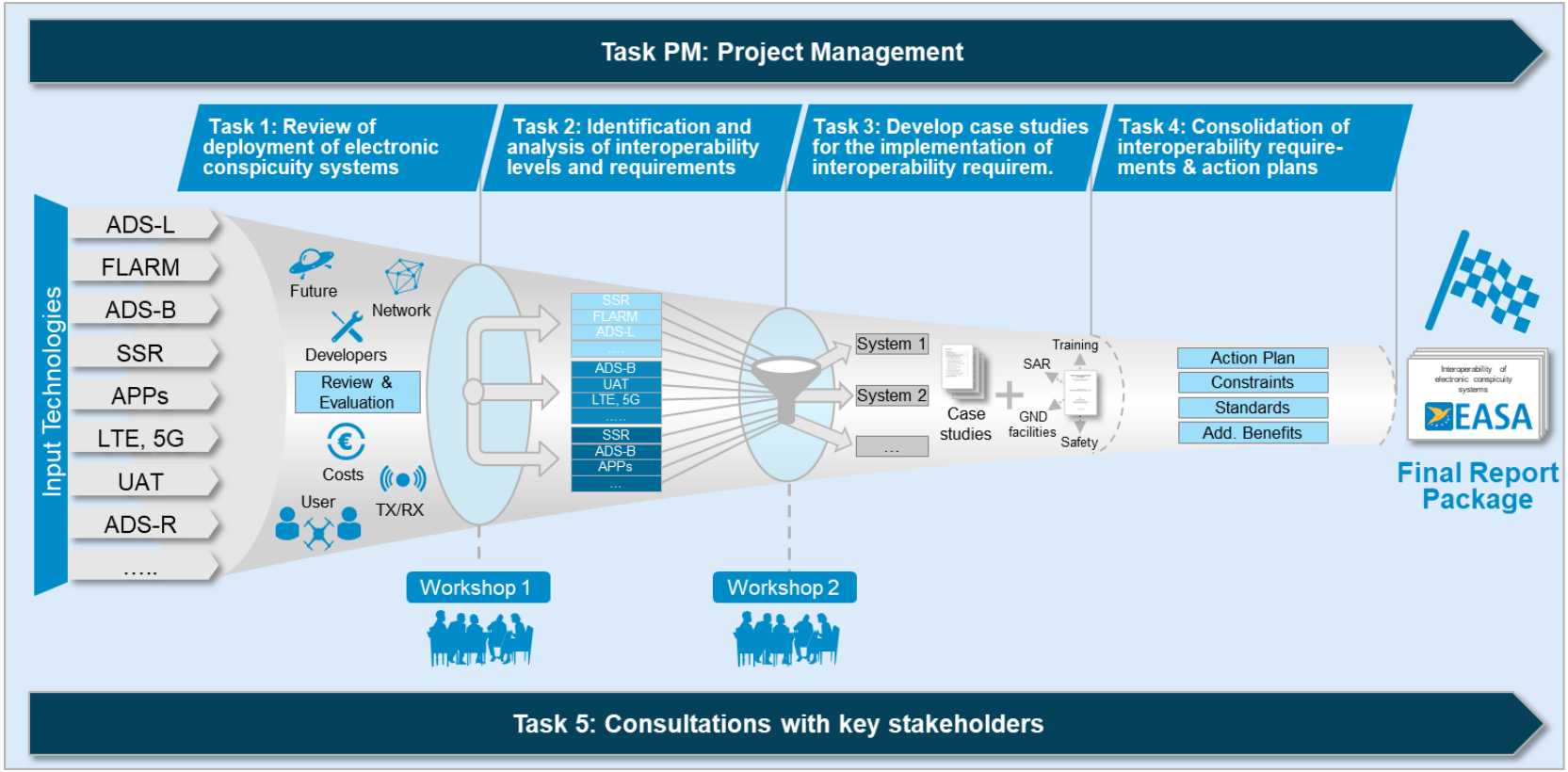
Project Course



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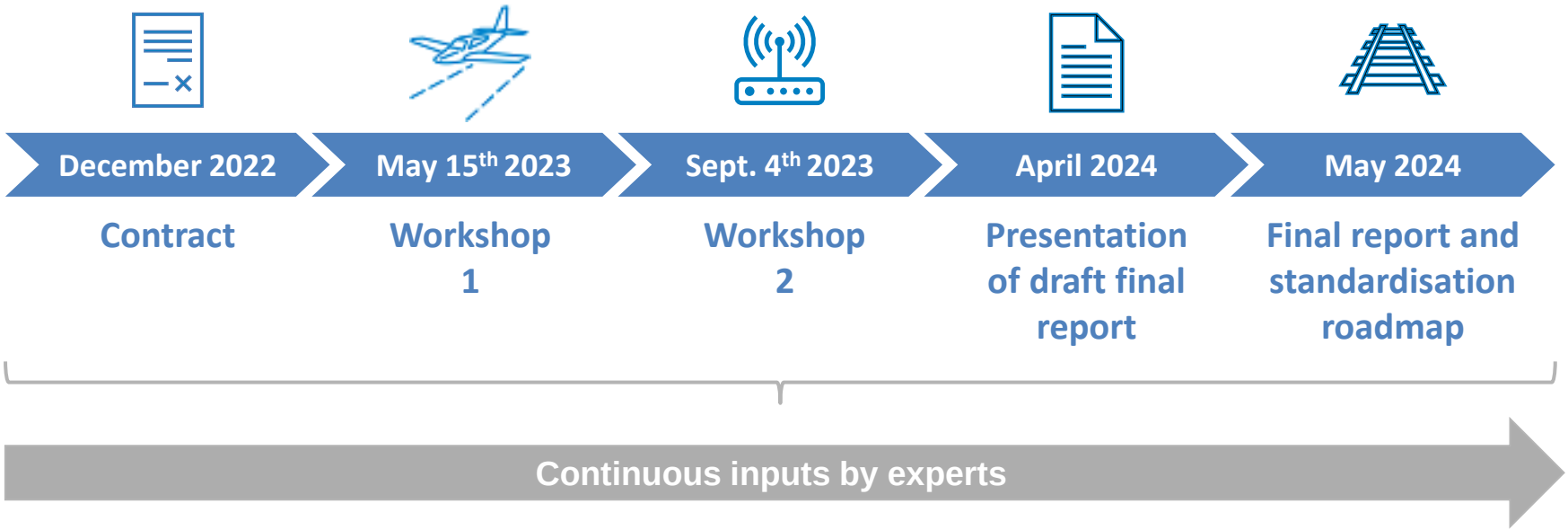
Project timeline



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Overview of major deliverables

End products	Description
Survey report on existing e-conspicuity systems 	▪ Survey of the **existing deployments of e-conspicuity systems** for GA in Europe including the **current initiatives** developed by NAAs, ANSPs, and USSPs ▪ Consideration of **constraints, costs and benefits** of existing systems to strengthen the understanding of the status quo
Interoperability levels and requirements report 	▪ Report of the analysis of the **main needs and constraints** of enabling the interoperability between systems including the **associated interoperability levels** and **implementation scenarios** ▪ Consideration of **different requirements and options** for data exchanges, deployed technologies, and associated data formats and protocols
Case studies for deployment of interoperability solutions 	▪ **Series of case studies** (minimum two) assessing and comparing the **feasibility and possible constraints** of the previously **identified interoperability requirements** ▪ Simultaneous consideration of **various deployment scenarios** and **action plans** for different actors
Case study on benefits for additional actors 	▪ Case study report about **possible benefits for GA traffic and various ground users** from the availability of **large data sets** and the **increased interoperability**

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Overview of surveys

	General survey	Internal survey
Addresses	▪ End users	▪ Workshop participants and experts
Distribution of survey	▪ Websites ▪ Social media ▪ AERO 2023	▪ E-mail
