Third Workshop report

D5.5

AW-Drones

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Consortium coordinator:	**Deep Blue**
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Authoring & Approval

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Rejected By - Representatives of beneficiaries involved in the project

Name/Beneficiary	Position/Title	Date

Document History

Edition	Date	Status	Author	Justification
00.00.01	10/12/2021	Draft	Peter van Blyenburgh, vera Ferraiuolo	Initial draft, outcomes of workshop
00.01.00	30/12/2021	Issued	Damiano Taurino	Integration of internal reviews

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AW-Drones

CONTRIBUTING TO A WELL-REASONED SET OF AIRWORTHINESS STANDARDS FOR MASS-MARKET DRONES

Abstract

This document reports on the set-up and results of the third AW-Drones Workshop (that is the Final Dissemination Event of the project), detailing the outcomes identified and the resultant priorities arising from the involvement of the participants. The event has been held online on December 7th 2021 with an audience of more than 250 participants.

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FINAL INFORMATION DISSEMINATION WEBINAR - REPORT

Date:	December 7, 2021
Hours:	09.00 – 11.10 & 11.30 - 13.00
Meeting Type:	Webinar
Medium Used:	GoToMeeting
Participation:	Registered Participants: 262 persons
Objective:	The event aimed to explore the challenges that the drone sector is facing in Europe, and how the development and adoption of adequate industry standards may contribute to the safe integration of drones in aviation. In this context, representatives of the AW Drones consortium highlighted the role that the project has in supporting the establishment of a safe and sustainable framework for drone operations in the European Union.
Webinar Agenda:	**Annex 1**
Participants:	**Annex 2** – Alphabetical list of participants: 13 Speakers + 1 Logistics Person 162 Participants 86 Registered, but not participating
Presentations:	**Annex 3** All presentations given in chronological order.
Webinar Recording:	The entire webinar was recorded (Audio & video) and is available - **Click Here**
Online Poll:	**Annex 4** The online poll obtained feedback from the webinar participants on 3 critical questions.
Questionnaire:	**Annex 5** The online questionnaire obtained feedback from the webinar participants on the degree of satisfaction concerning the the webinar.
Chat Questions:	**Annex 6** By means of the webinar chat box questions could be asked & were answered throughout the webinar.
Survey Results:	**Annex 7** Survey Conclusions: 1) UAS OPS & OPS Risk Surveys 2) U-Space Insight
Webinar Posters:	**Annex 8** 1) AW Drones Project - General Information 2) AW Drones Project - Outcomes

WEBINAR - HIGH LEVEL REVIEW

1 09.00-09.30 Welcome & Introduction

- Vladimir Cid-Bourié - CINEA/EC — Project Officer
- Damiano Taurino - Deep Blue, Italy — Project Coordinator
- Christos Petrou - MED Flight Safety Foundation, Cyprus — Project Partner

Damiano Taurino opened the webinar and welcomed all participants and explained the webinar logistics and objectives.

Christos Petrou, the official webinar organiser, gave an opening speech during which he called for a public awareness campagne at global, regional & national levels and highlighted the requirement to address a number of topics.

Vladimir Cid-Bourié, the project officer, gave a short overview of CINEA (European Climate, Infrastructure and Executive Agency of the European Commission) and its activities. He announced the publication by CINEA of its 10 drone projects (AW Drones, 5DAerosafe, Drones4Safety, Labyrinth, Rapid, AiRMOUR, AURORA, FF2020, ASSURED-UAM, MONIFLY) in January 2022.

2 09.30-09.50 AW-Drones Overview

- Marco Ducci - Deep Blue, Italy — Project Deputy Coordinator

An overview of the AW Drones project was presented (the what, why & how, the involvement of external experts, and the outcomes). The project's annual focus (Year 1: standards required to supprt SORA; Year 2: standards to support the development of U-space; Year 3: standards to demonstrate compliance with SC Light-UAS requirements) was covered. The project's annual reports and its principal deliverable was introduced: the open online repository containing structured information about technical rules, procedures and standards for drones worldwide, including applicability to different UAS OPS categories and different SAIL = metastandard.

3 09.50-10.10 Standards in Support of UAS Operations

- Natale di Rubbo - EASA

An overview of the EASA activities in the context of the EU regulation was given and the importance of standards was explained. The upcoming standards for the Open category were highlighted (Product & verification requirements; Direct Remote Identification requirements; Geoawareness requirements; Lighting requirements). Natale di Rubbio explained EASA's upcoming assessment of the AW Drones deliverables and the ongoing tender covering complementary work to AW Drones deliverables. The expected industry developments and the relevant planning was highlighted and an overview of the U-space situation was given. An overview of all existing working groups was presented. The critical Urban Air Mobility enablers that EASA is working on were presented, as well as 2 upcoming NPAs and the relevant timeline.

4 10.10-10.30 ICAO UAS-related Activities

- Sven Halle - ICAO

This presentation covered 3 ongoing ICAO guidance material activities: ❶ UTM Framework

update (edition 3 published; edition 4 is being drafted); ❷ U-AID (Humanitarian) Guidance material; ❸ UAS Model Regulations (published).

5 10.30-10.50 Urban Air Mobility and the Integration with Commercial Aviation
- Stefano Prola - IATA

A short presentation of IATA's activities was given. The current challenges regarding the integration of drones in the airspace were explained. The opportunities created by UTM & STM (including artificial intelligence & new concepts of automation) to modernize legacy ATM systems & concepts were highlighted. The requirements to reach an end state of highly automated ATM systems were presented.

6 10.50-11.10 U-space Services for the UAS/UAM Airspace Integration – EUROCONTROL's Role
- Giancarlo Ferrara - EUROCONTROL
- Munish Khurana - EUROCONTROL

Giancarlo Ferrara presented EUROCONTROL's activities in the field of R&D and participation in SESAR JU U-space-related projects (CORUS-XUAM; BUBBLES; DACUS; ICARUS; INVIRCAT; URCLerED; AURA) Hozizon 2020 U-space-related projects (5D-AeroSafe; Labyrinth; Drone4Safety). The consolidation of U-space CONOPS with SESAR JU, as well as EUROCONTROL's support to regulations and standards development (including Counter-UAS), was touched on.

Munish Khurama explained EUROCONTROL's support to EU Member States (including in the field of airspace assessment). EUROCONTROL is also involved with the validation of U-space services in a simulated environment at its R&D hub in Bretigny, France. The presentation ended with an explanation of the transition from U-space demonstrations to actual deployment.

11.10-11.30 Break
During the break a poll amongst the webinar participants was conducted.

7 11.30-11.50 AW Drones Data Collection and Methodology
- Sebastian Cain - DLR, Germany — Project Partner
- Tom van Birgelen - NLR, The Netherlands — Project Partner

Sebastian Caen gave an overview of the work conducted relative to data collection, analysis of the standards (relative to SORA, U-space, and SC-LUAS) and the mapping and followed this with an explanation the methodology used.

Tom van Bigelen went deeper into the methodology used to assess the standards identified (coverage of the standards, ranking the standards) and to assess the gaps. The way the conclusions of the gap assessments were defined were then presented.

8 11.50-12.10 AW Drones Project Outcomes
- Matteo Natale, EuroUSC-Italia, Italy — Project Partner

The presentation explained the iterative approach used for the project, touching on the standards assessment methodology, and the multi-criteria analysis to address each case. Three examples were presented (SORA; U-space regulatory framework; SC Light-UAS).

9 12.10-12.30 AW Drones Survey Results: The Operator's Perspective of Drones

- Peter van Blyenburgh - Blyenburgh & Co., France Project Partner

The targeted participants (principally drone operators) and the objectives of the 3 multilingual (GB, FR, DE, ES) surveys conducted in the framework of AW Drones [UAS OPS (May 2020); OPS Risk (May 2020); U-space Insight (April 2021)] and the survey methodology were explained. The UAS OPS survey examined the current and near-future situation for multiple market sectors. The OPS Risk survey addressed the operators' perception of SORA, and the U-Space Insight survey addressed the operators' perception of U-space and related services. A few of the conclusions of each survey were presented. All webinar participants were recommended to read the conclusions of the three surveys, which could not be condensed into a 20 minute presentation.

Note:
- Status of the survey conclusion downloads on the day of the webinar:
  UAS OPS & OPS Risk: 651 persons
  U-space Insight: 282 persons.
- The day after the webinar, all 162 webinar participants received an email from the presenter with the links to the conclusions of the three surveys.
  Links to survey conclusions: **UAS OPS & OPS Risk**
  U-space Insight

10 12.30-13.00 Drone Standards Information Portal & Future Actions

- Damiano Taurino - Deep Blue, Italy Project Coordinator

In this presentation Damiano Taurino presented the Drone Standards Information Portal, (**https://standards.aw-drones.eu/**) the principal AW Drones deliverable. The current portal was accessed online and shown, and the speaker walked the audience through the functionalities of the portal.
In the second stage of the presentation, the future version of the portal (to be online at the end of December 2021) was explained. The new portal will incorporate:

- Better user support & complete user manual
- New & responsive graphical identity
- Specific internal sections (SORA; U-Space; SC-Light UAS)
- Easier access to the information

It was emphasized that the new edition of the Drone Standards Information Portal and the project web site will be maintained after the conclusion of the AW Drones project on 31 December 2021 for at least 2 years.

Prior to closing the meeting a short satisfaction survey was conducted online.

In addition, the webinar participants were asked by means of an online poll if they will make use of the AW Drones outcomes. The following positive answers were recorded:

- Recommended standards 56%
- Drone Standards Information Portal 80%
- Survey results 35%

After the closing remarks by Christos Petrou, the webinar was closed after 3.32 minutes of active discussion.

AW DRONES

Is European aviation conquering the challenges of drones?

FINAL PUBLIC EVENT

7 DECEMBER 2021 - ONLINE

AW-Drones is an H2020 project that contributes to the harmonisation of the EU drone regulations and standards. The project supports the European Union rulemaking process for the definition of rules, technical standards, and procedures for civilian drones to enable safe and reliable operations in the EU Open and Specific categories.

OBJECTIVES

The event aims to explore the challenges that the drone sector is facing in Europe, and how the development and adoption of adequate industry standards may contribute to the safe integration of drones in aviation.

In this context, representatives of AW-Drones will highlight the role that the project had in supporting the establishment of a safe and sustainable framework for drone operations in the European Union.

AGENDA

09.00-09.30	**Welcome & Introduction** *Vladimir Cid-Bourié, CINEA/EC – Project Officer* *Damiano Taurino, Deep Blue – Project Coordinator and Christos Petrou, FSF/MED – Project Partner*
09.30-09.50	**AW-Drones overview** *Marco Ducci, Deep Blue – AW-Drones Deputy Coordinator*
09.50-10.10	**Plans for UAS rulemaking and U-Space** *Natale di Rubbo, EASA*
10.10-10.30	**ICAO UAS related activities** *Sven Halle, ICAO*
10.30-10.50	**Urban Air Mobility and the integration with commercial aviation** *Stefano Prola, IATA*
10.50-11.10	**U-space services for the UAS/UAM airspace integration – EUROCONTROL Role** *Giancarlo Ferrara, Munish Khurana, EUROCONTROL*
11.10-11.30	**Break**
11.30-11.50	**AW-Drones data collection and methodology** *Sebastian Cain, DLR – Project Partner and Tom van Birgelen, NLR – Project Partner*
11.50-12.10	**Project outcomes** *Matteo Natale, EuroUSC– Project Partner*
12.10-12.30	**AW-Drones survey results: the operator's perspective of drones** *Peter van Blyenburgh, Blyenburgh & Co. – Project Partner*
12.30-13.00	**Drone Standards Information Portal and future actions (includes interactive session and wrap-up)** *Damiano Taurino, Deep Blue – Project Coordinator*

Webinar Participants

Presenters

	Last Name	*First Name*
1	Cain DLR, Germany	Sebastian
2	Cid-Bourié European Commission - CINEA	Vladimir
3	di Rubbo EASA, Europe	Natale
4	Ducci Deep Blue, Italy	Marco
5	Halle ICAO, International	Sven
6	Ferrara Eurocontrol, International	Giancarlo
7	Khurana Eurocontrol, International	Munish
8	Natale EuroUSC-Italia, Italy	Matteo
9	Petrou FSF/MED, Cyprus	Christos
10	Prola IATA, International	Stefano
11	Taurino Deep Blue, Italy	Damiano
12	van Birgelen NLR, The Netherlands	Tom
13	van Blyenburgh Blyenburgh & Co, France	Peter

Dissemination

1	Ferraiuolo Deep Blue, Italy	Vera

Webinar Participants

	Last Name	*First Name*
1	Abrines	Marc
2	Adolf	Florian
3	Aguilera	Miguel
4	Alchanatis	Victor
5	Antoine	Hubert
6	Arampatzis	Stratos
7	Ari	Cengiz
8	Avgoustis	Alkis
9	Aydin	Emel
10	Babanic	Ivan
11	Ballit	Marine
12	Barbarossa	Diamante
13	Beechener	Jenny
14	Bendig	Juliane
15	Bernabei	Virginio
16	Bernard	Maurizio
17	Bisson	Pascal
18	Borra-Serrano	Irene
19	Botton	Frederic
20	Boyadjis	Philippe
21	Brants	Hans
22	Brieger	Nicolas
23	Brühl	Robert
24	Bulanowski	Kathryn
25	Buric	Marian
26	Capasso	Pasquale Junior
27	Christofi	Marios
28	Clarisse	Lionel
29	Colangeli	Claudio
30	Constantinides	Michael
31	Crivellaro	Giancarlo
32	Crone	Robert
33	Cunha	Pedro
34	D'Ottavio	Matilde
35	Daniels	Bart
36	Daxini	Abhishek
37	Day	Chris
38	De Fabritiis	Fabio
39	De Grove	Lionel
40	De Rycker	Geert
41	Del Hierro	Santiago
42	Delgado	Conrad
43	Devilee	Hans
44	Doumanas	Dimitris
45	Eertmans	Nicolas
46	Esposito	Roberto
47	Evers	Jan
48	Fazio	Michele
49	Fernández Varela	Diego
50	Filaferro	Alan
51	Foullis	Andreas
52	Foullis	Eraclis
53	Gady	Antoine
54	Gardasanic	Zoran
55	Gaspari	Fabrizio
56	Gavrielides	Orestis
57	Geister	Robert
58	Genco	Nicola Silverio
59	Giorgi	Alex
60	Giua	Antonio
61	Glaser	Florian

	Last Name	First Name
62	Greusard	Léo
63	Grujdin	Ion
64	Gutiérrez Menéndez	Antonio
65	Hampton	Paul
66	Haruvi	Ofer
67	Hasdeniz	Oguzhan
68	Hasevoets	Nathalie
69	Hatenboer	Jaap
70	Haxhiaj	Adrian
71	Hebert Vernhes	Morgane
72	Hellman	Noam
73	Holsten	Johanna
74	Hristov	Martin
75	Hristozov	Stefan
76	Hérion	Xavier
77	Indra	Thorsten
78	Iwaniuk	Paula
79	Johansson	Hans
80	Jonker	Robert
81	Järvenpää	Mika
82	Karbro	Per-Ola
83	Kenul	Philip
84	Kneepkens	Jules
85	Kraus	Jakub
86	Krivohlavek	Jannik
87	Krumm	Malte
88	Kruse Brandao	Jacques
89	Kyprianou	Loizos
90	Lamon	Marcella
91	Lavallée	Chantal
92	Lebel	Pierre
93	Legrand	Frédéric
94	Liebsch	Ronald
95	Lootens	Peter
96	Lotfi	Zahra
97	Lundby	Tobias
98	Maes	Michael
99	Maggiore	Lisa
100	Marchand	Pierre-Alain
101	Mariani	Serena
102	Martin	Kellerhals
103	Marzella	Mara
104	Masutti	Davide
105	Mauroschat	Roman
106	Mazel	Christophe
107	Mckenna	Alan
108	Metzner	Nora
109	Meyrignac	Pierre-Jean
110	Moir	Gavin
111	Moren	Mona
112	Multu	Arife Aycan
113	Mykoniatis	Georges
114	MÁTÉ	Besenczy
115	Niemelä	Timo
116	Nouacer	Réda
117	Ojanen	Pekka
118	Okochi	Hiroshi
119	Pagnano	Giuseppe
120	Paolini van Helfteren	Sebastian
121	Patrakov	Andrey
122	R	Meir
123	Ranieri	Andrea
124	Reuber	Edgar
125	Reynoso	Hamlet
126	Ribeiro	Marta
127	Rossi	Umberto
128	Sanchez	Julia
129	Sanchez-Pinilla Sanz	Cesar
130	Saurer	Josef
131	Savo	Jukka
132	Schleifer	Christian
133	Schrauwen	Hans
134	Schönberg	Jan
135	Scott	Benjamyn
136	Sellem-Delmar	Ségalite
137	Sivertun	Ake
138	Sousa	Jose
139	Stückrath	Felix
140	Tesija	Igor
141	Tolvanen	Jesse
142	Torres	Armindo
143	Traversa	Giulio
144	Tricault	Aurelien
145	Tromaras	Alkiviadis
146	Tuaz	Martin
147	Turco	Simona
148	Valdivia	Victor
149	Van Mook	Elie
150	Van Mosnenck	Daniel
151	Van Vooren	Joke
152	Vanhandenhove	Geert
153	Venditti	Sara
154	Vidal	Carlos
155	Vincent	Valentin
156	Vogt	Florian
157	Walsh	Enda
158	Watelet	Emilien
159	Weatherseed	Michael

	Last Name	*First Name*
160	Wieland	Christoph
161	Zhan	Victor
162	Crivellaro	Giancarlo

Registered Participation But Did Not Login

1	Alderson	Peter
2	Andersen	Klavs
3	Araque	Marino
4	Bahat	Libby
5	Bertrand	Jean-Claude
6	Bordallo	Louis M
7	Brchl	Lukas
8	Cain	Sebastian
9	Centenera Pecharromán	Angel Luis
10	Christoforou	Costas
11	Christoforou	Costas
12	Cioranu	Adrian
13	Cohen	Daniel
14	David	Tristan
15	De Roo	Rob
16	Defrancq	Katia
17	Del Estal Herrero	Alejandro
18	Fabretti	Silvia
19	Feres	Raphael
20	Gach	Alicja
21	Garcia	Eduardo
22	Garland	Julie
23	Georgiou	Agathangelos
24	Giorgi	Al
25	Gkotsis	Ilias
26	Gregoriou	George
27	Guerin	David
28	Hadjiyannis	Elias
29	Hoermann	Robert
30	Hullah	Peter
31	Iben Brahim	Houda
32	Kenul	Philip
33	Kiritsis	Theodore
34	Kuzmane	Laine
35	Kyriazis	Panagiotis
36	Lattanzi	Pamela
37	Lind	Timo
38	Ljungren	Wendy
39	Lorenzo	Jose-Maria
40	Lyrakides	Nicolas
41	López	Elena
42	Magazine	Dronezine
43	Makridis	Georgios
44	Maurizi	Massimiliano
45	Mavromichalos	Demetrios
46	Mazel	Ariane
47	Menicucci	Simone
48	Michaelides	Alexandros
49	Miller	Nicholas
50	Morier	Yves
51	Nannavecchia	Rocco
52	Nedzveckas	Gintautas
53	Nicolaou	Nicolaos
54	Parson	Georgiou
55	Patsalou	Maria
56	Pavlakos	Pascal
57	Piccione	Emanuele
58	Pounds	Chris
59	Poupazi	Angelo
60	Renaux	Mariane
61	Resnick	Boris
62	Rodriguez-Plaza	Daniel
63	Roman	Razvan
64	Romero Olóriz	Carlos
65	Sala	Ettore
66	Savoldelli	Giovanni
67	Sergiou	Charalampos
68	Sheahan	Dave
69	Signorini	Andrea
70	Sousa	Joaquim
71	Stasis	Georgios
72	TG	Alessandro
73	Taylor	Stewart
74	Testa	Daniele
75	Thalmann	Guillaume
76	Valette	Lilian
77	Van Haaster	Robin
78	Visser	Marcel
79	Wandel	Veronika
80	Yilmaz	Selcuk
81	Yrjölä	Seppo
82	Zalecki	Aleksander
83	Zecevic	Djordje
84	Zilli	Antonio
85	van de Goor	Bennie
86	Şan	Ufuk

AW-Drones final dissemination event:
“Is European aviation conquering the challenges of drones?”
7/12/2021 – Online

Drones in Aviation at CINEA

Vladimir CID-BOURIE
Project Officer

European Climate, Infrastructure and Environment Executive Agency (CINEA),
Department C - Green research and innovation, Unit C3 – Horizon Europe Transport

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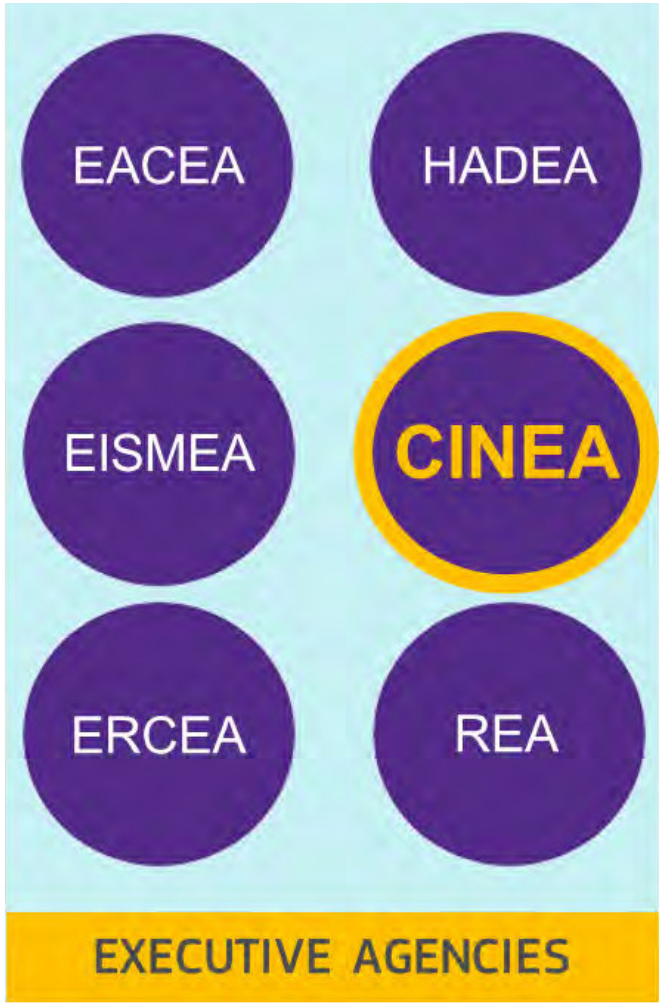
2. CINEA's R&I Aviation and Drones project portfolio
3. Conclusions

European Commission

CINEA among the EU players



European Commission

CINEA: The European Climate, Infrastructure and Environment Executive Agency

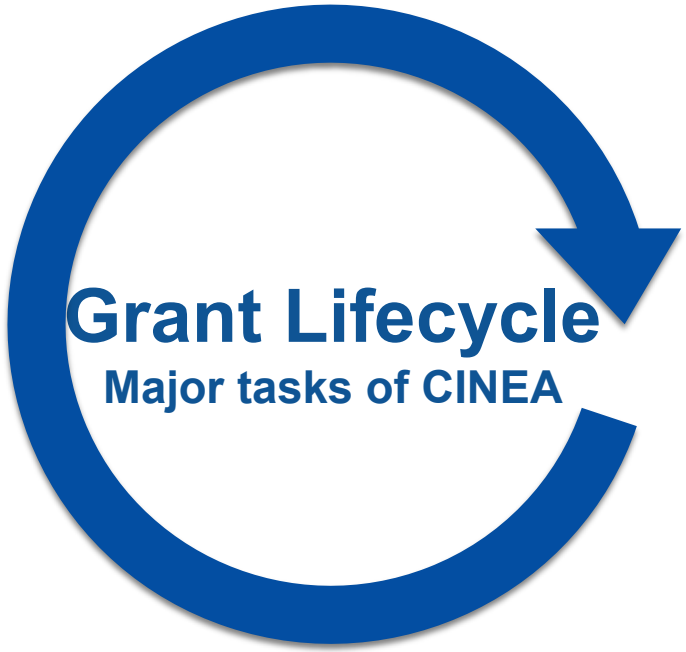
- Builds on the predecessor agency INEA
- Under the new MFF, CINEA manages a large portfolio of programmes including:
  - Horizon Europe (Cluster 5 Climate, Energy and Mobility)
  - Connecting Europe Facility (CEF) 2
  - Innovation Fund
  - LIFE
- and legacy programmes including:
  - Horizon 2020
  - Connecting Europe Facility (CEF)
- CINEA implements all EU programmes that contribute to the European Green Deal

European Commission

CINEA's major tasks and role

Key feedback to DGs

Call for proposals



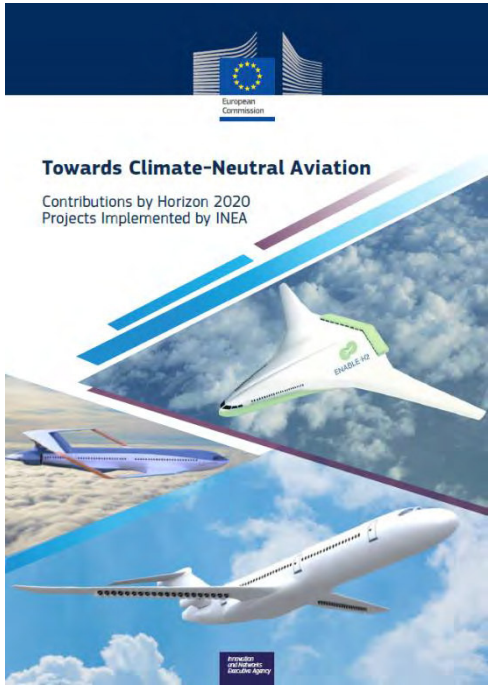
Evaluation and Selection

Technical and financial follow-up

Preparation of Grant Agreements

European Commission

CINEA R&I in Aviation – Publications



CINEA's R&I Drones portfolio

5 ongoing H2020 projects on Drones:

- AW-Drones (CSA)
- 5D-Aerosafe (RIA)
- Drones4Safety (RIA)
- LABYRINTH (RIA)
- RAPID (RIA)

4 recently launched H2020 projects on Urban Air Mobility:

- **AiRMOUR**, **AURORA** and **FF2020** awarded from topic MG-3-6-2020: Towards sustainable Urban Air Mobility (RIA)
- **ASSURED-UAM** awarded from topic MG-1-12-2020: Prepare for the deployment of Urban Air Mobility in urban and peri-urban areas (CSA)

1 finished H2020 project on Drone Swarms:

- MONIFLY (RIA) using 4G/5G infrastructure

European Commission

Conclusions

- CINEA implements all EU programmes that contribute to the European Green Deal, including drones where relevant
- Extensive aviation portfolio obtained under H2020
- CINEA's role in the implementation of EU aviation R&I is continuing under Horizon Europe

@cinea_eu

Look for CINEA!

https://cinea.ec.europa.eu/index_en

European Commission

AW DRONES

Project Overview

Marco Ducci

Deputy Project Coordinator

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Outline

- What is AW-Drones?
- Objectives and scope
- Approach
- Involvement of external experts
- Outcomes

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Why AW-Drones?

A list of recommended industry standards to allow operators to comply with regulatory requirements is not yet available

- Developing a comprehensive list of recommended standards requires:
  - **Collecting information** about on-going and planned activities of all Standard Making Bodies
  - Evaluating to what extent a standard is **covering** a given requirement
  - Ranking the available standards and **identify gaps**

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

What is AW-Drones?

AW-Drones is a **3-years** Coordination and support action (CSA) funded under the EU H2020 program.

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

deepblue

EUROUSC ITALIA

DLR

nlr

FLIGHT SAFETY FOUNDATION MEDITERRANEAN "Never take safety for granted"

HELLENIC INSTITUTE OF TRANSPORT CERTH / HIT

TU Delft

ortelio

dji

DELAIR AERIAL INTELLIGENCE

UNIFLY

IAI

Objectives

- **Collect information** on on-going and planned work with regards to technical and operational **standards** developed for drones worldwide
- Carry out a **critical assessment/benchmarking** of all collected data to identify best practices, gaps, bottlenecks and applicability
  … in other words a "metastandard"
- Propose and **validate** a well-reasoned set of standards for each category of drone operations
- Create a **knowledge base** (online repository) to explore the data
- **Engage** with key stakeholders and end-users, i.e. representatives of the whole drone value chain

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Approach – Collecting and categorizing

Collection of drone standards

→ **airworthiness**, operations & procedures, ….

EUSCG RDP
ANSI Roadmap

Collection of drone-related and applicable general standards

EUROCAE, RTCA, ISO, ASTM, ASD-STAN, …

→ component, subcategories, industrial level

Assessment of standards - categorization & evaluation

→ maturity, safety, cost, suitability …

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

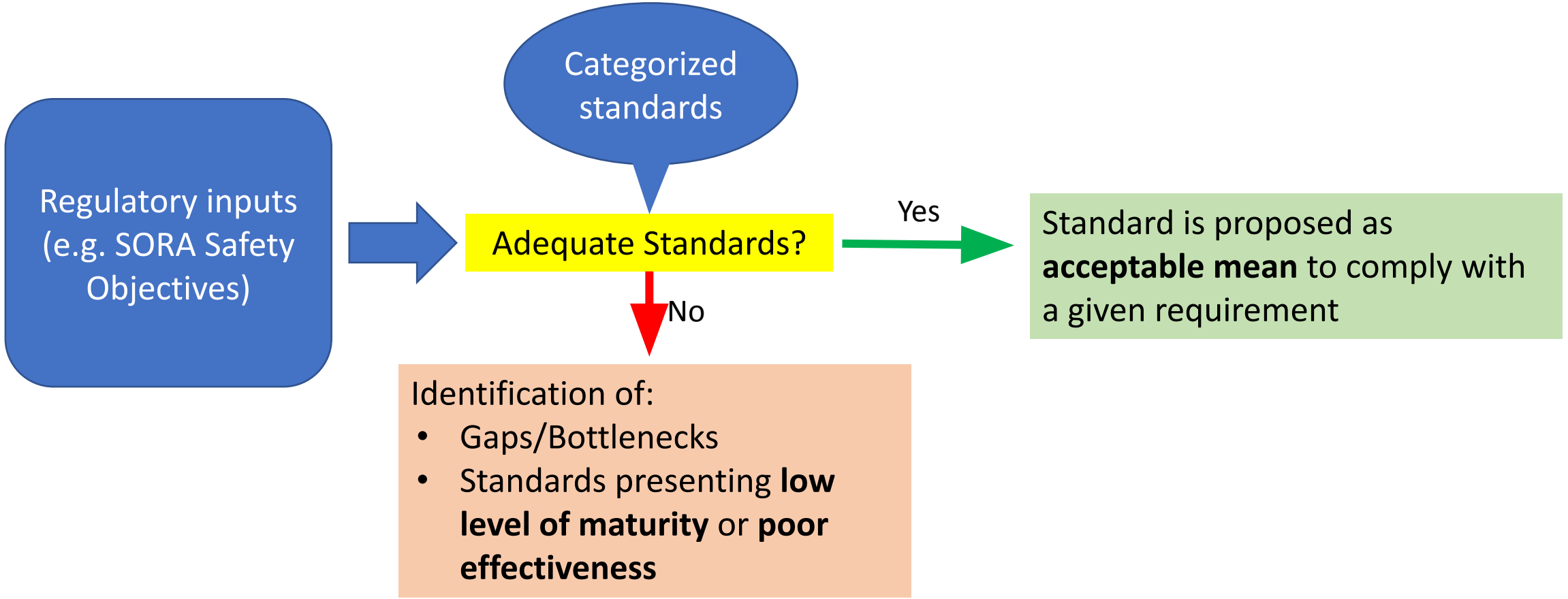
Standards coverage of SORA

- Over **600** standards collected
- **300** standards fully assessed from:

and more…

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Approach - Developing a “meta” standard



This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Scope

- Year 1: Standards required to support effectively the Specific Operations Risk Assessment (**SORA**) methodology
- Year 2: Standards supporting the development of **U-space** in Europe (+ 2nd iteration of SORA)
- Year 3: Standards to demonstrate compliance with SC Light-UAS requirements (+ 3rd iteration of SORA and 2nd iteration of U-space)

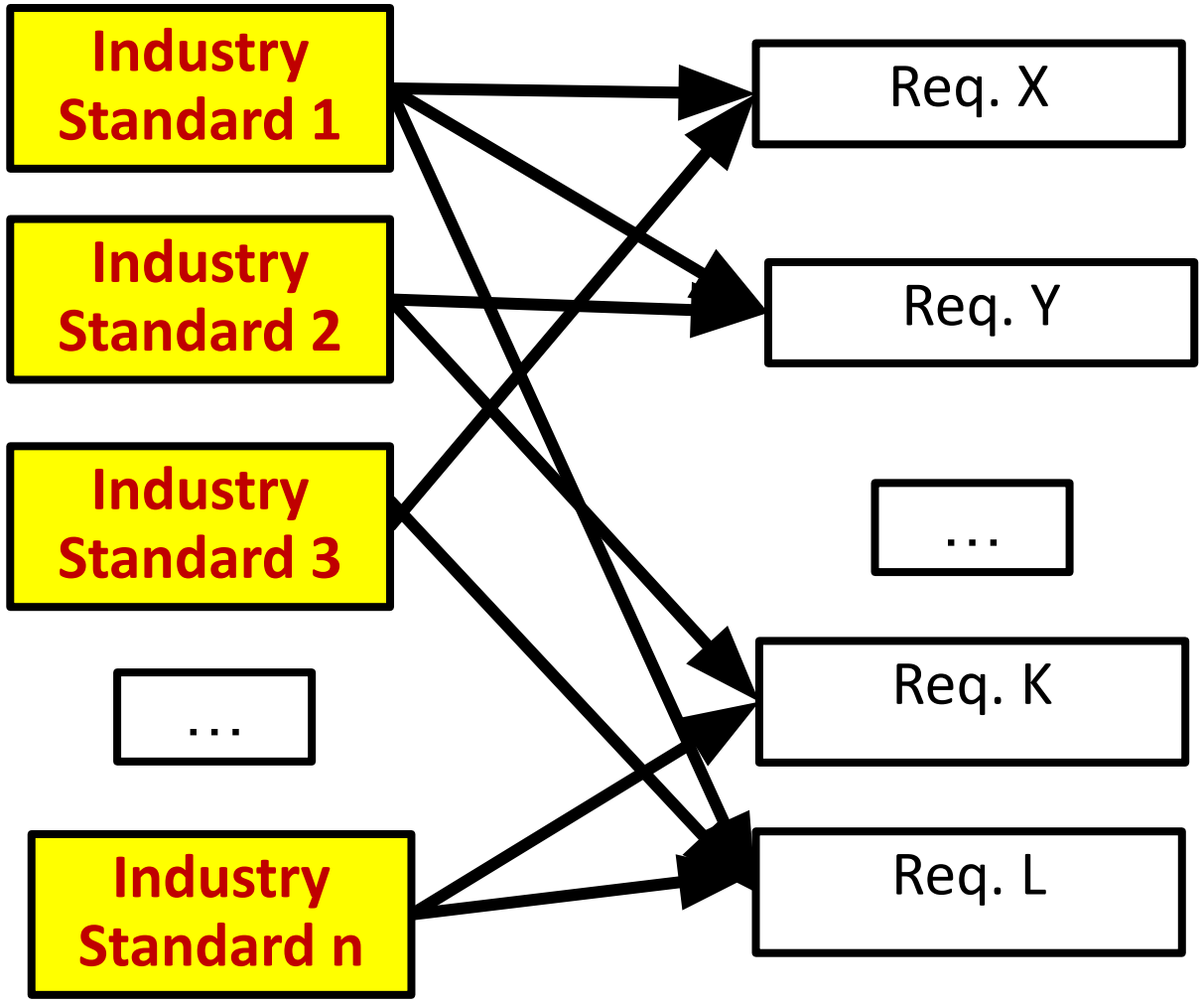
Iterative approach throughout the project duration

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Project timeline

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

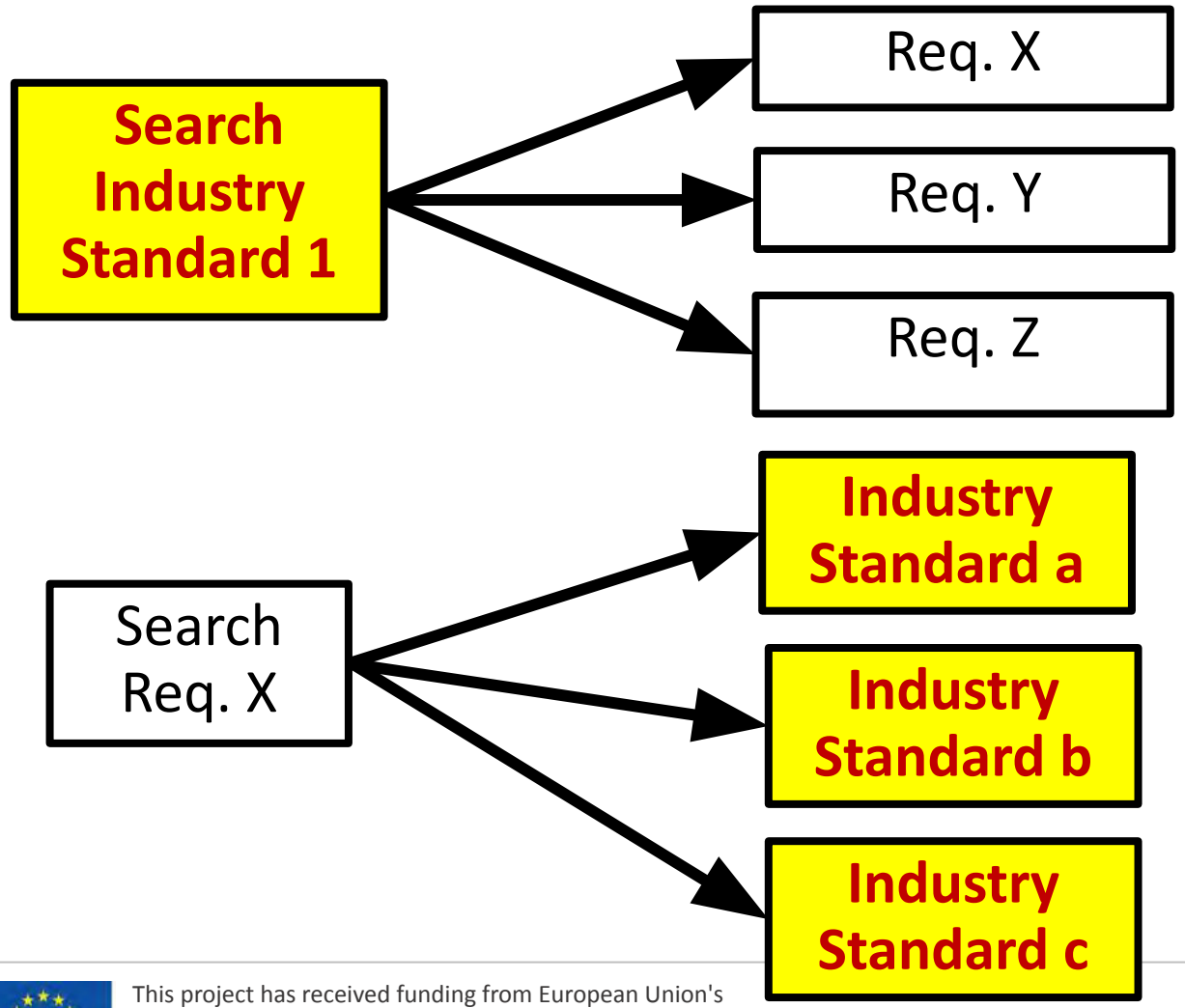
Requirements versus standards – not biunivocal



- There is no biunivocal relationship between one requirement and one standard
- One standard may contribute to several requirements
- One requirement may be supported by several standards
- **All possible relationships will be listed in AW-Drones outcomes**

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Metastandard – two directions to enter



- Online repository built from project results, would allow searching from “two directions”
- Searching a standard and finding to which requirement(s) it may contribute
- Searching a requirement and finding which standards may contribute to it

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Stakeholders

EU Commission (INEA)

EASA

SDOs

UAS Manufacturers

UAS Operators

U-space service providers

Research & Academia

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Stakeholders' involvement

- **EASA** and **DG Move** gave feedback and steered the work in dedicated workshops
- **The Advisory Board** (made of regulators, manufacturers, operators, standard making bodies)
  - supported the methodological work of the project
  - provided review, recommendations and feedback on project activities and findings
  - brought an external view
- Everybody else provided inputs through online surveys and public workshops

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Outcomes

- A **yearly report** about “State-of-the-Art” of standards for UAS
- A yearly report containing a **“well-reasoned” set of standards:**
  - Applicability
  - Maturity
  - KPA Effectiveness
- An **open repository** containing structured information about technical rules, procedures and standards for drones worldwide, including applicability to different UAS OPS categories and different SAIL = **metastandard**

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Follow us!

@AWDrones_EU

AW-Drones

www.aw-drones.eu

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Questions?

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AW DRONES

Thank you for the attention

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Deputy Coordinator:
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Dissemination Manager:
vera.ferraiuolo@dblue.it

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

AW - Drones project

Standards in support of UAS operations

Natale Di Rubbo

7 December 2021

Applicability of regulation for open and specific category

Regulations 2019/945 and 947 become applicable
To all new authorisations in the specific category

2021

Authorisation/certificates issued based on national regulation cease to be valid and they need to be converted into the EU system

2022

Full open category becomes applicable

2023

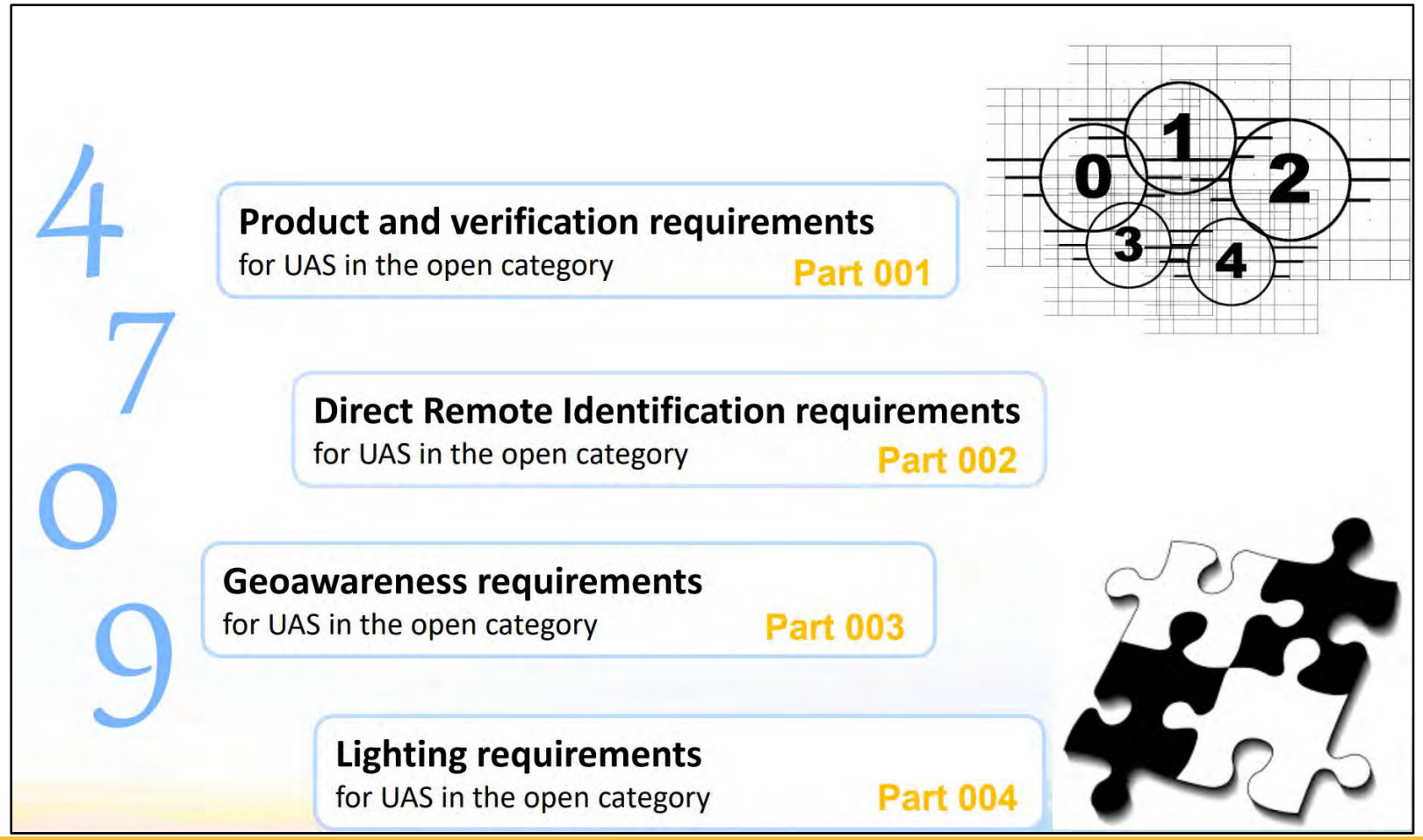
U-space applicability
(January 2023)

Open category

Verification of design using the EU market regulation framework

Manufacturers are allowed to claim presumption of compliance when they use EN (European norms)

ASD STAN the standardisation body to develop EN



prEN publication planned for Q2 2022

Specific category: need for standards

- All SORA elements should be associated with standards acceptable to each level of robustness.
- AW DRONES
- EUSCG ination
- EASA European Union Aviation Safety Agency :s evaluation

Expected industry developments

EASA regulatory input to EC Drone Strategy 2.0

Drones Business Services
Initially: in corridors
Later: free routes

Passenger-carrying eVTOL
(*with* pilot on board)

International Cargo
(*no* crew on board)

2020

2025

2030

2035

U-space applicability
(January 2023)

Passenger-carrying eVTOL
(*no* pilot on board)

RMT.0230 planning

2020		2021				2022				2023				2024
Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1

NPA #2

Opinion #2

Type#2 operations
Specific high risk

Type#3 operations
Manned UAM

NPA #3

Opinion #3

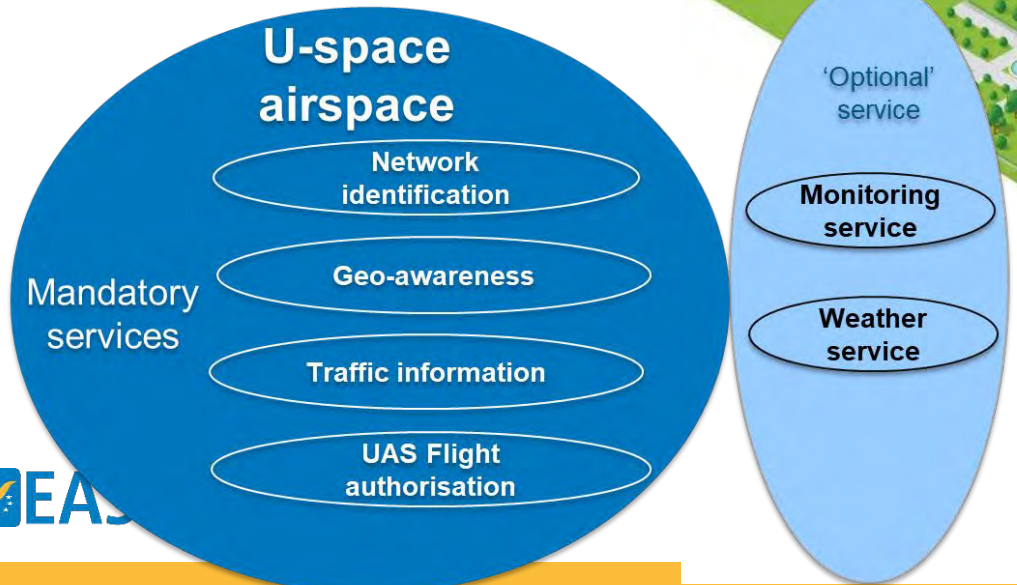
Type#1 operations
IFR cargo

Type#2 operations
Unmanned UAM

The U-space

Airspace where some services are provided.

Regulation (EU) 2021/664
Applicability date 26 January 202



Making it happen – safely!

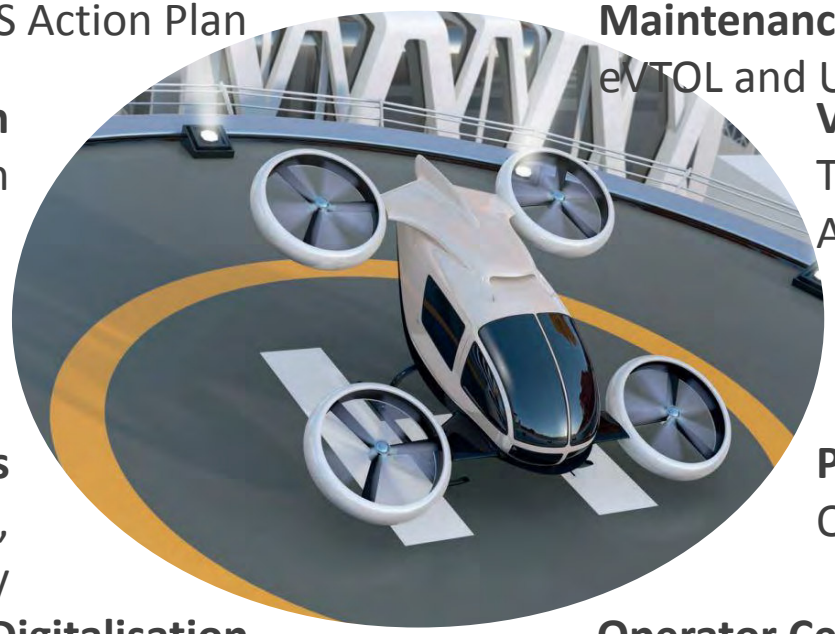
Critical UAM enablers EASA is working on

International Cooperation
Harmonised Technical Standards, Research, Demonstrations

Uncooperative and malicious Drones
Counter-UAS Action Plan

Airworthiness, Aircraft Certification and Maintenance
eVTOL and UAS

Civil-Military Coordination
Dual-use Drones, ATM Integration



Vertiports
Technical Specifications and Navigation Aids

Training and Simulation
Virtual & Augmented Reality

Air Operations
Operating Rules in Urban Environments

Novel Technologies
Flight Controls, Avionics, Propulsion, Energy

Personnel training and licencing
Operators, eVTOL Pilots, Remote Pilots

Digitalisation
Artificial Intelligence, Autonomy, Cybersecurity

Operator Certification
Air Operator Certificates

Airspace Architecture and Integration
U-space, C2-Link, Detect-and-Avoid, iConspicuity

EASA
European Union Aviation Safety Agency

Your safety is our mission.