Expected results	▪ Overview of deployed systems and initiatives ▪ Needs and constraints ▪ Financial capability	▪ Detailed overview of systems on the market ▪ Interoperability needs ▪ Hardware and network capability
Timeframe	▪ April – May	▪ 4 weeks before Workshop 1

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Next Steps

Nº	Description	Responsibility	Start CW	Due CW
1	Documentation of initiation workshop and distribution of slides to all participants	Horváth	13	13
2	General survey	Droniq	14	20
3	Internal survey	Droniq	16	19

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Overview of workshops

	Workshop: Initial alignment 29.03.2023 (Online)	Workshop 1: Survey of existing ECDs 15.05.2023 (On-site)	Workshop 2: Interoperability levels 04.09.2023 (On-site)
Objective	▪ Introduction of the project and the e-conspicuity systems survey	▪ Presentation and discussion of interoperability levels	▪ Case study presentation and discussion about implementation and interoperability solutions
Agenda	1 **Project presentation** ▪ Goals ▪ Time ▪ Procedure 2 **First draft, survey & features** 3 **Conclusion of ideas & proposal** 4 **Next steps** ▪ Workshop-roadmap ▪ Attendance at WS	1 **Current status** 2 **Presentation of the potential systems** ▪ Check up by all participants 3 **Requirements of the interoperability** ▪ Financial ▪ Technical ▪ Operational ▪ Useability ▪ Airspaces	1 **Current status** 2 **Results phase 2** ▪ Procedure ▪ Results 3 **System proposals for individual interop. levels along the user** 4 **Election of the preferred solution**
Results	▪ All participants are informed ▪ Potential systems are roughly outlined ▪ Potential add-ons of the systems are considered by the participants	▪ Acceptance of the system trial ▪ Requirements of the interoperability	▪ System proposal for each interop. level ▪ Preferred choice by workshop participants

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