An Agency of the European Union

ICAO UAS RELATED ACTIVITIES

AW Drones Webinar

7 December 2021

Introduction

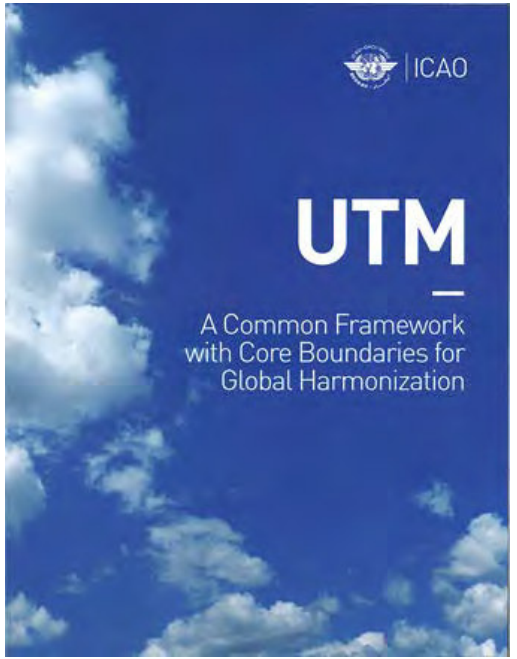
- ICAO UTM Framework Update
- ICAO U-AID (Humanitarian) Guidance Material
- ICAO UAS Model Regulations

ICAO's Mandate

- ICAO's UAS mandate:
  - Harmonization of regulations
  - Safe and coordinated integration of UAS activities
  - Assistance to ICAO Member States

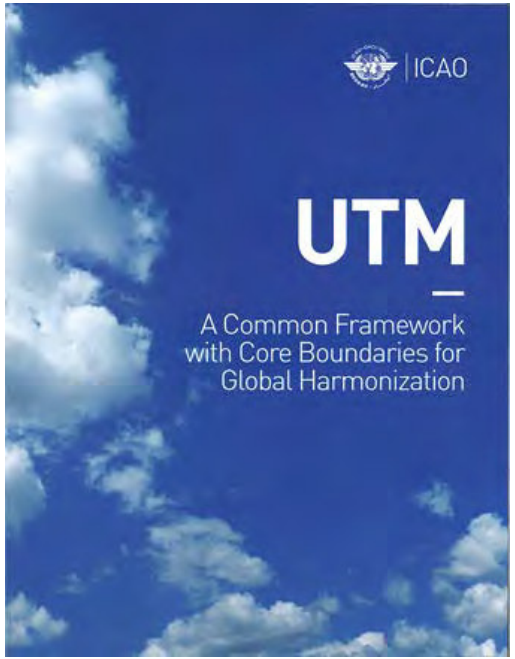
UTM Framework – Overview

- A framework and core capabilities of a “typical” UTM system
- Not a technical solutions document
- Developed in collaboration with industry/academia



ICAO UTM Framework

- Provides high level UTM requirements/considerations
  - Not a technical solutions document
  - Safety-focused
- Maintain safety and facilitate integration with existing aviation system
- Support technological developments while enabling stakeholders to grow safely and efficiently



UTM Framework

EDITION 1 (RELEASED)
- Registration, identification and tracking
- Communications systems
- Geofencing-like systems
- Potential architectures

EDITION 2 (RELEASED)
- UTM-ATM boundaries and transitions
- Information exchange between ATM and UTM

EDITION 3 (RELEASED)
- UTM risk assessment/contingency procedures
- UTM service providers structure
- Separation and deconfliction in UTM

EDITION 4 (DRAFTING)
- UA performance requirements in a UTM environment
- UTM system certification requirements
- UTM in aerodrome environments/activities

U-AID Guidance

- Guidance for humanitarian operations conducted by UAS (on-going and emergency response)
- Emphasizes safety risk assessment
- Facilitates rapid approvals
- Provides considerations for carriage of dangerous goods
- Addresses societal concerns
- Includes sample forms for the applicant and the local CAA for expedited approval
- Supports counterparts in the UN System and NGOs

UAS – ICAO Model UAS Regulations

ICAO UAS Model Regulations

- Development and background

Sept. 2016

39th Session of ICAO Assembly

- Leadership role to develop guidance for harmonized UAS regulations;
- Receive industry studies on cyber-resiliency;
- Develop UAS awareness and educational campaigns for users.

Oct. 2018

13th Air Navigation Conference

- Formulate & implement technical and regulatory solutions for UAS;
- Insure UTM systems interoperable with ATM systems;
- Enable authorization of non-certificated UAS in high-seas airspace.

Sept. 2019

40th Session of ICAO Assembly

- Accelerate full regulatory framework for UAS and UTM;
- Develop provisions and guidance material for safety risks of unauthorized presence of UA near aerodromes.

ICAO UAS Model Regulations

- Establish scope of unmanned aviation

ICAO UAS Model Regulations

Establish scope of unmanned aviation

- Categorization:
  - Open category: Part 101
  - Specific category: Part 102
  - Certified category: ICAO Annexes
- Approved Aviation Organizations (AAO): Part 149
- Advisory Circulars (acceptable means of compliance):
  - AC 101-1
  - AC 102-1
  - AC 102-37: Dangerous Goods
- Guidance Materials:
  - U-AID
  - UTM

ICAO Model UAS Regulations

- A compilation of existing UAS regulations
  - Vanuatu, New Zealand, Australia, Canada and the U.S.
- Model Regulations articulate:
  - remote pilot licensing, standard operating conditions, SMS requirements, operational risk assessments
- Guidance material providing best practices
- Prescriptive and performance-based regulations
- Operation-centric, risk-based approach
- Living document evolving with UAS technologies

ICAO UAS Model Regulations

Elements NOT addressed in the UAS Model Regulations

- States will need to address the following to insure alignment with existing national policy/law:
  - Privacy, insurance, economic authority;
  - Environmental requirements (noise and emissions);
  - Law Enforcement requirements and/or guidance;
  - Cyber Security Issues.

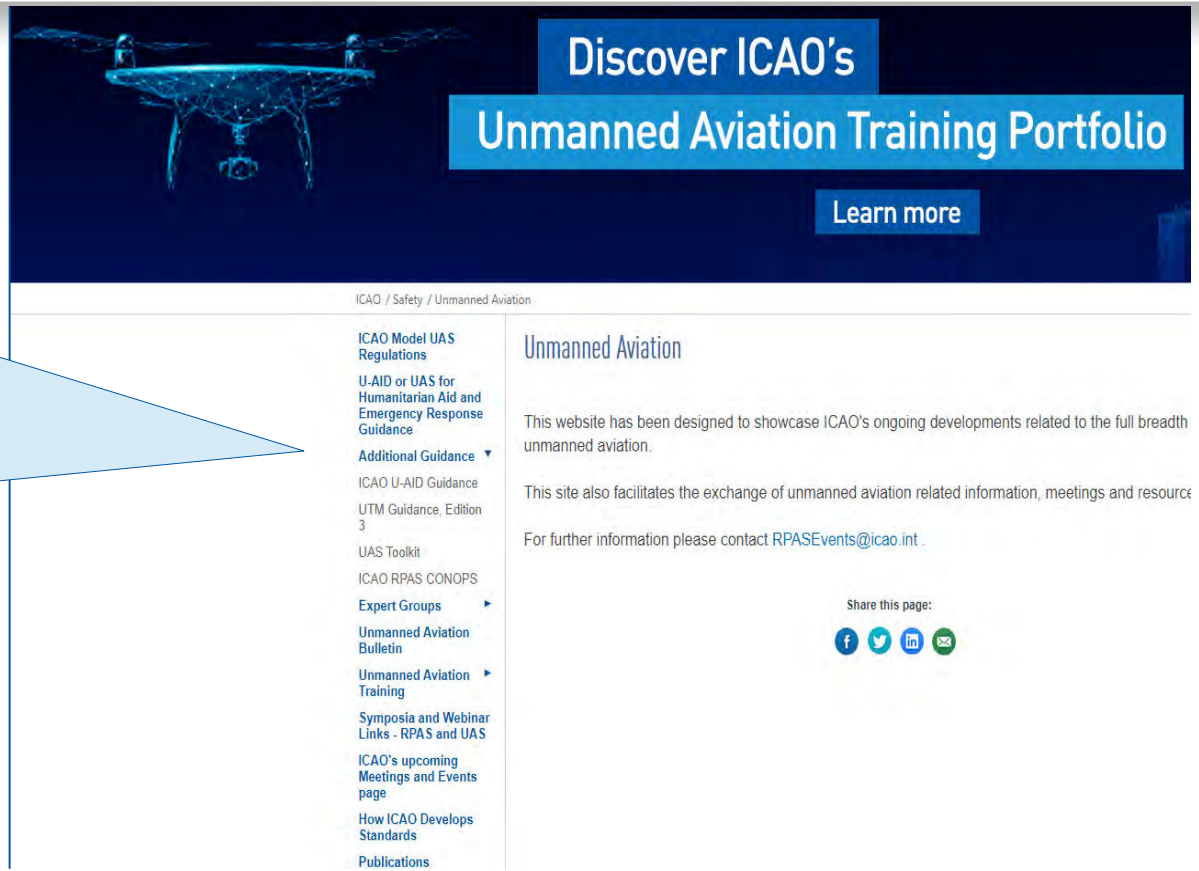
www.icao.int/safety/UA

Model UAS Regulations

Humanitarian Aid & Emergency Response Guidance

UTM Guidance Edition 3

UAS Toolkit



Questions/Discussion

The Future Air Mobility

New players

Why is this important to us?

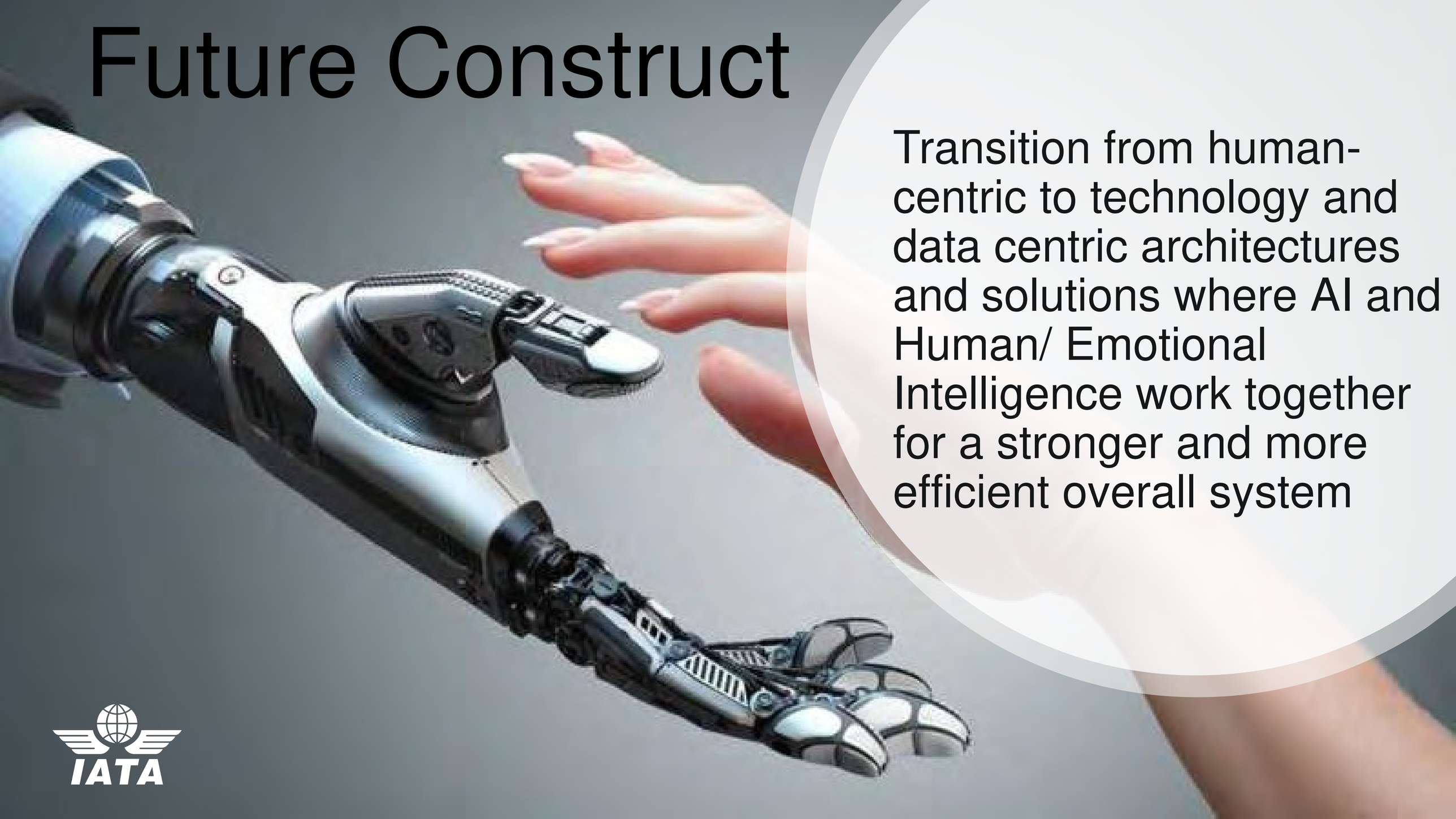
Airlines are exploring the use of new concepts for the **air transport of goods and people**.

Airspace is a finite resource and to share it safely and efficiently, integration of new entrants is required.

UTM and STM provide an opportunity to **modernize legacy** ATM systems/concepts.

COVID-19 pandemic may have **fast-tracked** certain future operational concepts.

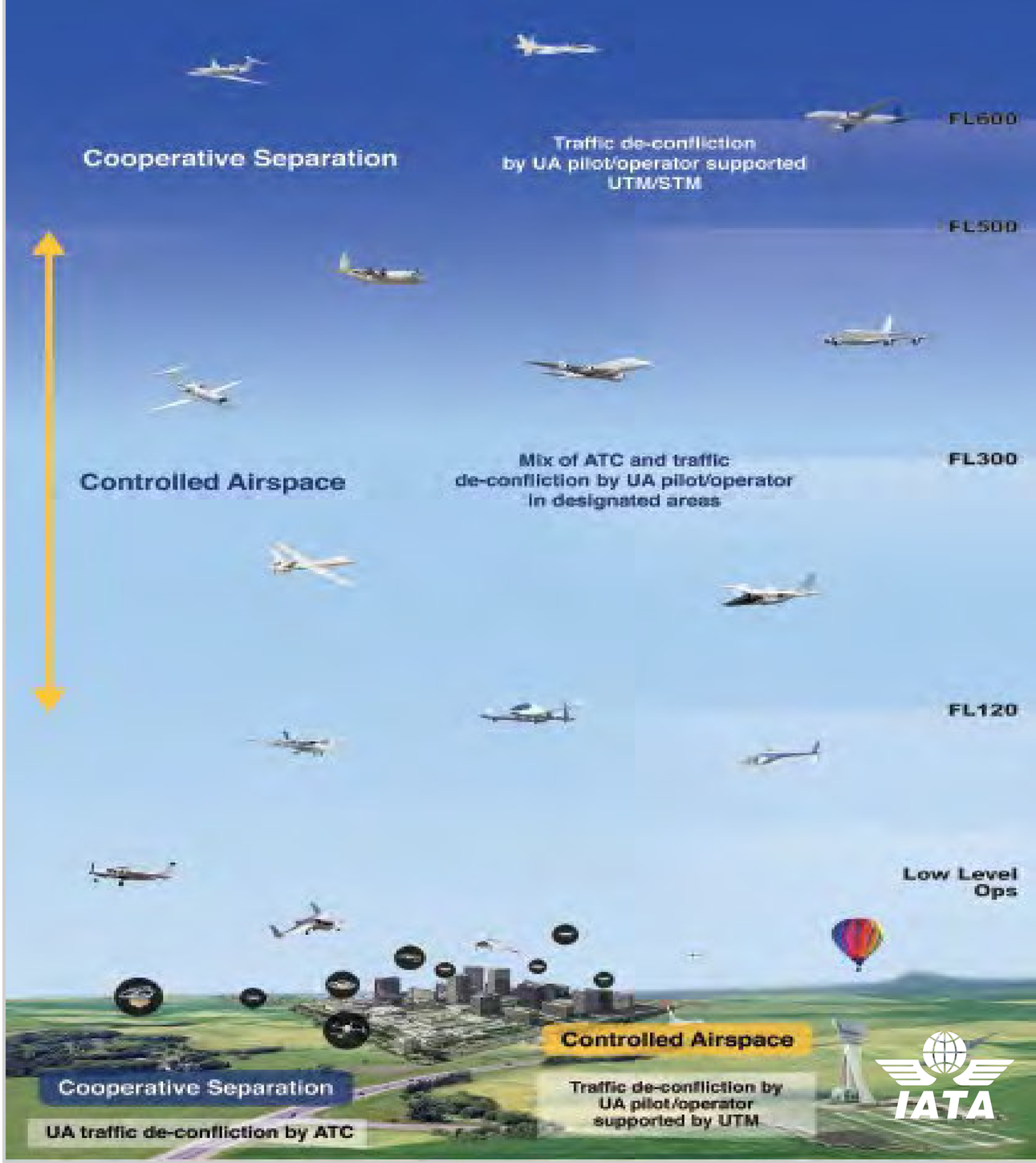
Future Construct

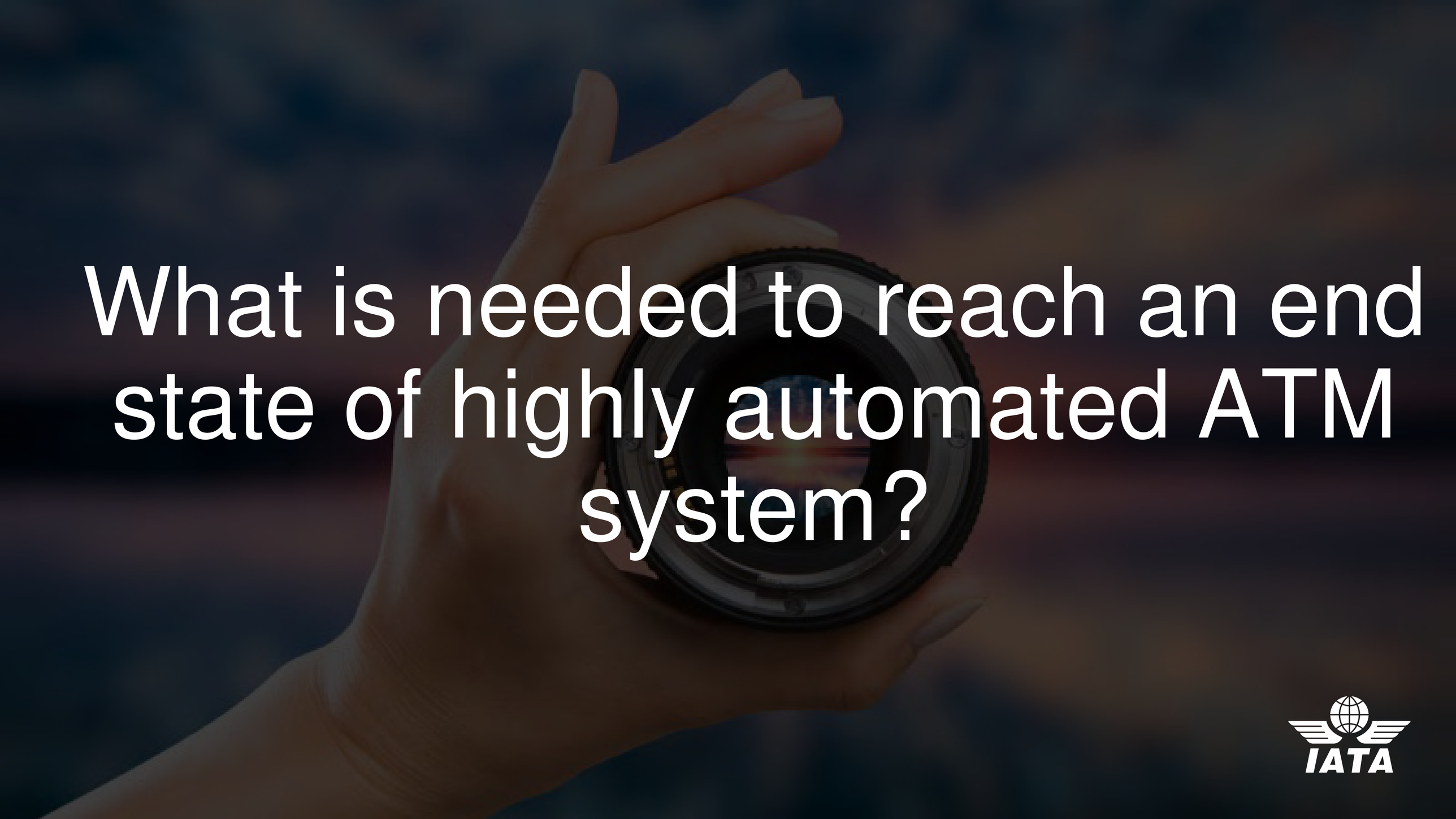


Transition from human-centric to technology and data centric architectures and solutions where AI and Human/ Emotional Intelligence work together for a stronger and more efficient overall system

The main challenge

The operating characteristics, the scale, and type of operations that will be / are performed by an ever-increasing fleet of new entrants in airspace are incompatible with some of the underlying assumptions for how traffic is managed.





What is needed to reach an end state of highly automated ATM system?

Performance based regulatory framework that allows for shorter innovation cycles

Cyber resilience and trust

Partnerships and Collaboration

Harmonization & Interoperability

Obstacles

- System integration & regulatory framework
- Investment
- Workforce & new players

Actions

- Review ATM assumptions
- New mechanism for global standards
- Prioritize tech roadmap
- Regulators' competence
- Efficiency at system level
- Competence of workforce

WE ARE ALL ONE IN THE SKY

There is only one sky and all stakeholders, new and traditional, need to collaborate to keep it safe, secure, efficient and fair.

IATA

Thank You!

Stefano Prola
IATA EUR Safety & Flight Ops
prolas@iata.org

Supporting European Aviation

EUROCONTROL

U-space services for UAS/UAM airspace integration - Role of EUROCONTROL

Giancarlo Ferrara and Munish Khurana
DECMA/INO/Drone Unit

7th Dec 2021

Presented to: AW Drones Final Dissemination Event

FOUNDING MEMBER SESAR JOINT UNDERTAKING

NETWORK MANAGER

Research & Innovation

- Co-founder of **SESAR Joint Undertaking**
- In kind contribution to Research and Innovation
- Key research projects:

SESAR U-space projects

CORUS-XUAM (*Concept of Operations for euRopean U-space Services – eXtension for Urban Air Mobility*) – Project Leader

BUBBLES (BUilding Basic BLocks for a U-Space SEparation Management Service)

DACUS (Demand and Capacity Optimisation in U-space)

ICARUS (Integrated Common Altitude Reference system for U–space)

INVIRCAT (IFR RPAS Control in Airports and TMA)

URCLerED (Unified Integrated Remain Well Clear Concept in Airspace D-G Class)

AURA (ATM U-Space Interface)

Horizon 2020 U-space related Research projects

5D-AeroSafe (5 services of Drones for increased Airports and waterways Safety and security)

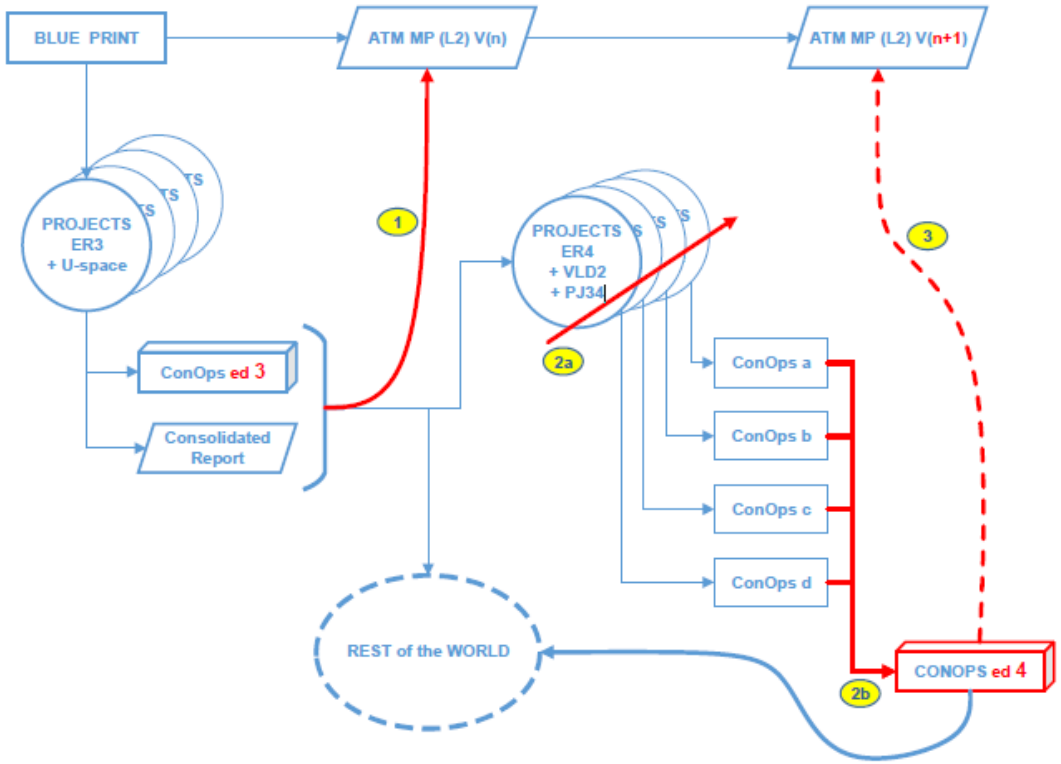
LABYRINTH (Unmanned Traffic Management 4d Path Planning Technologies for Drones)

Drone4Safety (Inspection Drones for Ensuring Safety in Transport Infrastructures)

Consolidation of U-space CONOPS with SJU

EUROCONTROL, in coordination with SJU, is leading the transversal coordination of 17 SESAR and H2020 projects related to U-space/UAM (European U-space ConOps Coordination Cell) with the aim to:

- ✓ Focus the discussion on specific ConOps issues and **accelerate R&D** on U-space
- ✓ Fertilize information sharing among U-space related projects ensuring **consistency of project outcomes**
- ✓ Discuss proposed changes to the ConOps & **foundation package** information
- ✓ Support the projects in their contribution to **accelerate a consistent deployment** of U-space/UAM services at a European level
- ✓ Carry out necessary liaison with **regulation and standardization** bodies (e.g. EASA, EUROCAE, ASTM, ISO) to achieve harmonious outcomes.



Support to Regulations Development

a. U-space Regulation (2021/664)
b. Drone regulation (2019/947) and (2019/945)
c. Ongoing development of Acceptable Means of Compliance and Guidance Material for U-space Regulation :

WP1: Airspace Risk Assessment

WP5: U-space Flight Authorization

WP7: Electronic Conspicuity

WP9: Coordination with local authorities

d. Mitigate potential risks from unauthorised drones
e. Promote guidance material

a. Member of the ICAO RPAS Panel and co-rapporteur of the RPASP WG 2 C2 Link, a datalink which is critical for ATS and ATC data/voice
b. Member of the ICAO UAS Advisory Group

Support to Standards Development

a. Counter UAS (C-UAS)
b. ED-286 OSED for C-UAS in controlled airspace
c. ED-xxx Interoperability Requirements for C-UAS systems
d. ED-xxx System Performance Requirements for non-cooperative UAS detection systems

Provide domain expertise in developing a document on “Unauthorized UA incursions at the airport”

Support to States

- Establish a test corridor between EEC and St Quentin en Yvelines in order to validate scenarios and equipment for the purpose of Paris Olympics

- Conduct airspace assessments

Note: Additional request from 19 States to conduct airspace assessment

- Provide technical guidance to implement U-space regulation

Validation of U-space services in simulated environment at the European Innovation Hub at Bretigny (France)

- Development of a Validation and Simulation Center to enable validation and certification for airspace implementation and deployment.

Real/Fast time simulation platform open to all players (UTM Service Provider, CAAs, Researchers, …)

- Neutral validation against current standards and regulations (airspace assessment)
- Provide simulation capabilities for SESAR and other research / innovation projects
- Interactive showcase that highlights UTM concepts to key stakeholders

Transition from U-space Demonstration to Deployment

INITIATIVE

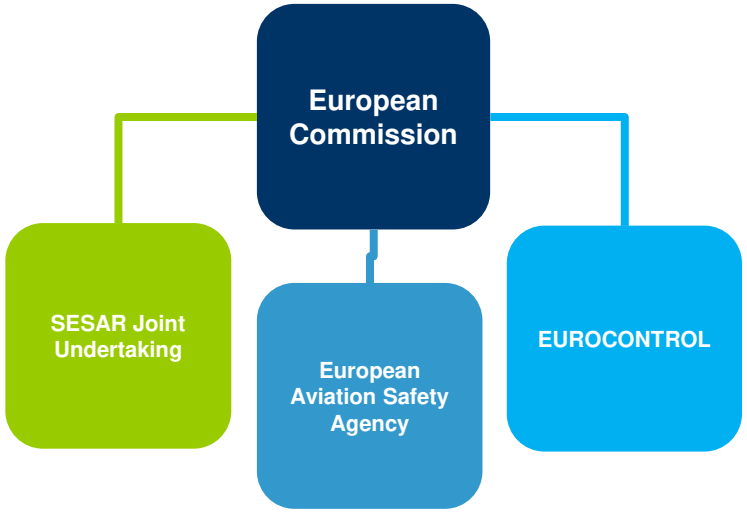
European Network of U-space Demonstrators

Enabler to achieve the following

OBJECTIVES

- Building on state-of-the-art deployment of BVLOS operations
- Stimulate creation of regulations and standards
- Accelerate lead time to market
- Promote economies of scale
- De-risk implementations
- Reduce red tape

UNIQUE PARTNERSHIP



DELIVERABLES

- U-space status monitoring
- Share lessons learned
- U-space project inventory
- Open discussion forum

By European Institutions for European stakeholders

AW DRONES

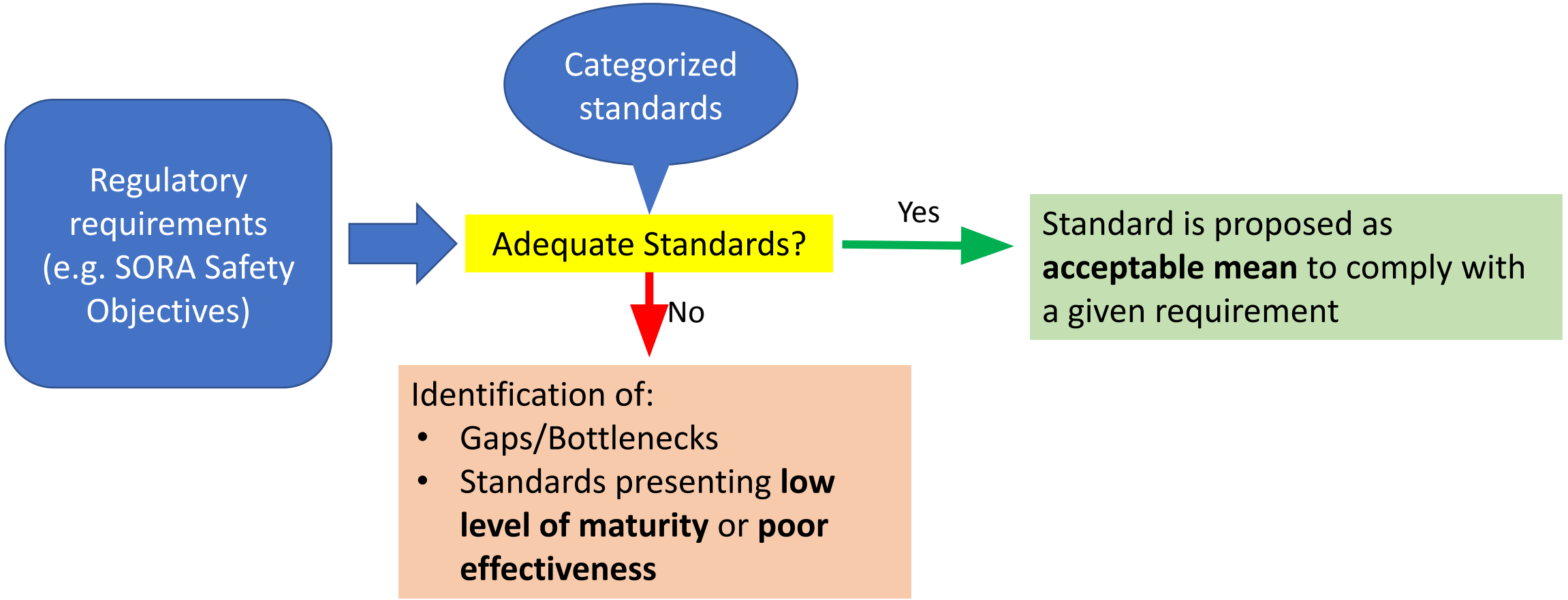
AW-Drones
Data Collection and Mapping

Sebastian Cain

DLR

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Structure of Approach



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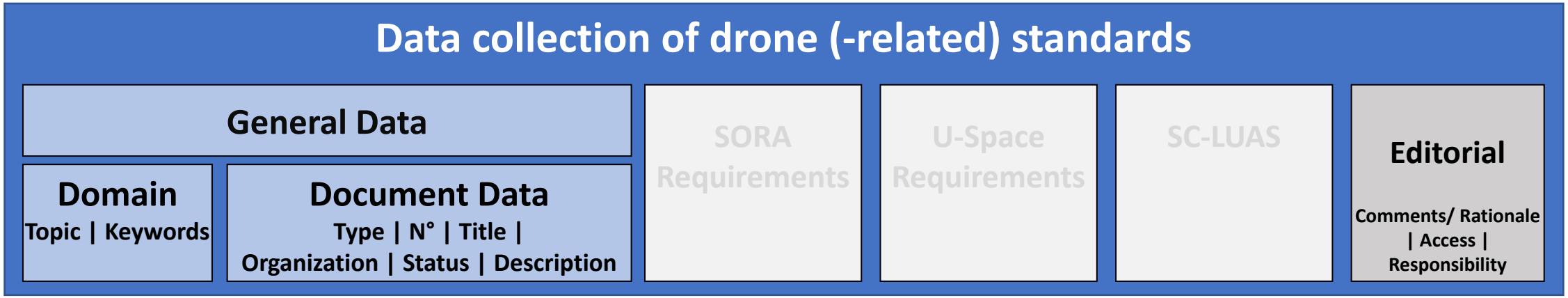
Data Collection

1st step: setting up a database



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Data Collection

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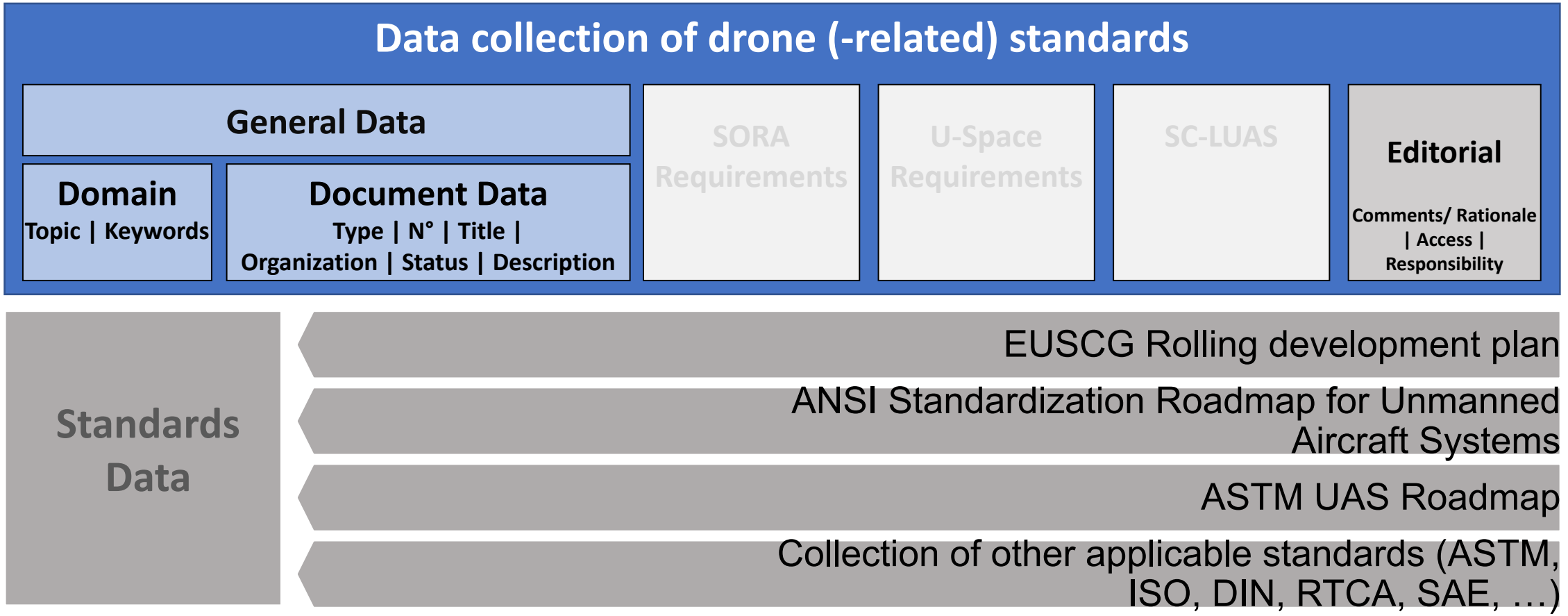

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Data collection and analysis – 1st year

Iteration 1

Focus on SORA Requirements

JARUS guidelines on Specific Operations Risk Assessment (SORA)

Data collection of drone (-related) standards

General Data		SORA Requirements			
Domain Topic | Subtopic	**Document Data** Type | N° | Title | Organization | Status | Description	**Affected OSOs** #01 … #24	**Affected GRM** M1 [1…2]| M2 | ERP	**Affected ARM** Strat | Tact	**SORA STEP #9**

Standards Data

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Data collection and analysis – 2nd year

Iteration 2

Focus on U-Space Requirements

Data collection of drone (-related) standards

General Data		SORA REQ.	U-Space Requirements	
Domain Topic | Subtopic	**Document Data** Type | N° | Title | Organization | Status | Description		**Services** Network identification service | Geo-awareness service| Flight authorization service|…	**HLR** Contingency | Occurrence Reporting | …

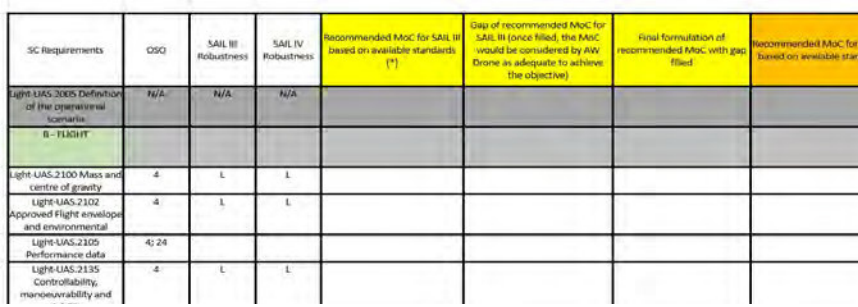
Standards Data

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Data collection and analysis – 3rd year

Iteration 3

Focus on SC-LUAS Requirements



SC Requirements	OSO	SAIL III Robustness	SAIL IV Robustness	Recommended MoC for SAIL III based on available standards (*)	Gap of recommended MoC for SAIL III (once filled, the MoC would be considered by AW Drone as adequate to achieve the objective)	Final formulation of recommended MoC with gap filled	Recommended MoC for based on available sta
Light-UAS.2085 Definition of the operational scenario	N/A	N/A	N/A				
B - FLIGHT							
Light-UAS.2100 Mass and centre of gravity	4	L	L				
Light-UAS.2102 Approved Flight envelope and environmental	4	L	L				
Light-UAS.2105 Performance data	4; 24						
Light-UAS.2135 Controllability, manoeuvrability and	4	L	L				

Data collection of drone (-related) standards

General Data

Domain
Topic | Subtopic

Document Data
Type | N° | Title | Organization | Status | Description

SORA Req. +

U-Space Req. +

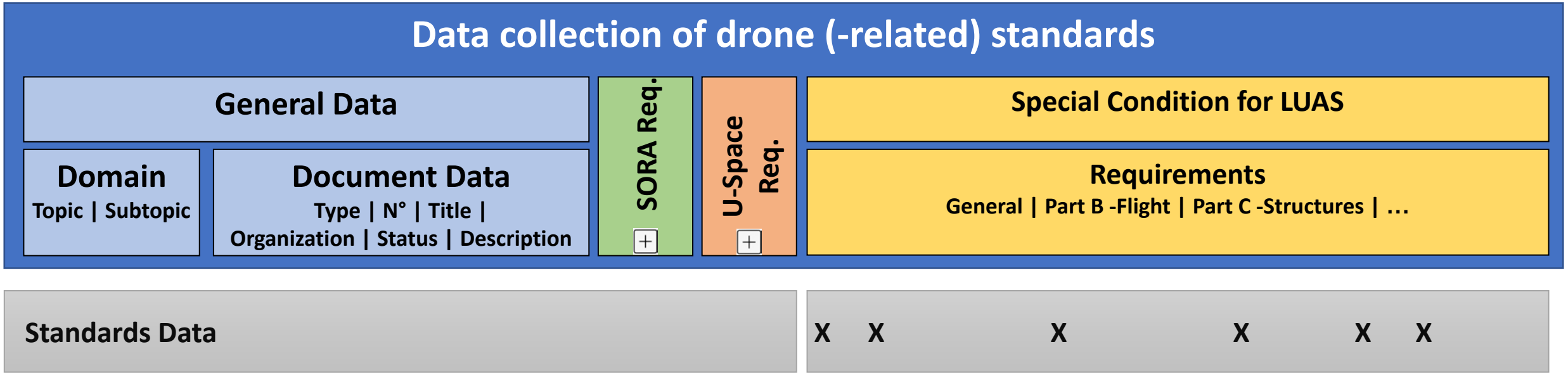
Special Condition for LUAS

Requirements
General | Part B -Flight | Part C -Structures | …

Standards Data

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Mapping



Mapping

Draw connection between standards and requirements

Input for a more detailed view during the **assessment**

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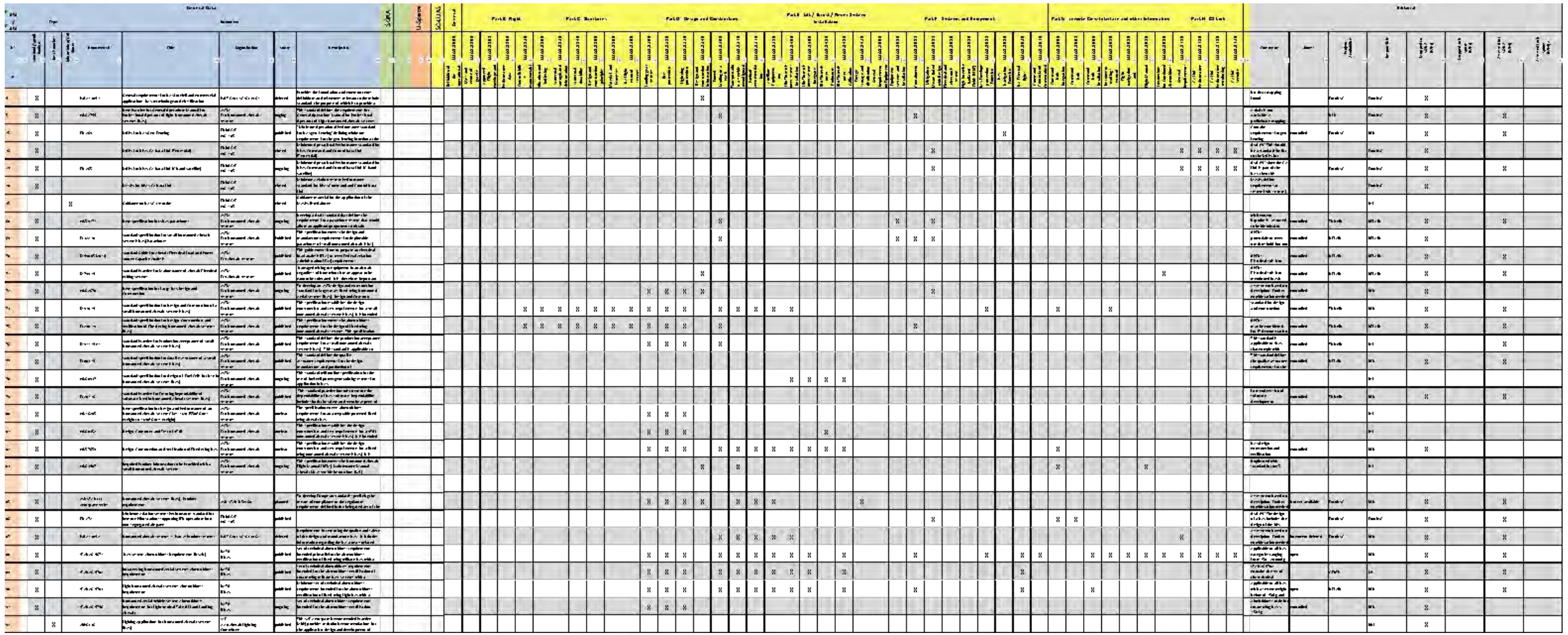
Data Collection Document

General Data | **Special Condition for LUAS** | **Editorial**



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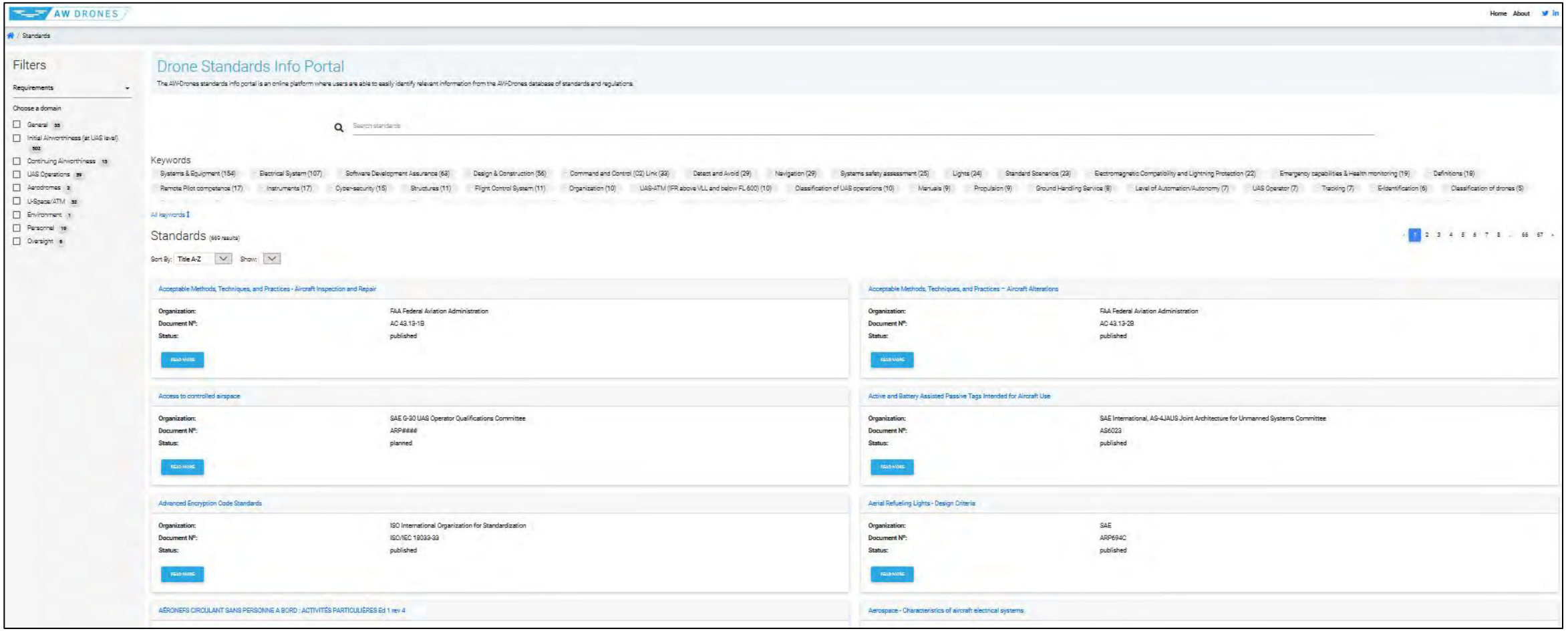
Data Collection Document

General Data			Special Condition for LUAS	Editorial



AW DRONES

Thank you!

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Standards Categorization

Domains
General
Initial Airworthiness (at UAS level)
Continuing Airworthiness
Environment
UAS Operations
Personnel (involved in UAS airworthiness and operations)
Aerodromes
U-Space/ATM
Oversight

Keywords

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

AW DRONES

Methodology for assessment of standards

Tom van Birgelen - NLR

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Outline of presentation

1. Coverage of requirements by standards
2. Ranking the standards per requirement
3. Conclusions from the ranking of the standards
4. Identification of gaps
5. Assessment of the gaps
6. Conclusions from the assessment of the gaps
7. Remarks

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Coverage of requirements by standards

- Identified standards for each requirement (from SORA objectives and mitigations and identified U-Space services) have been assessed on how effective they are in covering the requirement.

- Three outcomes
  - Full coverage
  - Partial coverage
  - No coverage

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Ranking the standards per requirement

Each standard with partial or full coverage has also been assessed using the criteria below. Each criterion has a scoring system and a weight factor. The weighted scores for all criteria are summed which gives a total score.

Criterion (Weight)	-2 (lowest ranking)	-1	0	1	2 (highest ranking)
Maturity of standard (2)	Drafting	Internal Consult.	External Consult.	Published	Recognized / Accepted / Used
Type of standard (1)	N.A.	N.A.	Information Guidance	Best Practice	Standard Specification
Cost of compliance (2)	Very High	High	Medium	Low	Very Low
Environmental Impact (1)	Bad	N.A.	Neutral	N.A	Good
Impact on EU Industry competitiveness (1)	Very negative	Negative	No impact	Positive	Very Positive

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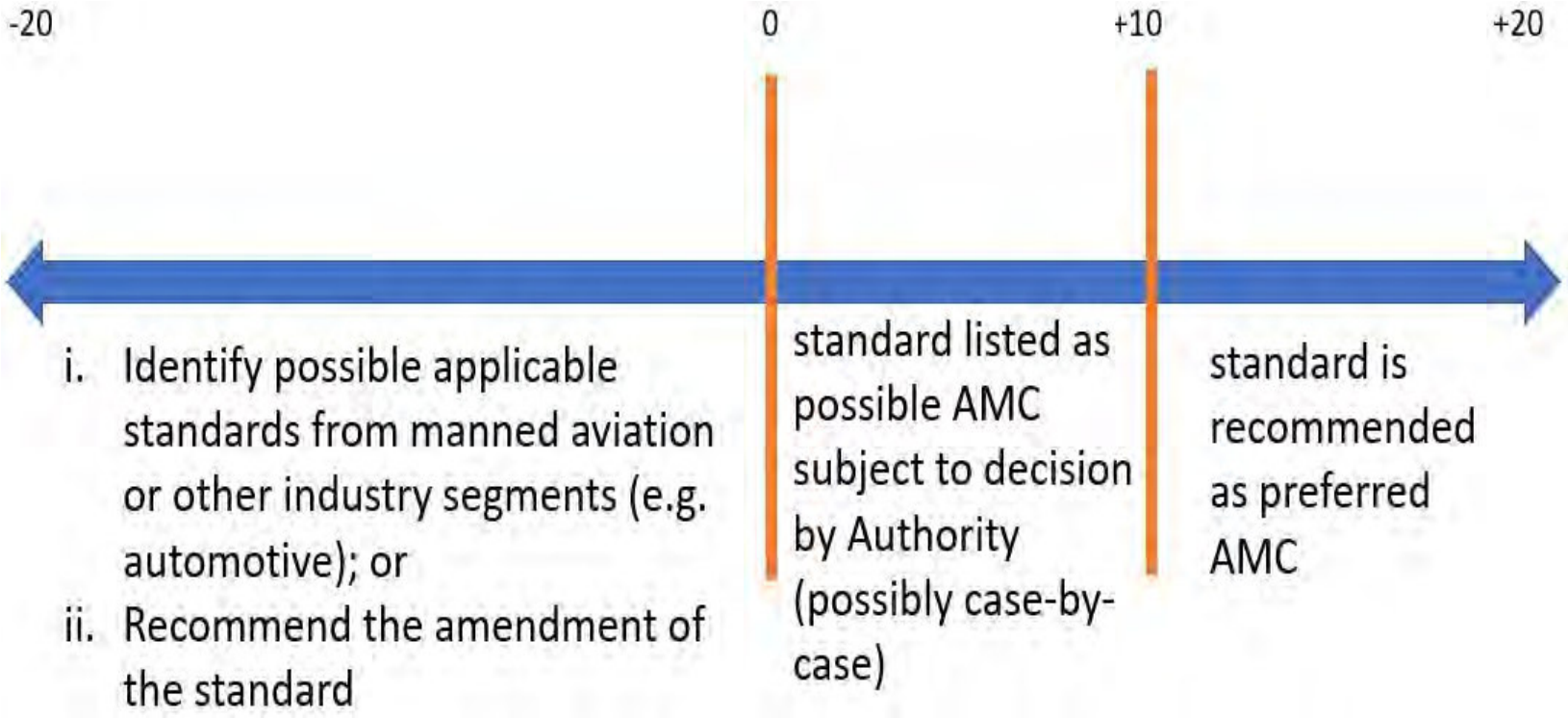
Conlusions from the ranking of the standards

- The total scores are used to rank the standards per requirement.
- Depending on the total score, the following conclusions are drawn:



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Identification of gaps

- For each requirement that is not fully covered by existing standards, the gaps have been identified.

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Assessment of the gaps

Each gap has been assessed using the criteria below. Each criterion has a scoring system and a weight factor. The weighted scores for all criteria are summed which gives a total gap score.

Criterion (Weight)	-2	-1	0	1	2
Safety impact (3) of not having a standard	Very High	High	Medium	Low	Very Low
Cost of compliance (2) to the requirement with the lack of a standard	Very High	High	Medium	Low	Very Low
Environmental Impact (1) of not having a standard	Bad	N.A.	Neutral	N.A.	Good
Impact on EU Industry competitiveness (1) of not having a standard	Very negative	Negative	No impact	Positive	Very positive

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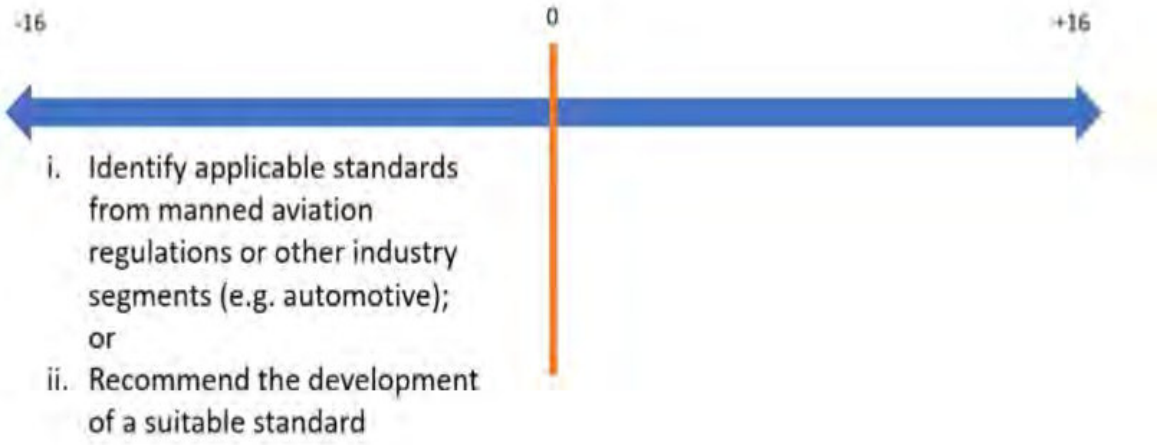
Conclusions from the assessment of the gaps

Depending on the total gap score, the following conclusions will be drawn:

When the weighted gap score is below zero, applicable standards from manned aviation and other industries will be proposed (e.g. standards applicable to navigation receivers for the automotive industry or standards for mobile telephony) or a recommendation to develop a suitable standard will be provided.



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Remarks

- It shall be emphasized that the assessment did not address the technical quality of the individual standards. It was assumed that each standard was adequate to fulfil the scope for which it was developed, and hence the assessment only evaluated the standard's capability to address the criteria.

- AW-Drones partners did not have full access to all standards at the time of the assessment. A complete assessment is provided only for the standards with full access. For the others we provide a preliminary assessment based on the publicly available information.

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AW DRONES

Thank you for your attention !

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AW DRONES

AW-Drones: Project Outcomes

Matteo Natale

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Introduction: 3 Iterations

- Year 1: Standards required to support effectively the Specific Operations Risk Assessment (**SORA**) methodology
- Year 2: Standards supporting the development of **U-Space** in Europe (+ 2nd iteration of SORA)
- Year 3: Standards needed to support **SC Light UAS** (+ 3rd iteration of SORA and 2nd iteration on U-Space)

Iterative approach throughout the project duration

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Methodology for the assessment of the standards

The methodology for the assessment of the standards comprises **different cases:**

- **CASE 1: Assessment of standards potentially suitable to comply with a given requirement (e.g. SORA OSO, U-space service, SC requirement)**
- **CASE 2: Assessment of the gaps (i.e. requirements not covered)**

- Multi Criteria Analysis to address each **CASE**

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CASE 1

➢ CASE 1: Assessment of standards **potentially** suitable to comply with a given requirement

Criterion	Weight
Effectiveness to fulfill requirement*	3
Maturity	1
Type of standard	1
Cost of compliance	2
Environmental impact	1
Impact on EU industry competitiveness	1

Scoring system **example**

Item	-2	-1	0	1	2
Maturity	Draft	INT Consult.	EXT Consult.	Pub.	Recommended

* Effectiveness to fulfill SORA req. removed in final iteration

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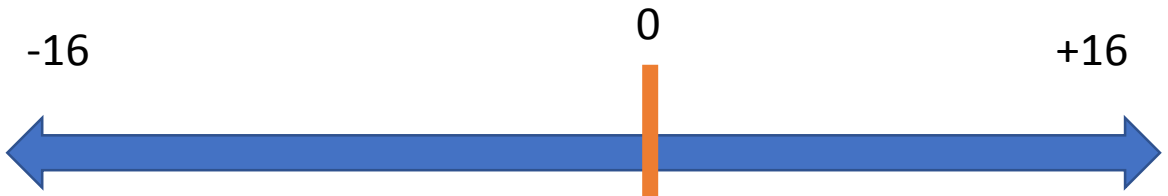
➢ CASE 2: assessment of **gaps** related to a given requirement

Criterion	Weight
Safety (or other reference KPA)	3
Cost of compliance (to the requirement)	2
Environment	1
Impact on EU competitiveness	1
Social acceptance	1

Same principle as CASE 1



i. Identify applicable standards from manned aviation regulations or other industry segments (e.g. automotive); or

ii. Recommend the development of a suitable standard

Impact of gap negligible = no action recommended

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Example: SORA

OSO #09, 15, 22: Remote Crew Training

REMOTE CREW COMPETENCIES		Level of integrity		
		Low	Medium	High
OSO #09, OSO #15 and OSO #22	Criteria	The competency-based, theoretical and practical training is adequate for the operation[1] and ensures knowledge of: (a) the UAS Regulation; (b) airspace operating principles; (c) airmanship and aviation safety; (d) human performance limitations; (e) meteorology; (f) navigation/charts; (g) the UAS; and (h) operating procedures.		
	Comments	*[1] The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).*		

REMOTE CREW COMPETENCIES		Level of assurance		
		Low	Medium	High
OSO #09, OSO #15 and OSO #22	Criteria	Training is self-declared (with evidence available).	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	A competent third party: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	*N/A*	*N/A*	*N/A*

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Example: SORA assessment

OSO #09, 15, 22: Remote Crew Training

Standard	Coverage	Gaps	Score
ISO 23665 - Unmanned aircraft systems -Training for personnel involved in UAS operations	Partial	• Lack of standards covering training requirements for personnel, other than remote pilot, in charge of duties essential to the management of the flight (semi-regulated professions; e.g. Visual Observer) • Lack of standards covering training requirements for non-regulated professions (e.g. supporting personnel, payload operator, flight dispatcher etc.) • ISO 23665 (current version) only covers VLOS.	**8**
JARUS Recommendations for RPC	Partial		**8**

OSO completely covered for the Remote Pilot.
The first identified gap has graver implications on safety, hence it is recommended to take action to cover it.

Requirement

Standards identified and assessed

Conclusions

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Highlights: SORA

- Most SORA requirements are at least partially covered by published standards, except:
  - OSO#13 - External services supporting UAS operations
  - OSO#18 - Automatic protection of the flight envelope from human errors
  - OSO #16 – Multi-crew Coordination
- Some requirements are fully covered, but with **limitations** (e.g. limited MTOM/configuration)
- Roughly 40 gaps identified
- Some gaps solved by AMCs in new EASA NPA of 09/2021, e.g.:
  - Emergency Response Plan
  - OSO #08, 11, 14, 21 – Operational Procedures
  - Assurance criteria on operational procedures of:
    - M1 – Strategic Mitigations for Ground Risk
    - M2 – Effects of Ground Impact are Reduced
    - OSO #16 – Multi-crew Coordination
    - OSO #19 – Safe Recovery from Human Error
    - OSO #23 – Adverse Operating Conditions

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U-space regulatory framework

- Assessment of standards related to the following U-space services:
  - Network ID
  - Geo-Awareness
  - Flight Authorisation
  - Traffic Information
  - Weather Info*
  - Conformance Monitoring*

U-space services in Commission Implementing Regulation 2021/664

Standards assessed vs. U-space services analogously to SORA objectives

*** services seen as optional services but may be obligatory if deemed necessary by a Member State**

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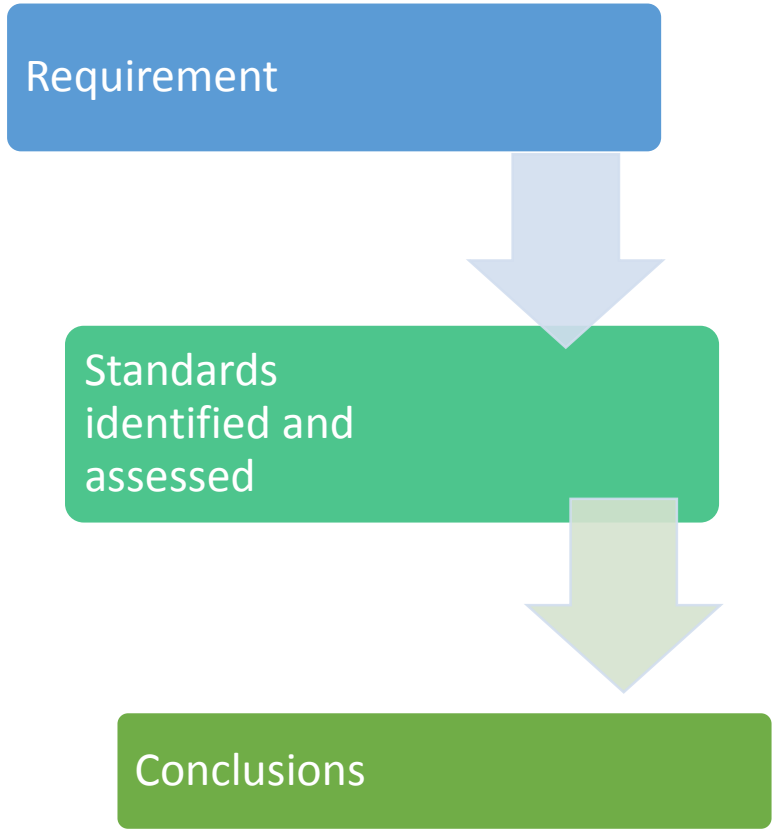
Example: U-space assessment

Network identification service

A network identification service shall allow the continuous processing of the remote identification of the UAS throughout the whole duration of the flight and shall provide the remote identification of the UAS to authorised users in an aggregated manner.

Standard	Coverage	Gaps	Score
ASTM F3411-19 UAS Remote ID and Tracking	Partial	• Compliant with draft U-space regulations: partially, but gaps are being addressed in ASTM's current revision.	**10**
ASD-STAN prEN 4709-002 Aerospace series - Unmanned Aircraft Systems - Direct Remote identification	Partial	• Direct Remote Identification covered, not Network Identification Service	**8**

While the requirement is not fully covered, ASTM is working with EUROCAE to address a global standard for NIS. This effort is coordinated by ISO TC 20 SC 16, which is developing a global standard on remote identification of unmanned aircraft (i.e. 23629-8).



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Highlights: U-space

- All services only partially covered.
  - Selected standards only fit very particular parts of a service e.g ED-269 as data format for geozones as part of the geo-awareness service
- Most standards have not been published yet
- EUROCAE, ISO, ASTM and ASD-STAN are actively working on the development of new standards covering U-space services.

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Example: SC Light-UAS assessment

Light-UAS.2625 Instructions for Continued Airworthiness (ICA)

Standard	SAIL	Coverage	Gaps	Score
F2909-19 Standard Practice for Maintenance and Continued Airworthiness of Small Unmanned Aircraft Systems (sUAS)	III and IV	Full	In principle it is only applicable to UAS with MTOM up to 25kg, but applicability can be extended if approved by NAA	**6**
F3366-19 Standard Specification for General Maintenance Manual (GMM) for a small Unmanned Aircraft System (sUAS)	III and IV	Supporting standard for the above covering Maintenace Manuals	In principle it is only applicable to UAS with MTOM up to 25kg, but applicability can be extended if approved by NAA	**6**

Requirement adequately covered. Applicability of identified standards to be further assessed from a technical point of view

Requirement

Standards identified and assessed

Conclusions

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Highlights: SC Light-UAS

- Availability of standards to cover the requirements is mostly aligned with the corresponding SORA OSOs and mitigations
- ASTM F3298 − 19 Standard Specification for Design, Construction, and Verification of Lightweight Unmanned Aircraft Systems can be the baseline complemented by specific standards to cover the individual requirements, e.g.
  - ED-280 Guidelines for UAS safety analysis for the Specific category for Light.UAS.2510
  - ASTM F3002 – 14 Standard Specification for Design of the Command and Control System for Small Unmanned Aircraft Systems (sUAS) for Light.UAS.2575
- Main gaps related to:
  - Subpart C – Structures: Test load and targets to be defined
  - Subpart E – Lift/Thrust/Power System: lack of standard for engines design
  - Subpart F – Equipment: lack of standards for environmental protection of the GCS

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Conclusions

- The final deliverable with conclusions will be submitted by mid-December
- Portal online at https://standards.aw-drones.eu/
- User interface to be further developed
- Some AW-Drones partners are committed to keep the portal running after the end of the project

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Thank you for your attention

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Back-up

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Example: OSO #09/15/22 Remote Crew Training

OSO #09, 15, 22: Standards' Assessment

SDO	#	Title	Maturity	Type of standard	Cost of Compliance	Environmental Impact	Impact on EU Industry competitiveness	Score
ISO	23665	Unmanned aircraft systems -Training for personnel involved in UAS operations	Published (+2)	Standard specification (+2)	Low (+2)	Positive (+2)	Neutral (0)	**8**
JARUS	GM to JARUS-RPC A/B	JARUS Recommendations for RPC	Published (+2)	Standard specification (+2)	Medium (0)	Positive (+2)	Very Positive (+2)	**8**

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Example: OSO #09/15/22 Remote Crew Training

OSO #09, 15, 22: Gaps' Assessment

Gap	Safety	Cost of compliance	Environmental Impact	Impact on EU Industry	Social Acceptance	Score
Lack of standards covering training requirements for personnel, other than remote pilot, in charge of duties essential to the management of the flight (semi-regulated professions; e.g. Visual Observer)	High (-3)	High (-2)	None (0)	Negative (-1)	Negative (-1)	**-7**
Lack of standards covering training requirements for non-regulated professions (e.g. supporting personnel, payload operator, flight dispatcher etc.)	Low (+3)	Very Low (+4)	None (0)	Negative (-1)	None (0)	**+6**

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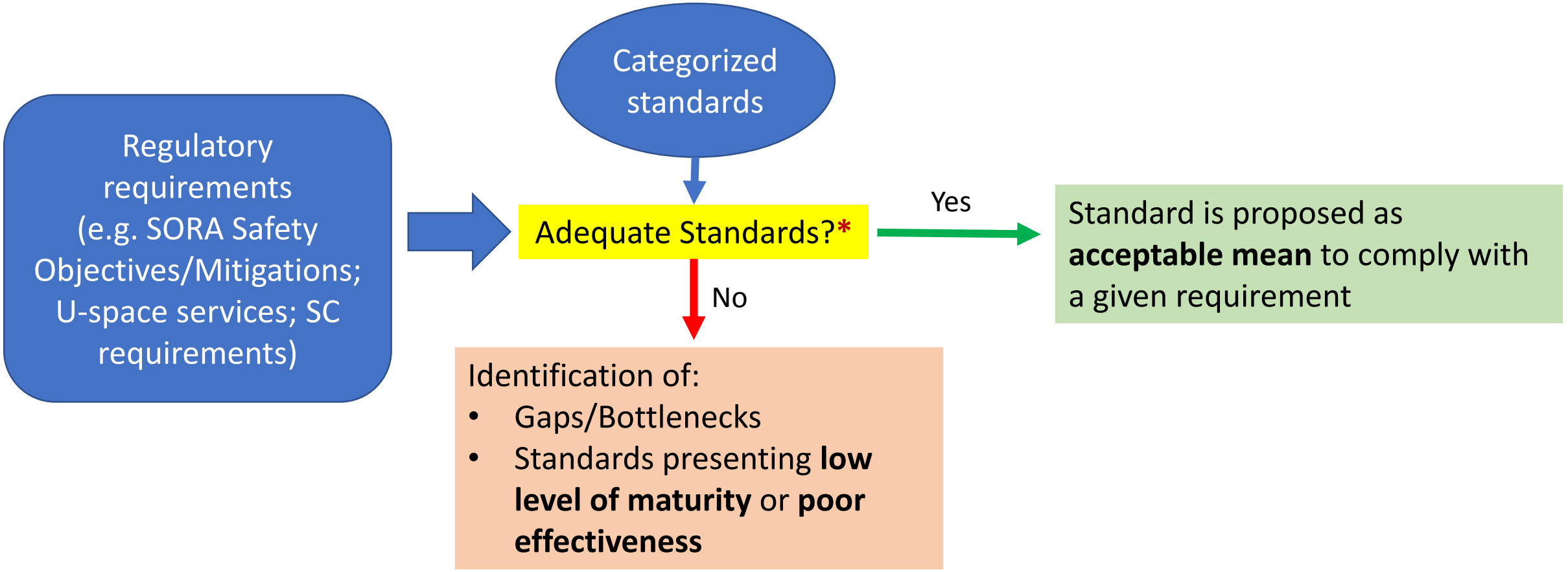
Methodology - Developing a “meta” standard



*** Results of Multi-Criteria Analysis**

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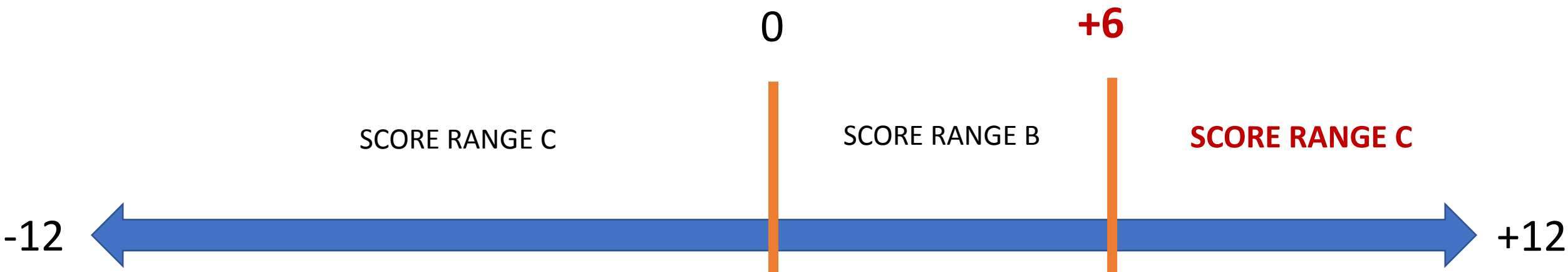
CONCLUSIONS FOR CASE 1



i. Identify possible applicable standards from other industry segments (e.g. automotive); or
ii. Recommend the amendment of the standard

standard listed as possibly **acceptable mean** to comply with the requirement **on a case-by-case basis**

Standard is proposed as **preferred acceptable means** to comply with the requirement

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AW-DRONES Information Dissemination Meeting – 7 December 2021

REVIEW OF THE 3 CONDUCTED SURVEYS

UAS OPS	OPS RISK	U-SPACE INSIGHT
European UAS Operations	Operation Risk Assessment	Perception of U-Space

Surveys Set Out in English, French, German & Spanish

Peter van Blyenburgh - Blyenburgh & Co, France
pvb@rps-info.com

This project is funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Objective

UAS OPS	**Current Situation**	Identify the **market sectors** in which drone flight operations currently take place in compliance with the **currently applicable rules or regulations**.	**VLOS, EVLOS, BVLOS** **Below 500 ft. (150 m) above ground level** **Over densely or sparsely populated areas**
		Identify the **mission purposes** of the flight operations currently taking place in compliance with the **currently applicable rules or regulations**.	
	Near Future (1-2 years starting 210101)	Identify the **market sectors** in which drone flight operations will take place **starting 1 Jan 2021** in compliance with **new EU drone regulation**.	
		Identify the **mission purposes** of the flight operations that will take place **starting 1 Jan 2021** in compliance with **new EU Drone regulation**.	
	Obtain **initial feedback** on the use of **SORA / Standard Scenarios / Predefined Risk Assessment** & **qualification of respondents to participate in the OPS RISK Survey**.		
OPS RISK	Obtain **detailed feedback** on the use of **SORA / Standard Scenarios / Predefined Risk Assessment**.		

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Terms & Explanations

Operator

Each respondent is a drone “Operator”: A company or organisation (non-governmental or governmental) conducting, or planning to conduct, commercial or non-commercial flight operations with drones.

Note: **Only Operators could participate**

Types of Operation

Commercial
Flights carried out by companies for paying customers (incl. Flight Schools and Test & Demonstration Site Management organisations).

Non Commercial
Flights carried out by companies or organisations without external financial compensation from a customer.
Non-commercial operations include «**Corporate Operations**», which should be understood as: «Flights carried out by companies or organisations to meet their own internal requirements».

Explanations of these terms were supplied (in EN, FR, DE, ES) as survey reference documents.

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Terms & Explanations

Types of Operator

- **Corporate Entity - Drone Manufacturer & Operator**
- **Corporate Entity - Drone Operator**
- **Corporate Entity - Flight School**
- **Corporate Entity - Research**
- **Corporate Entity - Test & Demonstration Site Management**
- **Corporate Entity - U-Space Service Provider**
- **Governmental Entity - Drone Operator**
  (non-military; including fire civil defence, coast guard, customs authorities, emergency services, police, environmental & infrastructure maintenance agencies, fire brigades)
- **Governmental Entity – Research**
- **Academia / University**
- **Non-governmental organisation (NGO)**
  (e.g. Red Cross, Doctors Without Borders, environmental protection groups)

- = Have contributed to survey
- = Have NOT contributed to survey

Explanations of these terms were supplied (in EN, FR, DE, ES) as survey reference documents.

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Terms & Explanations

Drone Market Sectors

Each Market Sector contributed to the survey

1 Aerial Photography, Audio-Visual Production, Advertising	13 Mining & Exploration
2 Agriculture, Fishery, Fish Farming, Forestry	14 Miscellaneous - Air Show
3 Aircraft System or Sub-system Production	15 Miscellaneous – Demonstration
4 Cinema & TV Industry	16 Miscellaneous – Ferry / Positioning
5 Construction & Real Estate	17 News Gathering & Broadcasting
6 Entertainment, Artistic Expression & Sport	18 Policy Compliance & Obtaining Legal Proof
7 Environmental Protection & Wildlife Conservation	19 Public Services & Safety
8 Flight Training / Instruction	20 Security & Law Enforcement
9 Heritage Site & Historical Monument Management	21 Remote Operations - Non-Sensing
10 Humanitarian Aid	22 Remote Operations – Sensing
11 Insurance (Accident & Claim Investigation)	23 Research & Science
12 Maintenance	24 Transport
	25 Utility Companies (Public & Private)

Explanations of these terms were supplied (in EN, FR, DE, ES) as survey reference documents.

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Terms & Explanations

Flight Mission Purposes

Each flight mission purpose was selected by at least one survey respondent

1 Advertising	12 Mapping	23 Special Purpose
2 Aerobatics, Special Effects & Sport	13 Measuring	24 Spotting
3 Aerial Photography & Film/Video Footage	14 Monitoring	25 Spraying
4 Broadcasting	15 Observation	26 Surveillance
5 Deterring	16 Patrolling	27 Surveying
6 Dispensing	17 Relief Flight	28 Testing
7 Exploration	18 Search & Rescue	29 Tracking
8 Identification	19 Security	30 Transport - Goods
9 Inspection	20 Sensing	31 Transport - Persons
10 Localisation	21 Sky Painting	32 Validation
11 Manipulation	22 Sky Writing	33 Water Bombing

Explanations of these terms were supplied (in EN, FR, DE, ES) as survey reference documents.

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Survey Methodology

Survey Forms, User Instructions & Reference Documents in EN, FR, DE, ES

UAS OPS Survey (1) – RESPONDENT DECLARATIONS
● Respondent is a **Drone Operator** ● Respondent conducts "**Commercial**" or "**Non-Commercial**" operations ● The applicable **Type of Operator** *(10 choices – See slide 4)*

Survey software:
SoGoSurvey
(GDPR compliant)

UAS OPS Survey (2) – CURRENT SITUATION	**UAS OPS Survey (3) – NEAR-FUTURE SITUATION**
The respondent selected: ● Up to **4 Market Sectors** in which he/she is currently active; ● Up to **5 Mission Purposes** (currently being flown) in each selected Market Sector, indicating if the flights are: ♦ **VLOS, EVLOS, or BVLOS** ♦ Over **densely** or **sparsely populated areas**	The respondent selected: ● Up to **4 Market Sectors** in which he/she plans to be active; ● Up to **5 Mission Purposes** that he/she anticipates to fly in each selected Market Sector, indicating if the flights are: ♦ **VLOS, EVLOS, or BVLOS** ♦ Over **densely** or **sparsely populated areas**
UAS OPS Survey (4) – Initial Feedback SORA Use	**OPS RISK Survey – Detailed Feedback SORA Use**
Questions with 2 types of answers: Yes/No & multiple choice. Objective: Identify the respondents with the **experience** to be invited to contribute to the "OPS RISK" survey.	Questions with 2 types of answers: Yes/No & multiple choice. Objective: Obtain feedback on the **use of SORA, Standard Scenarios, and Predefined Risk Assessment**.

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Respondents - Basic Numbers

Respondents		
	UAS OPS	247
	OPS RISK	20

22 Countries – In Alphabetical Order

Austria	2
Belgium	34
Bulgaria	1
Denmark	1
Estonia	1
Finland	3
France	64

Germany	34
Greece	1
Ireland	7
Italy	13
Lithuania	1
Netherlands	30
Poland	5
Portugal	1

Romania	1
Serbia	1
Slovakia	2
Spain	23
Switzerland	10
Ukraine	2
UK	10

22 Countries – In Order of Respondents/Country

France	64
Belgium	34
Germany	34
Netherlands	30
Spain	23
Italy	13
Switzerland	10

UK	10
Ireland	7
Poland	5
Finland	3
Austria	2
Slovakia	2
Ukraine	2
Bulgaria	1

Denmark	1
Estonia	1
Greece	1
Lithuania	1
Portugal	1
Romania	1
Serbia	1

Operator Categories

Commercial Operators	76%
Non Commercial Operators	24%

Operator Types

Corporate Entity *(5 categories)*	88%
Governmental Entity	5%
Research Organisation (non-commercial)	2%
Association, Federation, Union, TechCluster	2%
Academia / University	3%

SORA – Comprehension & Use

Understand SORA methodology	155
Use SORA	86
Have submitted SORA to their NAA	47

This project is funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Survey Results
Report Layout

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Survey Respondents
- Nominal Listing 11
- Basic Numbers 13

UAS OPS SURVEY

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- **Market Sectors**
  - Flight Envelopes – VLOS, EVLOS, BVLOS 14
  - Flight Zones – Sparsely/Densely Populated 16
- **Flight Missions**
  - Flight Envelopes – VLOS, EVLOS, BVLOS 18
  - Flight Zones – Sparsely/Densely Populated 20

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  - Flight Envelopes – VLOS, EVLOS, BVLOS 22
  - Flight Zones – Sparsely/Densely Populated 24
- **Flight Missions**
  - Flight Envelopes – VLOS, EVLOS, BVLOS 26
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- Market Sectors – Flight Envelopes 30
- Market Sectors – Flight Zones 31
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OPS RISK SURVEY

SORA, Standard Scenarios, Predefined Risk Assessment
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ANNEX - PART 2 – OPS RISK SURVEY

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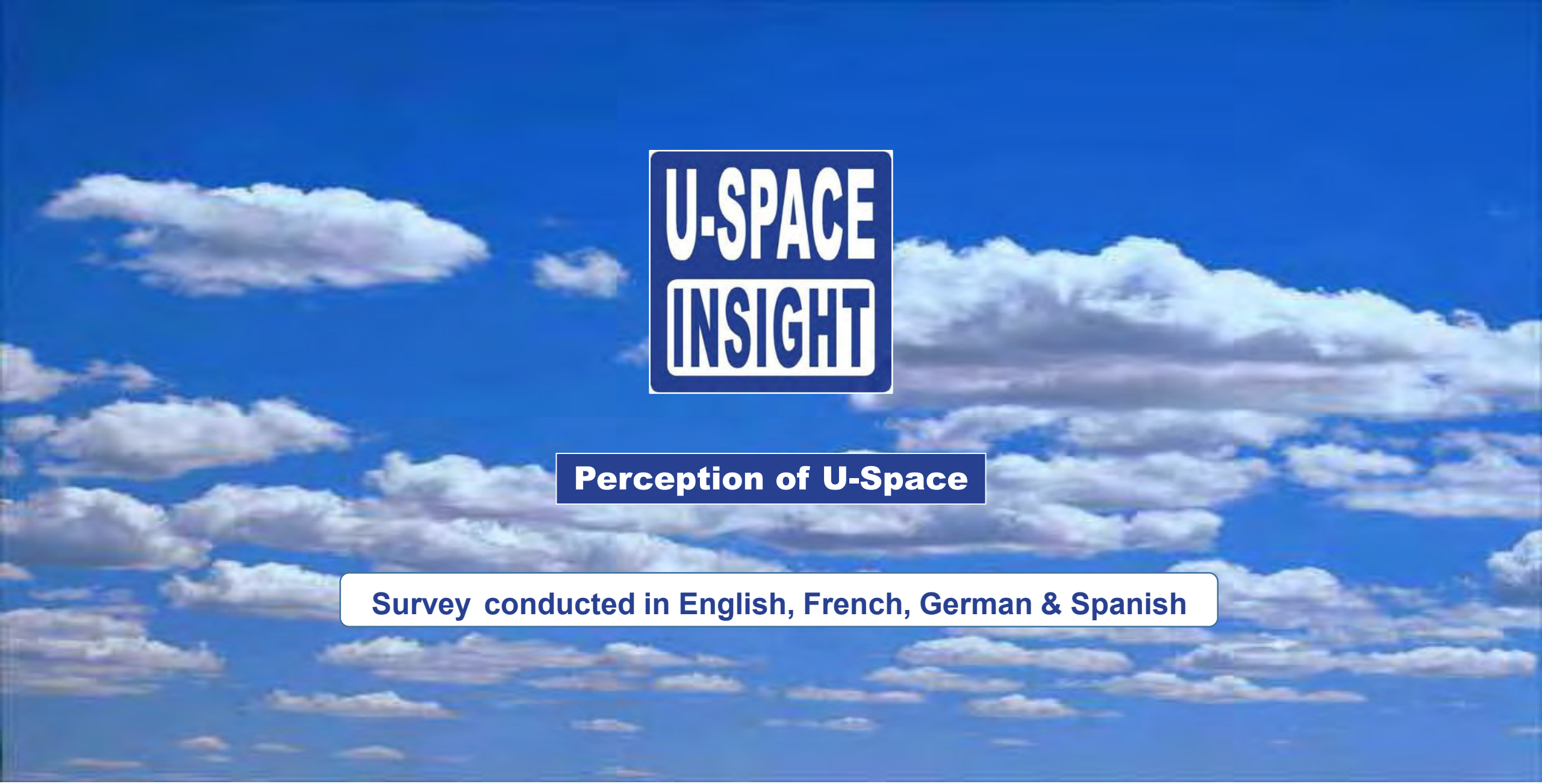
This project is funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.



AW DRONES

This project is funded by the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

Basic Numbers

Survey Respondents: 120

28 Contributing Countries – In Alphabetical Order – Contributions in %

1	Albania	0,83	8	Denmark	2,48	15	Jamaica	0,83	22	Portugal	0,83
2	Australia	1,65	9	Estonia	0,83	16	Kenya	0,83	23	**Spain**	**9,92**
3	Austria	2,48	10	**Finland**	**4,96**	17	Lithuania	0,83	24	Sweden	1,65
4	**Belgium**	**13,22**	11	**France**	**11,57**	18	**Netherlands**	**7,44**	25	Switzerland	2,48
5	Bulgaria	2,48	12	**Germany**	**13,22**	19	New Zealand	0,83	26	Ukraine	0,83
6	China	0,83	13	Ireland	0,83	20	Norway	0,83	27	United Kingdom	2,48
7	Czech Rep.	0,83	14	**Italy**	**6,61**	21	Poland	2,48	28	**U.S.A.**	**4,96**

Principal Contributing Countries
71,9% of All Contributions Received

1	**Germany**	**13,22**	**5**	**Netherlands**	**7,44**
2	**Belgium**	**13,22**	**6**	**Italy**	**6,61**
3	**France**	**11,57**	**7**	**Finland**	**4,96**
4	**Spain**	**9,92**	**8**	**U.S.A.**	**4,96**

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Targeted Participant Categories

Top 3 Respondent Categories		
	UAS Operators	35%
	Consultancy Specialized in Safety Risk Assessment	22%
	UAS Manufacturer/Integrator & Operator	19%

		Current Activities	Possible Future Activities
1	Aeronautical Information Service Provider	5%	6%
2	Air Navigation Service Provider	7%	7%
3	ATM / UTM / U-space software dvpt comp.	13%	15%
4	Common Information Service Provider	5%	9%
5	Communication Service Provider	1%	2%
6	Conformity Assessment Body	7%	10%
7	Consultancy specialized in safety risk	22%	28%
8	UAS Manufacturer / Integrator	17%	18%
9	UAS Manufacturer / Integrator & Operator	19%	24%
10	UAS Operator - All flight missions (except transport of cargo & persons)	35%	33%
11	UAS Operator - Transport of cargo & persons]	13%	19%
12	General Aviation	10%	9%
13	Commercial Manned Aviation	2%	5%
14	National Aviation Authority	7%	9%
15	Local Authority	2%	2%
16	Notified Body	1%	4%
17	Qualified Entity	3%	7%
18	Standard Development Organisation	2%	5%
19	Urban Air Mobility (UAM)	12%	21%
20	U-space Service Provider	12%	24%

Principal Expected Growth

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Respondent Qualification & Sector Involvement

Qualification & Competence	Quantity of Years				
	< 1	1-2	3-5	5-10	> 10
Respondent organisation's involvement with drones	4%	12%	30%	34%	20%
Respondent's personal involvement with drones	5%	10%	26%	27%	33%
Respondent's personal involvement with aviation	3%	3%	11%	17%	66%

Respondent involvement

ASD-STAN	17%
ASTM	37%
CEN/CENELEC	7%
ETSI	0%
EUROCAE	49%
ICAO RPAS Panel	22%
ISO	22%
JARUS	22%
JARUS SCB	17%
RTCA	10%
National Standards Orgs	29%

Participating Countries

European Union	17
EU-associated	4
Other	7
Total	28

Micro & SMEs	70%
Industry	30%

Quantity of Employees

1 Employee	7%
2 to 5 Employees	16%
6 to 10	15%
11 to 25	14%
26 to 100	11%
101 to 250	6%
251 & more	30%

Language Used

English	67%
German	13%
French	12%
Spanish	8%

Activity sector segmentation & competence has permitted to **benchmark the drone operations community** and obtain a **representative & qualified insight**

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General Comprehension of U-Space

Is the general concept of U-space clear to you?	1%	3%	22%	**46%**	28%
Are the relations between the service suppliers clear to you?	4%	12%	27%	**45%**	11%
Is it clear what data is supplied by each service provider?	7%	10%	**41%**	34%	7%
Is it clear in what format the data is supplied?	21%	16%	**46%**	16%	2%
Is it clear to whom the data is supplied?	11%	12%	**40%**	30%	7%
Is it clear how the data is supplied?	18%	11%	**48%**	20%	2%
Are the legal responsibilities & liabilities of the service providers clear to you?	15%	13%	**43%**	23%	6%
Is 5G coverage in your country sufficient to supply the data?	27%	25%	**30%**	15%	2%

No comprehension

Slight Comprehension

Partial comprehension

Above Average Comprehension

Complete Comprehension

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Services Currently Available in Respondent's Country (> 40% of positive replies)

Common Information Service (CIS)	ATM Data Service Flight planning Geo-Awareness Data Service	55% 53% 47%
UAS Flight Authorisation Service	Flight plan/authorisation validation	47%
Geo-awareness Service	Applicable operational conditions Airspace constraints in designated U-space airspace Geographical zones in the designated U-space airspace	46% 42% 41%
Network Identification Service	Data for authorized users	69%
Traffic Information Services		40%
Weather Information Services		61%

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Preference & Expression of Needs (> 50% of respondents)

● Prefer Integration to Segregation	76%
● Need for further specifications of rules & guidelines in the U-space regulation (e.g. de-conflicting processes)	83%
● Need for clarification of the roles & responsibilities of Air Navigation Service Providers, Common Information Service Providers, U-space Service Providers	64%
● Business & financial aspects of U-space should be referred to in the regulation	53%
● Business & financial aspects of U-space should be a national implementation matter	50%

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Maturity - Comprehension

Maturity & Information Sufficiency

The majority of respondents indicate that the **U-space is not mature** and that the **available information/ documentation** is **insufficient**.

Above Average & Total Comprehension

- The U-space concept	**74%**
- Relations between service suppliers	**56%**
- Data supplied by each service provider	41%
- To whom the data is supplied	37%
- Legal responsibilities & liabilities of service providers	29%
- How the data is supplied	22%
- Format of the supplied data	18%

The 10 Most Urgently Required Services

- Flight Authorisation Request Processing	**56%**
- Geographical Zones in the Designated U-space Airspace	48%
- Geo-Awareness Data Service	47%
- Authorization Request Service	45%
- Applicable Operational Conditions	45%
- Supply of Flight Authorisation	44%
- Flight Plan/Authorisation Validation	42%
- Airspace Constraints in the Designated U-space Airspace	42%
- Weather Information Service	42%
- Dynamic Airspace Restrictions	40%

Majority of respondents (>50%) **do not know when the required services will be available** in their countries.

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Principal Currently Missing Information

> 50% of respondents	- Required technical standards	73%
	- Required operational standards	69%
	- Detailed additional information on U-space	62%
	- Detailed additional regulatory information	57%
	- Costing aspect of U-space services	56%
	- Responsibilities & liabilities relative to U-space services	55%
< 50% of respondents	- Definition of «dynamic reconfiguration of the airspace» concept	48%
	- Defined communication interface between ANSP & USSP	38%
	- Defined communication interface between CSP & USSP	37%
	- Defined communication interface between CSP & ANSP	35%
	- Definition of «Notified Body» & applicable criteria/standards	28%

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Immature or Non-Exist Technology & Principal Required Standards

Concepts considered to be based on **immature** or **non-existent technologies**	
- Detect & Avoid	80%
- Collaborative interface with ATC	51%
- Surveillance & communication technology for manned aviation VLL flights	51%
- Dynamic geo-fencing	47%
- Tactical de-confliction	47%
- Communication methods – 5G	41%
- Procedural interface with ATC	40%
- Strategic de-confliction	40%

Principal **required** European-wide standards	
- Pilot Training & Qualification: Theoretical	85%
- Detect & Avoid	84%
- Electronic conspicuity methods (UAS position transmission)	82%
- Pilot Training & Qualification: Practical	81%
- Command & Control integrity	78%
- Cybersecurity	78%
- Drones for Transport - Cargo/Goods	77%
- Drones for Transport – Persons	76%
- Population density definition/calculation	67%
- UAS «black box» recorder (on aircraft)	60%
- Person-identifiable imagery	55%

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Opinions Expressed on the Current Situation

	No
Is the currently available U-space information (Reg. Draft) sufficient to evaluate the impact on your future activities?	59%
Is the currently available regulatory information sufficient to evaluate the impact on your future activities?	66%
Is the currently available U-space information (Reg. Draft) sufficient to draw up a business plan/commercial strategy?	58%
Is the currently available regulatory information sufficient to draw up a business plan/commercial strategy?	57%
Is the information on U-space currently available (Reg. Draft) sufficient to implement U-space?	59%
Is the information on U-space currently available (Reg. Draft) a solution for your future activities?	49%

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Opinions Expressed on Standards

Respondents **desiring to be involved in ongoing standards work**

Data Exchange Standards	55%
Remote Identification Standards	60%
Electronic Registration Standards	56%

GENERAL COMMENTS	Yes	No	?
● Is your national standards organisation involved in the drone standards producing activity (for the «open» category) by ASDSTAN?	21%	23%	56%
● Is your national standards organisation involved in the drone standards producing activity by ISO?	31%	19%	50%
● Are the standards that your company/organisation requires available?	31%	39%	31%
● Are the standards that your company/organisation requires easily identifiable/findable?	28%	44%	28%
● Are the standards that your company/organisation requires available in your local language?	20%	43%	37%

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Opinions Expressed on Standards

DO THE STANDARDS FOR THESE SERVICES EXIST IN YOUR COUNTRY?

Common Information Service (CIS)
- ATM Data Service
- Geo-Awareness Data Service
- Authorization Request Service
- Communication Service (infrastructure)
- Conformance Monitoring Service

UAS Flight Authorisation Service
- Flight authorisation request processing
- Flight plan assistance
- Flight plan processing
- Flight plan/authorisation validation
- Priority management
- Strategic de-confliction
- Supply of flight authorisation

Geo-awareness Service
- Applicable operational conditions
- Airspace constraints in designated U-space airspace
- Geo-graphical zones in designated U-space airspace
- Dynamic airspace restrictions temporarily limiting the area in the designated U-space airspace

Network Identification Service
- Continuous processing of the remote identification of the UAS throughout the whole duration of the flight
- Remote identification of the UAS (Open category) to authorised users
- Data for authorized users

Traffic Information Service

Weather Information Service

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Opinions Expressed on Standards

STANDARDS ON FOLLOWING TOPICS ARE SUGGESTED BY RESPONDENTS

- Pilot Training & Qualification: Theoretical
- Pilot Training & Qualification: Practical
- Person-identifiable imagery
- Population density definition/calculation
- UAS «black box» recorder (on aircraft)
- Electronic conspicuity methods (UAS position transmission)
- Detect & Avoid
- Command & Control integrity
- Cybersecurity
- Drones for Transport - Cargo/Goods
- Drones for Transport - Persons

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Opinions Expressed on Standards

ADDITIONAL STANDARDS SUGGESTED BY RESPONDENTS

- Accident/incident reporting
- All 30 UTM services in ISO 23629-12
- Area of Buffer dynamic calculation
- ATS/ATC service provided by ANSP to UAS/U-space entities
- ATM/UTM communications
- ATM/UTM contingency management
- Cross-border Interoperability (avoiding national implementations)
- Data exchange from different sources
- Drone-to-Drone communication
- Drone-to-Infrastructure Communication
- E-Insurance Card
- E-Pilot Licence
- GNSS use for drones (in particular EGNOS)
- Human-Autonomy Teaming & Human-Machine Interactions
- Night operations ie. Lights
- Radio emission power
- SMS communications
- Surveillance observation
- System design
- UTM integration

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Opinions Expressed on Standards

IS THERE A REQUIREMENT FOR THE FOLLOWING STANDARDS CURRENTLY UNDER CONSIDERATION BY ISO 23629-12

(Yes / No / No Opinion)

- Collaborative Interface with ATC (CIA)
- Dynamic (airspace) Capacity Mgt (DCM) Service
- Tactical Conflict Management Service (TCM)
- Communication Coverage Information Service (CCI)
- Electro-Magnetic Interference Inform. Service (EMS)
- Geospatial Information Service (GIS)
- UTM Communication Service (LCS)
- UTM Route Design Service (URD)

- Navigation Coverage Information Service (NCI)
- Population Density Information Service (PDI)
- Procedural Interface with ATC (PIA)
- Accident and Incident Reporting Service (ARS)
- Digital Logbook Service (DLB)
- Maintenance Management (MMN)
- Operational Plan Preparation (OPP)
- Risk Analysis Assistance (RAA)

NOTE: All respondents also indicated, standard-by-standard, if they were interested to be involved in the relevant standards creating work.

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Opinions Expressed on Geo-Zones & E-Registration

Have geo-zones been established in your country?	**Yes**: **65%** **No**: 14% **Do not know**: 21%
Do you know where to find the existing geo-zones?	**Yes**: **62%** **No**: 18% **Do not know**: 19%
Are all geo-zones in your country managed by the same entity?	**Yes**: **39%** **No**: 32% **Do not know**: 29%

80% of the respondents indicate that **E-registration is available in their country**.

61% indicate that **E-registration is free-of-charge**.

The **minimum age** is principally 16 or 18 years.

France, **Italy** & **Spain** have **3 classes**: 14, 16 & 18 yrs
Denmark has **2 classes**: 15 & 16 years
Germany has **2 classes**: 16 & 18 years

The responsibility for **management of the Geo-zones** and **Geo-awareness Service Provision** belongs to:

- National aviation authority	76%
- Governmental agency	38%
- Regional authority	25%
- Municipal authority	14%
- Independent company	14%

The majority of the respondents indicate that a **Geo-awareness Service Provider** should have a **designated accountable geo-awareness manager**.

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Survey Results
Report Layout

INTRODUCTION	Survey Scope, Objective & Conditions
	Terms & Explanations
	Targeted Participant Categories
CONCLUSIONS	**Summary of the Principal Results & Conclusions**
Respondents	Sector Involvement
	Size
	Participating Countries
	Language Used to Complete Survey
	Current & Possible Future Respondent Activies
	General Comprehension
	Participation in Standard Producing Organisations.
	Responding Companies & Orgs - Names & Countries
	Respondant Organisations & Respondents - Review
Services	Current Availability in the Respondant's Country
	Services Currently Supplied by Respondents
	Services Most Urgently Required
	When will the Following Services be Available in your Country
	Desired Urgency to Make Services Available
U-space	Preferred Airspace Reconfiguration Concepts
	Rules & Regulations - Need for Specifications
	Roles & Responsibilities - Need for Clarification
	Business & Financial Aspects
	The U-space Concept - Degree of Maturity
	The U-space Concept - What is Currently Missing
	Concepts Based on Immature/Non-Existant Technologies
Standards	Standards - Possible Participation
	General Standard-related Matters
	Do the Standards for the Following Services Exist
	Standards - Requirements
	Suggested Additional European-wide Standards
	Requirement for standards currently under consideration by ISO & interest to contribute to this producing effort
E-Registration	Availability & Cost
	Annual Cost in €
	Minimum Age.
UAS Geo-zones	Existing Geo-Zones
	Responsability - Management of Geo-zones & Geo-Awareness Service Provision
	Accountable Geo-Awareness Manager
	Is There a Charge for the Geo-Awareness Service?

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UAS OPS

OPS RISK

Conclusions available online since 24/10/2020

https://rps-info.com/uas-ops-and-ops-risk-surveys-results-and-conclusions/

Current quantity of downloads: 651

View in Flipbook:
https://rps-info.com/publications/uas-ops-ops-risk_conclusions_flipbook/

U-SPACE INSIGHT

Conclusions available online since 29/09/2021

https://rps-info.com/u-space_insight_survey/conclusions/

Current quantity of downloads: 282

View in Flipbook:
https://rps-info.com/publications/u-space-insight-survey_conclusions_flipbook/

AW DRONES

The Drone Standards Information Portal and future actions

Damiano Taurino

Deep Blue

Stratos Arampatzis

Ortelio Ltd

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

What is the Drone Standards Information Portal?

Online repository that provides single point of access to relevant information about:

- rules, procedures and technical standards developed for mass-market drones worldwide;
- best practices, gaps and bottlenecks;
- technical standard for each category of drone operations.

This data are communicated in a single point, user-friendly online platform which can be accessed freely and globally by any type of user:

https://standards.aw-drones.eu/

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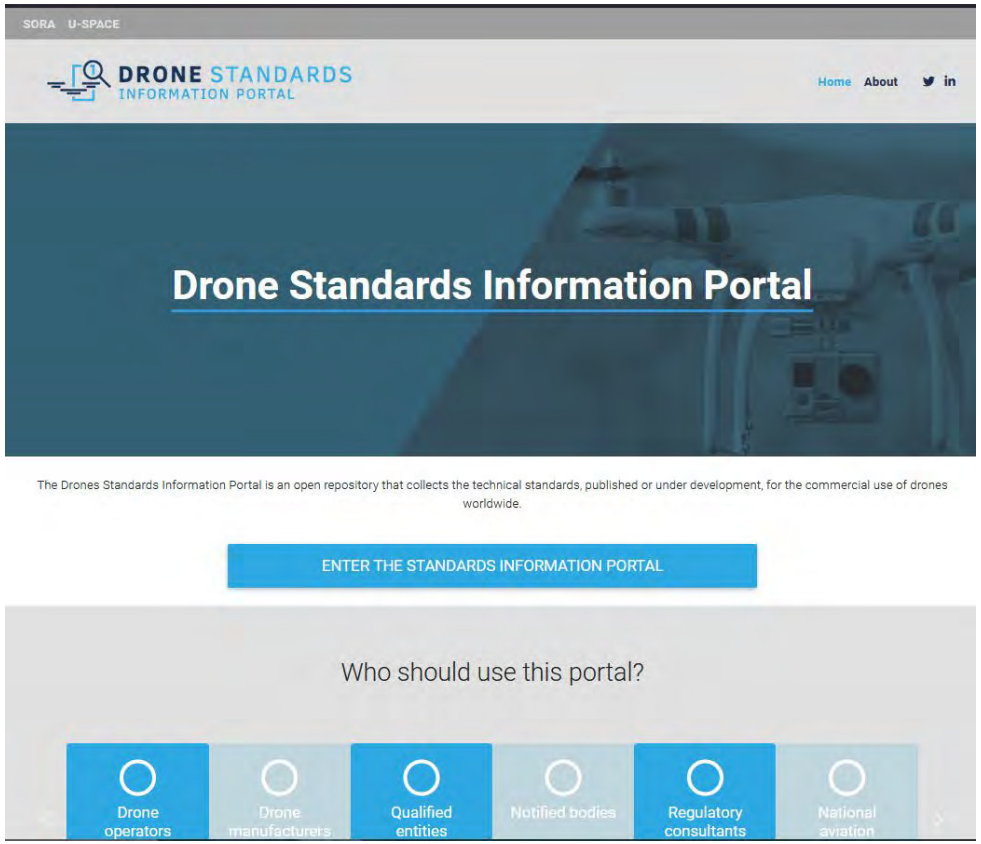
The new Drone Standards Information Portal

A renewed version of the Portal, with new functionalities, brand new graphical identity and better search tools is going to be released at the beginning of 2022!



DRONE STANDARDS
INFORMATION PORTAL

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

What's new in the new portal?

- Better user support and a full user manual available for the visitors
- A brand new and responsive graphical identity
- Specific internal sections (SORA, U-Space, SC-Light UAS)
- Easier access to the information (more intuitive search, less clicks to reach your information)

The portal is a "live creature" driven by your needs, do not hesitate to share your impressions with us!

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What's going on with the project?

AW-Drones will officially end this year (between Christmas at New Year's Eve), but….

A lot of things are still ongoing, including:

- Finalisation of the project's last outcomes and deliverables;
- Preparation and launch of the new Information Portal (it will be maintained after the end of the project!)
- Creation of an interactive platform to collect the contribution of the portal users (You!)

Keep in touch, AW-Drones' journey is coming to an end, but there is still a lot of work to do with drone standards!!!

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

AW DRONES

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This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No°824292.

WEBINAR POLL

94 of 162 Attendees Responded

In your opinion, which of the following factors would foster the development of the drone business more

Multiple choice with multiple answers

76.6%	A clear EU common regulatory framework	72 Responses
58.51%	Clear and well defined industry standards for drones	55 Responses
46.81%	Practical tools for ops risk assessment (SORA, scenarios...)	44 Responses
45.74%	A smooth and fast deployment of (basic) U-Space services	43 Responses
34.04%	More EU R&D funds for the SMEs operating in the sector	32 Responses

62 of 162 Attendees Responded

Would you say that AW-Drones reached its objective (contributing to the harmonisation of EU drone regulations and standards)?

Multiple choice with single answer

69.35%	Yes	43 Responses
30.65%	Not sure	19 Responses

59 of 162 Attendees Responded

Would you say that you will make use of the AW-Drones outcomes?

Multiple choice with multiple answers

57.63%	Yes, especially the list of the recommended standards	34 Responses
77.97%	Yes, especially of the Drone Standards Information Portal	46 Responses
32.2%	Yes, especially of the surveys on the operator's perspective	19 Responses

Feedback On The Webinar

Question	Satisfaction Rate 1 Low - 5 High
Were the objectives of the event explained clearly in advance?	4,52
Were you satisfied with the overall quality of presentations?	4,44
Were you satisfied with the supporting material provided (agenda, posters, presentations...)?	4,28
Was the schedule appropriate to the event?	4,48
Did the design of the event facilitate interaction with the speakers and the provision of feedback?	4,16
How was the quality of the assistance during the event?	4,52
Overall, how suitable was the streaming tool used (GoToWebinar)?	4,48
What is your overall level of satisfaction in having participated in this event?	4,48
Would you recommend participating in future AW-Drones events to a colleague?	4,48

What aspects of the webinar did you appreciate least, and why?

1	A more proficient coordination from the main speaker would have been better
2	There was no time allocated to a discussion amongst the stakeholders on the project results
3	More specific data is needed
4	Too much information on procedures and not on lessons, orientations, trends and practical conclusions
5	Very minor: some presentations were not fully displayed but it was ok, and agenda in advance missing (it seems to me but maybe I missed it)

QUESTION RECEIVED FROM THE AUDIENCE ON THE WEBINAR CHAT

Q: Do you have evidence that the identified standards were already really accepted as acceptable means by a CAA for a specific safety objective in the SORA process?
Thank you and best regards. [Christoph Wieland]
A: When we started no standard was already accepted by any CAA. Now there are some that can be reccomended and as soon as EASA will publish the list they will be accepted

Q: Question to Mr Ducci!: How many European drone manufacturers are involved in the project? Do you plan to review/amend the project considering that in the last 2 years we have had a lot of new drone manufacturers from the EU? Is your project mainly for the purpose of the EU or is it an international project? [Adrian Haxhiaj]
A: The project will finish in two weeks, so there is no plan to involve other manufacturers. During the project manufacturers covering more than 90% of the EU market where involved. They were not all EU manufacturers as most of the drones sold in EU are developed elsewhere. The project aimed at addressing the EU regulatory requirements only but standards developed worldwide were considered. The results of AW-Drones will be further reviewed by the Consortium that will win the tender EASA published a few months ago. So the question about the invovlement of additional manufacturers will need to be asked to them when their name will be known.

Q: Is UTM the US U-space? [Cengiz Ari]
A: Yes, indeed. https://www.faa.gov/uas/research_development/traffic_management/

Q: Have any service providers and/or on-board drone technology providers been involved in any way? [Réda Nouacer]
A: Unifly represented U-space providers in AW-Drones. Providers of on-board drone technology were not directly involved but they might have contributed through the Standard Design Organisations. However we don't have visibility on that.

Q: Are there any training programs available for prospective operators?[Eraclis Foullis]
A: There are many training programs available. I can reccomend to look into the courses offered by https://jaato.com/virtual-home/ and https://trainingzone.eurocontrol.int/

Q: "A compilation of existing UAS regulations - Vanuatu, New Zealand, Australia, Canada and the U.S." – will the EU regulation also be considered in the compilation? [Cengiz Ari]
A: Yes , it should be added to the compilation in the future

Q: OK, does this meas that ICAO has already adopted some terminology in that area or is there still room for common naming convention?[Cengiz Ari]
A: ICAO has been tasked to develop aregulatory framework by the Assembly

Q: Just one minor remark: the presentations displayed by the participants seem to be truncated from time to time, and we cannot see all the words ...
[Ségalite Sellem-Delmar]
A: Thanks Ségalite, I noticed it, it's an issue with the screen resolution of the speaker projecting. All the presentations will be made available after the event, in any case!

Q: Just one minor remark: the presentations displayed by the participants seem to be truncated from time to time, and we cannot see all the words ... [Ségalite Sellem-Delmar]
A: Sorry for this; all the presentations will be uploaded to the project website after the event, so you will be able to have another look at them.

Q: A lot of air-space possibilities were mentioned by the presenters, but agriculture was not mentioned at all. Is agriculture part of the topics that you address? Will there be separate handling of drones air-space for agricultural systems? [Victor Alchanatis]

Q: How does this Network function? [Stefan Hristozov]

Q: Will you explain during this presentation how the database will be maintained in the future «https://standards.aw-drones.eu/standards» ? [Cengiz Ari]
A: Yes, indeed in the final presentation

Q: Do we get all slides from today? [Kellerhals Martin]
A: Yes, they will be published on the AW-Drones website: www.aw-drones.eu

Q: Ok, thanks a lot ! [Ségalite Sellem-Delmar]
A: Thanks to you Ségalite!

Q: Yes I can see it again[Jules Kneepkens]
A: Thanks!

Q: I've fixed it by refreshing the window [Stefan Hristozov]
A: Thanks!

Q: It is well displayed [Ségalite Sellem-Delmar]
A: Thanks!

Q: I could see the screen well [Nathalie Hasevoets]
A: Thanks!

Q: I had to reinstall the webinar! Now I see the presentation and partners [Ake Sivertun]
A: Thanks Ake!

Q: I can see the screen. It is possible to restart the webinar again and it works [Adrian Haxhiaj]
A: Thanks Adrian!

Q: Slide 5 visible, I confirm [Lionel Clarisse]
A: Thanks Lionel!

Q: Yes page 5 [Pedro Cunha]
A: Thanks Pedro!

Q: If you can't see the screen you must refresh the page. It is visible if you do that. [Sebastian Paolini Van Helfteren]

A: Thanks Sebastian

Q: I had to refresh my screen (connecting through Chrome) [Nicolas Eertmans]
A: Thanks Nicolas!

Q: I had to refresh the page in the navigator to remove the poll pop-up [Lionel Clarisse]
A: Thanks Lionel!

Q: Shouldn't we also work on cargo standards because those will be essential for an efficient integration in customer logistic systems (e.g. standard container sizes and attachment points etc.) [Jaap Hatenboer]
A: Answer from Natale: Cargo standards exceed EASA competence since they are not safety related. This may anyway developed by industry and offered as best practices

Q: https://www.eurocae.net/training/unmanned-aircraft-systems-airworthiness-and-safety-training/[Christian Schleifer]
A: Thanks Christian!

Q: Thank you for the quality of the presentations which perfectly illustrate the complexity of the work carried out and the importance of the results obtained. I hope to meet you «physically» in the near future to work on a sequel to the AW-Drones project. [Réda Nouacer]

Q: Yes [Jules Kneepkens]

Q: Thanks for the webinar. I have to leave for another call. Looking forward to the slides [Jules Kneepkens]

Q: How long will the AW-Drones website still be up and running following the closure of the project? [Geert Vanhandenhove]
A: At list 2 years, we are now creating a plan to make it sustainable for a longer period (see last presentation)

Q: Yes [Giulio Traversa]

Q: Thank you very much for these excellent debriefs from all the presenters, and for AW-drones great job accomplished ! [Ségalite Sellem-Delmar]

Q: If not the full text of the standards, could be possible to have in the standard description a link to the original document or at least the publisher's site url? [Claudio Colangeli]
A: We are working to include the url of the publisher where the standard can be purchased.

Q: Have you also analyzed/ evaluated where standards overlap (or even contradict)? [Thorsten Indra]
A: Not really. If two standard overlap we currently recommended both of them. This kind of techncial evaluation was out of scope for AW-Drones

Q: I am working on a project for large scale modular UAV transport over 30tonnes... who wants to participate? Any interest? Thanks Daniel Van Mosnenck

Q: Yes, especially of the Drone Standards Information Portal [Giulio Traversa]

SURVEY ON EUROPEAN UAS OPERATIONS & OPERATION RISK ASSESSMENT METHODS

CONCLUSIONS

Funded By The European Union

In The Context Of The Horizon 2020 Programme

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The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. This document is for information purposes only. Although every effort has been made to provide accurate and timely information, there can be no guarantee that the information contained herein is accurate as of the date it is received or that it will continue to be accurate in the future. No one should act upon such information without appropriate professional advice after a thorough examination of the particular situation.

Acknowledgement: The survey respondents indicated in Annex 1 are wholeheardedly thanked for their contributions.

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SCOPE & PURPOSE

The objective of the UAS OPS and OPS RISK surveys is to:

- Consult only European drone operators (*ECAC countries*) conducting flight missions in order to increase the validity & pertinence of the results.
- Identify the European drone operator community to the regulatory and standards communities, as well as to itsself.
- Apply an operation centric approach (not make a distinction between on the drones used based on airframe type, size, mass, or propulsion).
- Identify the drone operators by:
  a) Category of operation: Commercial and/or non-commercial
  b) Type of operator: Corporate entity*:* Drone manufacturer & operator
  Drone operator
  Flight school
  Research organisation
  Test & demonstration site management
  U-Space service provider
  Governmental entity: Drone operator
  Drone research organisation
  Academia
  Non-governmental entity (NGO)
- Identify the market sectors where non-military drone operations are currently taking place (*25 selections proposed*).
- Identify the flight missions currently being conducted (*33 selections proposed*).
- Concentrate on flight missions with the following operational parameters:
  a) VLOS, EVLOS & BVLOS
  b) Flight Altitude: < 500 ft
  c) Over densely and/or sparsely polpulated areas.
- Identify the evolution of the market sectors and the flight missions that are anticipated to take place in the near term (*1 to 2 years starting on 1st January 2021*).
- Indicate in which market sectors and for which flight missions BVLOS operations are anticipated to start or grow (*and will require the application of operation risk analysis*).
- Make a high level evaluation of the current comprehension and use of operation risk analysis methods.
- Based on the aforementioned points, identify & engage the drone operators with the expertise required to make a more detailed evaluation of the current use of SORA, and identify possibly associated difficulties, bottlenecks and gaps.
- Obtain information permitting to confirm the usefulness of the AW Drones "Open Standards Repository".
- Contribute to promoting awareness of the AW Drones Project with the European Drone Operator community.

<table>
<tr><th colspan="6">Overview of the Scope & Purpose of the UAS OPS & OPS RISK Surveys</th></tr>
<tr><th>Designation</th><th>Applicability</th><th>Activity</th><th>Operation Parameters</th><th rowspan="6">Drone Operators</th><th rowspan="6">ECAC Countries</th></tr>
<tr><td rowspan="5">UAS OPS</td><td rowspan="2">Current Situation
(in compliance with applicable regulation)</td><td>Identify the market sectors where drone flight operations are currently taking place.</td><td rowspan="4">Control Distance: VLOS, EVLOS, BVLOS

Flight Altitude: Below 500 ft (150 m) above ground level

Overflown Areas: Densely or sparsely populated areas</td></tr>
<tr><td>Identify the mission purposes of the flight operations currently taking place.</td></tr>
<tr><td rowspan="2">Near Future
1-2 years
Starting 1 Jan. 2021</td><td>Identify the market sectors where drone flight operations that are anticipated to take place (new EU drone regulation).</td></tr>
<tr><td>Identify the mission purposes of the drone flight operations that are anticipated take (new EU Drone regulation).</td></tr>
<tr><td colspan="2">Obtain limited high level feedback on current use of risk analysis methods permitting the qualification of the respondents for participation in the OPS RISK Survey.</td></tr>
<tr><td>OPS RISK</td><td colspan="4">Obtain more detailed feedback on the current use of SORA / Standard Scenarios / Predefined Risk Assessment and identify difficulties, bottlenecks & gaps.</td></tr>
</table>

UAS OPS SURVEY

RESPONDENTS

Total Quantity	247 from 22 countries						
Countries *(in order of quantity of respondents - between brackets)*	France	(64)	Belgium	(34)	Germany	(34)	Netherlands (30)
	Spain	(23)	Italy	(13)	Switzerland	(10)	UK (10)
	Ireland	(7)	Poland	(5)	Finland	(3)	Austria (2)
	Slovakia	(2)	Ukraine	(2)	Bulgaria	(1)	Denmark (1)
	Estonia	(1)	Greece	(1)	Lithuania	(1)	Portugal (1)
	Romania	(1)	Serbia	(1)			

Quality	Drone Operator (*nominally identified*)	
Category	Commercial Operators	188
	Non-Commercial Operators	59
Type	Corporate Entities (*6 sub-types*)	216
	Governmental Entities	12
	Research Organisation	5
	Association Federation, Union, TechCluster	6
	Academia	8

CURRENT SITUATION

GENERAL

1 Drone operations are taking place in all proposed Market Sectors (*except "Policy Compliance & Obtaining Legal Proof"*).

2 All proposed Flight Missions are taking place.

➔ See Tables 1 - 4 & Graphs 1 & 3 in the Annex 2.

COMMENTS

Market Sectors

1 The 10 principal Market Sectors represent 86% of the total of all drone activity.

2 The 10 Market Sectors with the lowest drone activity represent 6% of all conducted operations.

Flight Missions

The 10 principal Flight Missions represent 68% of the total of all possible flight missions.

Flight Envelopes

1 VLOS & EVLOS flights represent 59% of all flight missions.

2 41% of the respondents indicate that they conduct BVLOS missions (*besides VLOS & EVLOS*).

Flight Zones

1 9% of the missions flown are over densely populated areas.

2 45% of the flight missions are over sparsely populated areas.

3 46% of the respondents indicate that their missions are over densely & sparsely populated areas

CONCLUSIONS

1 The replies demonstrate a wide recognition of the perceived potential benefits of drone use (*commercial & non-commercial*) by corporate and governmental operators.

2 The replies are indicative of an immature market and illustrate the Market Sectors where drone-related job creation is starting to taking place.

NEAR-FUTURE (1-2 YEARS)

GENERAL

1 It is anticipated that drone flight operations will be conducted in all proposed Market Sectors.

2 All proposed Flight Missions will be taking place.

➔ See Tables 5-8 & Graphs 2 & 4 in the Annex 2.

COMMENTS

Market Sectors

1 It is anticipated that the percentage of drone flight operations taking place in the 10 principal current Market Sectors will decrease from 86% to 79**%**, which indicates that there is more activity in the other Market Sectors.

2 "Aerial Photography, Audio Visual Production, Advertising" has exchanged first position with "Construction & Real Estate". "Mining & Exploration" has replaced "Cinema & TV Industry" in the tenth position.

3 The activity volume in the following Market Sectors is anticipated to change as indicated:

- Maintenance Stable
- Agriculture, Fishery, Fish Farming, Forestry + 26%
- Research & Science + 9%
- Flight Training & Instruction» + 12%
- Construction & Real Estate» - 26%
- Security & Law Enforcement» Stable
- Public Services & Safety» Stable
- Environmental Protect. & Wildlife Conserv. - 17%

Flight Missions

1 The quantity of flight missions represented by the top ten is anticipated to remain stable.

2 The designation of the anticipated ten most conducted flight missions is relatively stable. However, it is foreseen that "Broadcasting" will be replaced by "Mapping".

Flight Envelopes

It is anticipated that the quantity of operators conducting operations with the following Flight Envelopes will change as indicated:

- VLOS - 44%
- VLOS & EVLOS + 17%
- VLOS & EVLOS & BVLOS + 66%
- EVLOS - 12%
- VLOS & BVLOS + 50%
- BVLOS + 16%
- EVLOS & BVLOS - 15%

Flight Zones

1 The quantity of drone operators concentrating on operations over densely populated areas is anticipated to remain relatively stable.

2 Logically, the anticipated decrease (- 27%) of drone operators concentrating only on flight operations over sparsely populated areas will translate into an increase (+ 27%) of drone operators conducting operations over both densely and sparsely populated areas.

CONCLUSIONS

1 The survey respondents anticipate an evolution from VLOS & EVLOS flights to BVLOS flights (61%), but VLOS & EVLOS flights will continue to be of interest for a significant number of applications (39%).

2 Consequently, the use of safety risk analysis methods will become increasingly important to a steadily growing number of drone operators.

3 This increase in BVLOS flights will create an increase in demand for services from flight training schools (+12%) and flight training sites.

SAFETY RISK ANALYSIS METHODS

GENERAL

➔ See review of survey results in Table 9 in the Annex 2.

COMMENTS

1 The extistance of the SORA is generally known, but only 53% of the respondents indicate they have read SORA.

2 76% of the respondents indicate that they have read the English edition, and 24% indicate that they have read an edition translated into their national language.
Note: The question should be asked if unreliable/inaccurate web-based translations have been used?.

3 36% of the respondents indicated that the SORA guidelines have been translated into their national language by their National Aviation Authority (NAA). However, consultation with the relevant NAAs has brought to light that none of them have translated the SORA guidelines into their native languages.

4 In most cases, the respondents obtained the SORA guidelines from a source other than EASA, JARUS or their NAA.

5 49% of the respondents indicate that they master the SORA terminology.

6 64% of the respondents state that they understand the SORA methodology.

7 35% of the respondents state they currently use SORA, but only 23% state they have submitted a SORA to their NAA.

8 The respondents currently carry out an operation safety risk assessment by means of:
- A process approved by their NAA 56%
- A Predefined Risk Assessment (PDRA) 7%
- A national standard scenario 12%
- "Another method" 23%

9 14% of the respondents use an independent third party to undertake their safety risk assessments, namely
- Qualified Entities 26%
- NAA-approved organisations/consultants 31%
- Notified Bodies 3%
- Organisations/consultants not approved by NAA (31%)

10 92% of all respondents indicated that an online tool to guide them through the establishment of a SORA would be of interest to them and 65% of them preferred to have this tool in their national language.

CONCLUSIONS

1 The SORA guidelines are currently only used by a relatively small minority of the European drone operators.

2 The knowledge of and experience with SORA permitted to qualify only 14% of the UAS OPS respondents to receive an invition to contribute to the OPS RISK survey. Only 8% actually completed the survey.

3 The use of risk assessment methods other than SORA (*e.g. nationally approved processes, national standard scenarios, predefined risk assessment*) currently has the preference of the majority of the drone operators.

4 The availability of the SORA guidelines in the national European national languages will, without any doubt, make the SORA methodology more accessible and understandable to many more operators.

5 The current situation (*SORA is only available in English - no official nor courtesy translations have been made by any NAA*) does not give the operators in each EU Member State an equal opportunity to understand and use the SORA guidelines, as the English language is not evenly mastered in all countries.

OPS RISK Survey

RESPONDENTS

Total Quantity	**Invited**:	Invited (*after qualification*): 34 *(14% of the total)*
	Replied:	20 (*8% of the total*) from 12 countries
Countries *(in order of quantity of respondents - between brackets)*		Belgium (3), Italy (3), Netherlands (3), Bulgaria (2), Poland (2), France (1), Germany (1), Ireland (1), Spain (1), Sweden (1), Switzerland (1), UK (1)
Quality		Drone Operator (*nominally identified*)
Category		Commercial Operators 75% Non-Commercial Operators 25%
Type		Corporate Entity - Drone Operator 35% Corporate Entity - Drone Manufacturer & Operator 25% Corporate Entity - Flight School 15% Corporate Entity - Research 15% Governmental Entity - Drone Operator 10%

GENERAL

1 The very low amount of (*pre-qualified*) respondents (*8% of the total*) clearly indicates that SORA is not widely understood & used.

2 National Standard Scenarios (STS) and Predefined Risk Assessment (PDRA) and "other means" seem to be the preferred operation safety risk assessment methods.

➔ See Table 10 in the Annex 2.

COMMENTS

1 There is consensus relative to the interest of having a Light UAS Operator Certificate (LUC).

2 85% of the respondents indicated being conversant in English and understanding the SORA terminology.

3 On average, 91% of the respondents indicated to be aware of the requirements in their country relative security, privacy & data protection, environmental protection, and the use of the radio frequency spectrum.

4 55% of the respondents have drawn up a ConOps, used national standard scenarios and conducted a SORA.

5 On average, 70% of the respondents indicate that they can conduct a SORA for each of their missions and are capable of applying GRC and ARC miligations.
Note: The respondents have a minimal understanding of the application of standards.

6 25% of the respondants have used a Predefined Risk Assessment, and only 10% have used an EU standard scenario.

7 20% of the respondents indicate that they can detect other aircraft in uncontrolled airspace.

8 80% of the respondents indicate that they report drone incidents.

9 Practically all respondents use third parties when required by the OSOs.

10 In the context of SORA, the highest score for standards used (25%) is attributed to EUROCAE.

11 The responents indicate that they have experienced difficulties with the following:
- Showing compliance with the safety objectives due to an absence of standards (or knowledge of the standards) 40%
- Operational Safety Objectives (OSOs) 100%
- Strategic mitigations 88%
- Technical information to be obtained from the drone manufacturer 88%

12 The respondents indicated that their operations were associated with:

SAIL 1	20%	SAIL 2	40%	SAIL 3	25%	SAIL 4	5%
SAIL 5	5%	SAIL 6	5%	SAIL 7	5%	Not known	**55%**

13 The respondents indicated that they can currently demonstrate compliance up to the following levels:

SAIL 1	15%	SAIL 2	35%	SAIL 3	20%	SAIL 4	20%
SAIL 5	10%	SAIL 6	5%	SAIL 7	5%	Not known	**45%**

CONCLUSIONS

1 Whereas English is the "lingua franca" of the European and international aviation community, this is not the case in the European drone operator community (*constituted by a majority of micro companies & SMEs/SMIs*). There are wide variations in the English language competencies between the drone operators in the EU Member States. This situation could lead to unequal opportunities for drone operators in different countries, which in turn could have a

negative influence on the sector's job creation potential.
Note: The EU drone regulation does not impose a minimal level of English competency.

2 The possibility to access EU airspace should be equal for all qualified drone operators in all EU Member States. However, this is not the case when a large segment of the European drone operator community cannot grasp and comprehend the Acceptable Means of Compliance (AMCs) (*e.g. SORA*), because they have not been translated into the EU national languages. It is standard EASA procedure that the translation of AMCs into the national EU languages is left up to the discretion of the NAAs.
Note:
- If such documents are not made available to drone operators in their national languages, this could negatively impact the development of the EU drone market, as well as its job creation potential.
- In an ideal situation, making the referred to documents available in the EU national languages would be taken on by the national drone associations, but unfortunately they lack the resources for this task.

3 The NAAs of the EU Member States do not have the resourses (*and possibly, in some cases, the translators with the necessary competence*) to undertake the task of translating AMCs, Guidance Material (GM) and other critical documents (*e.g. the "Easy Access Rules for UAS"*) into their national language(s).

4 The same difficulty will arise concerning the access to and comprehension of the required standards, as most Standard Developing Organisations (SDOs) only publish standards in English.

5 In view of the aforementioned, it is anticipated that the use of independent third parties to conduct SORAs, and apply GRC mitigation & ARC mitigation strategies, will increase.

6 The aforementioned reinforces the potential for online tools (*in the EU languages*) to facilitate the safety risk analysis procedures for drone operators.

7 An additional reason for the anticipated increase in the demand for services by independent third parties (*Qualified Entities / Conformity Assessment Bodies / Notified Bodies*) is that the volume of work involved in the fields relative to Training, Airworthiness, Operations Manual qualification can only in some rare cases be taken on by the NAAs.

8 Currently, the actual use of standards is minimal. The necessity to use standards will increase with the increase of drone operations in the specific category. Independent third parties can be expected to have access to the required standards, which implies that their clients (*drone operators*) would not have to purchase the standards from the SDOs.

9 The identication by drone operators of the standards applicable (*partially or in their totality*) to a specific mission, in the context of:
- Showing compliance with the safety objectives of a specific mission
- Operational Safety Objectives (OSOs)
- Strategic mitigations

is currently problematic for all drone operators.
Note: The standards applicable to the open category are currently expected by December 2021.

10 Obtaining the required technical information from drone manufacturers is currently problematic for most drone operators. Manufacturers simply do not answer requests, or refuse to give the information.

11 Practically all respondents indicate they have encountered difficulties with:
- Complying with OSOs
- Strategic mitigations

12 On the average, 50% of the respondents do not know:
- To what SAIL level their drone operations are associated.
- Up to what SAIL level they can demonstrate compliance.

13 80% of the respondants consider that the detection of other aircraft in uncontrolled airspace (*< 500 ft*) is currently impossible.

1 The drone operators expect drone flight missions to increase in all market sectors. This increase is principally foreseen for BVLOS missions in the specific category. To make this possible and maintain, if not increase, the current volume of jobs in these market sectors, the following will have to be improved:

- Grasp and comprehension of the applicable operational risk analysis methods;
- Availability & acceptance of:
  - ♦ Independent third parties; and/or
  - ♦ Online tools to facilitate the safety risk analysis procedures;
- Availability & comprehension of the required standards;
- Availability of the required technical information from the relevant drone manufacturers/ distributors;
- Detection of other aircraft in uncontrolled airspace.

2 The AW Drones "Open Standards Repository" will facilitate the identification of applicable standards, which is going to be useful to:

- English speaking drone operators,

but also, and especially, for:

- "Independent third parties" (*Qualified Entities / Conformity Assessment Bodies / Notified Bodies*), which will probably be growing in importance.

ANNEX 1

SURVEY RESPONDENTS (Contriobuting Operators)

@ye.filmsbretagne-vidéos.fr	France
360images.be	Belgium
Actibot	Belgium
Actua Drone	France
AEA Energy	Ireland
Aerial Pictures	France
Aerial Ventures	Denmark
Aero Enterprise	Austria
Aeromedias	France
Aero Pyxis	France
Aéro-Nautic Formation	France
Aertec Solutions	Spain
African Drone Forum	UK
Air Drone Melide	Spain
Air Mobility by Setec	France
Airbus Defence and Space	Germany
Alpha Link Engineering	Germany
Altametris	France
Alticlip.fr	France
Altinime	France
Alto Drones	Italy
AML Technology	UK
ANWB Medical Air Assistance	Netherlands
AOZ-LFPM	France
Applied IPR	UK
Association À l'OuestImages	France
ATE Akademie/ Drone Safety	Germany
Atechsys	France
Athanor	France
Atlantique Expertises Drones	France
Atmoview Drone - AniWalls Production	Belgium
AuG Kiel	Germany
Autonomous Flight Technology	Romania
AVCA Logistics	Spain
AVR Ingénierie	France
Avtrain	Ireland
Azur Drones	France
BAM Galère	Belgium
bavAIRia	Germany
BE Drone & Engineering	Belgium
Bionic Eye (The)	UK
Boskalis Nederland	Netherlands
Bouygues E&S EnerTrans	Switzerland
Bureau de géomètres - Experts Morimont	Belgium
BVdrone	Finland
BVL de Winter	Netherlands
Calepsum Aeronautics	France
Capture4cad	France
CARAH	Belgium
Casper Smit Fotografie	Netherlands
Centre de formation Olivier Careau-EspaceModélismeArgelesSur Mer	France
Centre Drones Services	France
City of Jyväskylä	Finland
Civil Aviation Authority	Poland
Cofferon - Self Employed	Ireland
Colibrex	Germany
Condor IMS	Germany
Copter Squad UAS UG	Germany
Copterphot	Switzerland
D3E Electronique	France
Dany Starck	Belgium
DB Engineering & Consulting	Germany
Dcomdrone by DProds	France
DELAIR	France
Delta Advice	Germany
Delta Perspectives	Belgium
DeltaCopter / European Drone School	Belgium
Doks Innovation	Germany
Domdrone	France
Drona InTheAirForYou	Spain
Drone Class	Netherlands
Drone Déjà Vu	Netherlands
Drone Effect	France
Drone Engineering	France
Drone et Patrimoine	France
Drone Euskadi	Spain
Drone Photo and Video Services	Ireland
Drone R'Gie	Belgium
Drone Supervision	France
Drone2vues	France
Dronea	France
Drone Dreams!	Netherlands
Dronewatch	Netherlands
Dronify	Netherlands
Droning You	Spain
Dronivo	Germany
Dronotique	France
Dronude	Netherlands
Dunareade Jos University of Galati	Serbia
Dutch Filmgroup	Netherlands
Eagle Drones UK	UK
EBS Construction	Ireland
ecdrone	Italy
E-Drone-Tech	France
Emerald Style Company	Ireland
ENAC - EcoleNationalede l'AviationCivile	France
Engie	France
Eska Drones	France
ESSP - SAS	Spain
ESTACA	France
EuroUSC-Benelux	Belgium
Faculty of Aeronautics	Slovakia
FADA-CATEC	Spain
FADA-CATEC - Atlas Test Range	Spain
Fellner Organisation	Poland
Ferrovial	Spain
Feuerwehr	Germany
FG Services Aériens	France
FHU eMPiPiotr Małecki	Poland
Firefighter Department Trento	Italy
Flying Manta	France
FlyNex	Germany
Flyover di Vania Di Francesco	Italy
Forstliche Versuchs & Forschungsanstalt Baden-Wuerttemberg	Germany
Fotokite	Switzerland
Fotostudio Stebler	Switzerland
France Survol	France
Fraunhofer IFAM	Germany
Freiwillige Feuerwehr Hechingen	Germany
FuVeX	Spain

Geo Infra	Netherlands
Geodron Solutions	Spain
Georesearch Forschungsgesellschaft	Austria
GEOsat	Germany
GeoTech	Belgium
GeoZICHT - Drone Projecten	Netherlands
Germandrones	Germany
Goldy Aviations	Belgium
Gran Sasso Science Institute	Italy
Grijs Groen Advies	Netherlands
HD for YOU	Belgium
Heijdens Karwei Producties	Netherlands
Heliseo SAGL	Switzerland
Henri Coanda Labs	Italy
Hit & Run	Belgium
Hivebotics	France
Holding The Drones	Netherlands
Hubschrauberzentrum	Germany
IAV	Germany
ID2MOVE	Belgium
ILT - Human Environment & Transport Inspectorate	Netherlands
Insensiv	Germany
Instadrone Pau	France
Interconsulting	Italy
ISE	Spain
KEMEA	Greece
Knuckles5	Ukraine
Koetter Group	Germany
Kolordrone	France
Kopter-Profi	Germany
Kragten	Netherlands
Lancs Fire Service	UK
Leica Geosystems	Germany
Leitek Innovative Solutions	Portugal
Leondron	Spain
Liebenau Gebäude- & Anlagenservice	Germany
Live Emotions Studio	Belgium
Logiroad	France
Luchtbeeld.nl	Netherlands
Lukas	France
LZCreation	Belgium
Martin Detry	Belgium
Martin Keydel - Aerial Karlsruhe	Germany
MB-Drones	Netherlands
MD Drone	Belgium
Minute Drone	France
National Aviation University	Ukraine
Neva Aerospace	France
NLR - Netherlands Aeropace Centre	Netherlands
NOI Techpark	Italy
Oasis	UK
Oceansport Limited	Ireland
Office National des Forêts	France
OO-Drones	Belgium
Origin Stories	Netherlands
Paisajes Gallegos	Spain
Pascal Themans Productions	Belgium
Perlaux Graphics	Belgium
Phoenix Aerial	Italy
Pilgrim Technology	France
Pix-D	Belgium
PixxelAIR	Germany
PJF Drone	Spain
Prodrones	France
Realizacja Obrazu Marcin Kules	Poland
Rijkswaterstaat	Netherlands
Rijkswaterstaat	Netherlands
RM Drones	Spain
Roberto Pavoni	Italy
Rohner Bedachungen & Spenglerei	Switzerland
Rotterdam Brands and more	Netherlands
RPAS Services	Netherlands
Rusca	Italy
Rutger Lamers Fotoreportages	Netherlands
SATS	Finland
SBB CFF FFS - Swiss Federal Railways	Switzerland
Scandrone	France
SDIS - Service Départemental d'Incendie et de Secours 11	France
SDIS - Service Départemental d'Incendie et de Secours 58	France
Seateam Aviation	France
Securitas Belgium	Belgium
Shetland Flyer Aerial Media	UK
Siemens	Germany
Silent Wings	Germany
Silesian Aviation Cluster	Poland
Sky4D	Belgium
Skycorp	Estonia
SkyFun	Belgium
Skyledrone	Netherlands
Skyline	Italy
Snowdrop UAS	UK
SOTREFI	Belgium
Space53	Netherlands
Space Factory	Spain
Sport Turf Consulting	Italy
Star Engineering	France
Stichting Kenniscentrum Reeën	Netherlands
STRABAG	Germany
SupAirVision	France
SVZD - Swiss Federation of Civil Drones	Switzerland
Tech Drone Audiovisual Services	Spain
Technical University of Košice	Slovakia
Techn. Hochschule Ostwestfalen-Lippe	Germany
Télépilote	France
Tethered Drone Systems	UK
Thales Avionics	France
Thales AVS	France
Thrust Intelligent UAV Systems	Lithuania
Thyssengas	Germany
Tomedia	Belgium
UAS Consulting	Belgium
UAV Navigation	Spain
UAV Works Group	Spain
Universal Drone	France
Universität Rostock	Germany
Université de Liège	Belgium
Unmanned Systems Bulgaria	Bulgaria
Vecteur Tech	France
Visiodrone	Belgium
VisioFly	France
Visual Sky	Switzerland
Webinfomd	Belgium
Yannick Andrea	Switzerland
Zangano	Spain
Zenit Drones	Spain
Zetta Drones	France
Zipline	France

ANNEX 2

UAS OPS - CURRENT SITUATION

Table 1 - Principal Market Sectors		
1	Construction & Real Estate	13,31%
2	Maintenance	11,94%
3	Aerial Photography, Audio-Visual Production, Advertising	11,63%
4	Security & Law Enforcement	8,11%
5	Research & Science	7,39%
6	Agriculture, Fishery, Fish Farming, Forestry	6,85%
7	Public Services & Safety	6,56%
8	Environmental Protection & Wildlife Conservation	6,15%
9	Flight Training / Instruction	5,43%
10	Cinema & TV Industry	4,27%
Jointly representing 86% of the total		

Table 2 - Principal Flight Missions		
1	Aerial Photography & Film / Video Footage	14,48%
2	Inspection	11,16%
3	Surveying	7,12%
4	Monitoring	6,75%
5	Observation	5,60%
6	Localisation	5,51%
7	Measuring	5,26%
8	Testing	5,21%
9	Broadcasting	3,73%
10	Validation	3,31%
Jointly representing 68% of the total		

Table 3 - Flight Envelopes	
VLOS	48,26%
EVLOS	2,05%
BVLOS	10,51%
VLOS & EVLOS	8,62%
VLOS & BVLOS	10,41%
EVLOS & BVLOS	0,67%
VLOS & EVLOS & BVLOS	19,49%
In percentage of the total of the flight operations conducted	

Table 4 - Flight Zones	
Densely Populated	8,84%
Sparsely Populated	45,07%
Densely & Sparsely Populated	46,09%

UAS OPS - NEAR-FUTURE (1-2 years)

Table 5 - Principal Market Sectors		
1	Aerial Photography, Audio-Visual, Production, Advertising	12,09%
2	Maintenance	11,92%
3	Construction & Real Estate	9,77%
4	Agriculture, Fishery, Fish Farming, Forestry	8,61%
5	Security & Law Enforcement	8,10%
6	Research & Science	8,02%
7	Public Services & Safety	6,29%
8	Flight Training / Instruction	6,06%
9	Environmental Protection & Wildlife Conservation	5,10%
10	Mining & Exploration	3,37%
Jointly representing 79% of the total		

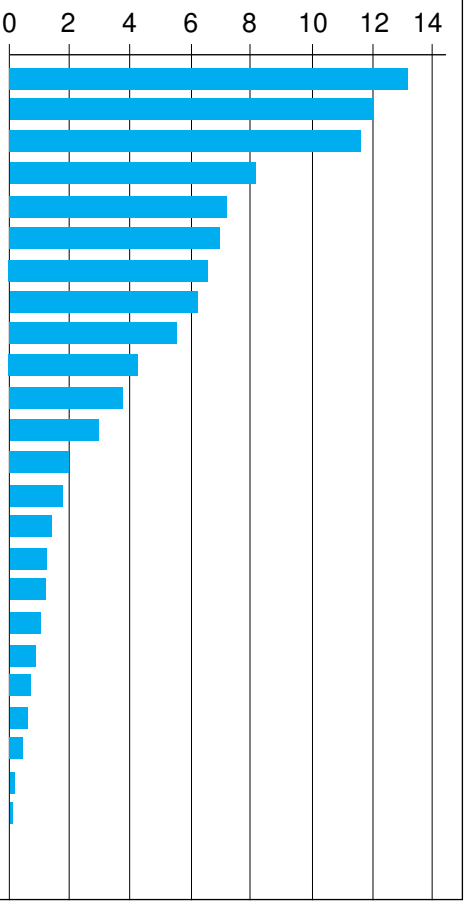
Table 6 - Principal Flight Missions		
1	Aerial Photography & Film/Video Footage	12,49%
2	Inspection	10,59%
3	Monitoring	7,53%
4	Surveying	7,10%
5	Localisation	5,79%
6	Measuring	5,62%
7	Observation	5,48%
8	Testing	4,72%
9	Validation	4,35%
10	Mapping	3,47%
Jointly representing 67% of the total		

Table 7 - Flight Envelopes	
VLOS	27,12%
EVLOS	1,81%
BVLOS	12,20%
VLOS & EVLOS	10,06%
VLOS & BVLOS	15,59%
EVLOS & BVLOS	0,57%
VLOS & EVLOS & BVLOS	32,66%
In percentage of the total of the anticipated flight operations	

Table 8 - Flight Zones	
Densely Populated	8,79%
Sparsely Populated	32,97%
Densely & Sparsely Populated	58,24%

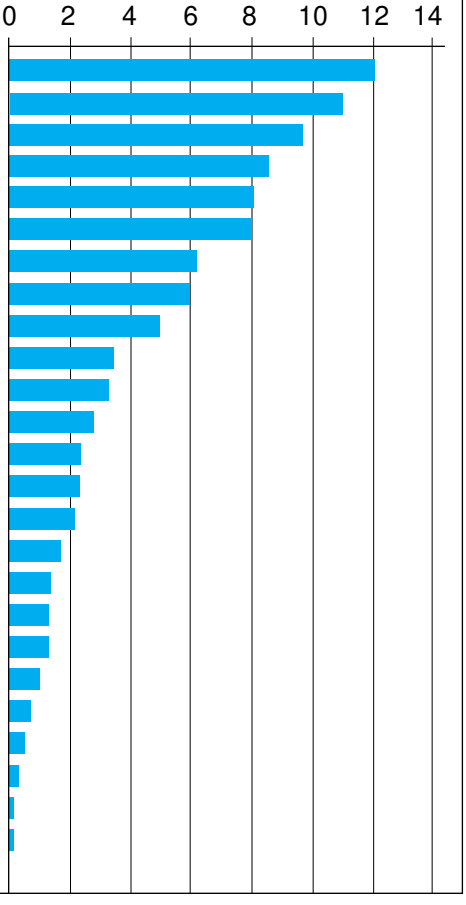
Graph 1 - Market Sectors - CURRENT

1	Construction & Real Estate	13,31%
2	Maintenance (all sectors)	11,94%
3	Aerial Photography, Audio-Visual, Production, Advertising	11,63%
4	Security & Law Enforcement	8,11%
5	Research & Science	7,39%
6	Agriculture, Fishery, Fish Farming, Forestry	6,85%
7	Public Services & Safety	6,56%
8	Environmental Protection & Wildlife Conservation	6,15%
9	Flight Training / Instruction	5,43%
10	Cinema & TV Industry	4,27%
11	Mining & Exploration	3,84%
12	Aircraft System or Sub-system Production	2,96%
13	Utility Companies (Public & Private)	2,06%
14	Remote Operations - Non-Sensing	1,88%
15	Entertainment, Artistic Expression & Sport	1,47%
16	Heritage Site & Historical Monument Management	1,31%
17	Humanitarian Aid	1,29%
18	Transport	1,11%
19	Remote Operations - Sensing	0,80%
20	Miscellaneous - Demonstration	0,64%
21	Insurance (Accident & Claim Investigation)	0,46%
22	News Gathering & Broadcasting	0,39%
23	Miscellaneous - Air Show	0,10%
24	Miscellaneous - Ferry/Positioning	0,05%
25	Policy Compliance & Obtaining Legal Proof	0,00%
	Total	100,00%



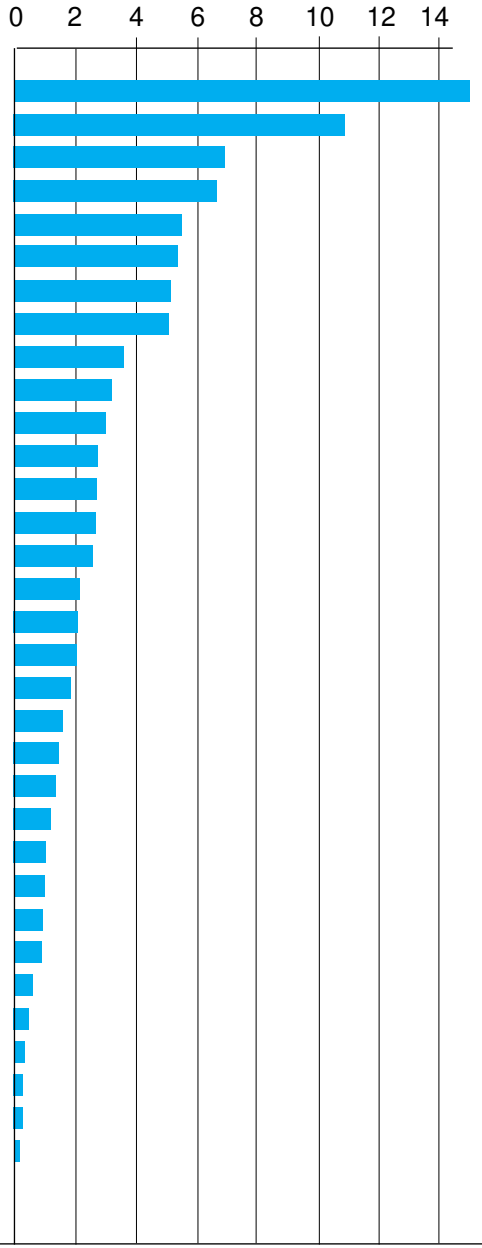
Graph 2 - Market Sectors - NEAR FUTURE

1	Aerial Photography, Audio-Visual, Production, Advertising	12,09%
2	Maintenance (all sectors)	11,92%
3	Construction & Real Estate	9,77%
4	Agriculture, Fishery, Fish Farming, Forestry	8,61%
5	Security & Law Enforcement	8,10%
6	Research & Science	8,02%
7	Public Services & Safety	6,29%
8	Flight Training / Instruction	6,06%
9	Environmental Protection & Wildlife Conservation	5,10%
10	Mining & Exploration	3,37%
11	Cinema & TV Industry	3,23%
12	Aircraft System or Sub-system Production	2,75%
13	Utility Companies (Public & Private)	2,38%
14	Remote Operations - Non-Sensing	2,32%
15	Heritage Site & Historical Monument Management	2,13%
16	Transport	1,70%
17	Humanitarian Aid	1,28%
18	Entertainment, Artistic Expression & Sport	1,22%
19	Insurance (Accident & Claim Investigation)	1,22%
20	Remote Operations - Sensing	0,96%
21	Miscellaneous - Demonstration	0,60%
22	News Gathering & Broadcasting	0,40%
23	Policy Compliance & Obtaining Legal Proof	0,34%
24	Miscellaneous - Air Show	0,11%
25	Miscellaneous - Ferry/Positioning	0,03%
	Total	100,00%



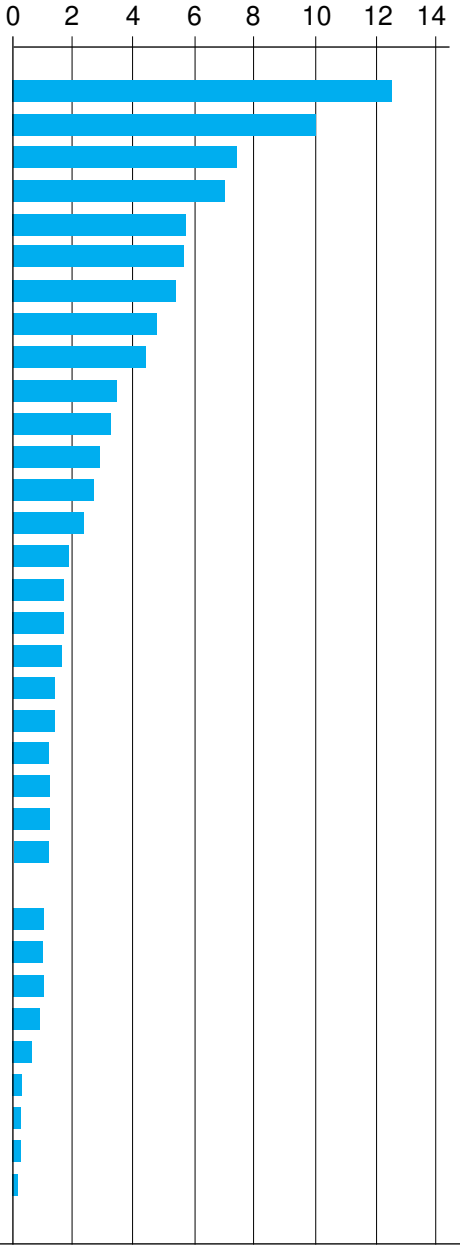
UAS OPS - FLIGHT MISSIONS - CURRENT & NEAR-FUTURE

Graph 3 - Flight Missions
CURRENT



1	Aerial Photography & Film / Video Footage	14,48%
2	Inspection	11,16%
3	Surveying	7,12%
4	Monitoring	6,75%
5	Observation	5,60%
6	Localisation	5,51%
7	Measuring	5,26%
8	Testing	5,21%
9	Broadcasting	3,73%
10	Validation	3,31%
11	Mapping	2,91%
12	Spotting	2,86%
13	Relief Flight	2,79%
14	Security	2,77%
15	Identification	2,72%
16	Surveillance	2,13%
17	Search & Rescue	2,13%
18	Tracking	2,04%
19	Sensing	1,80%
20	Aerobatics, Special Effects & Sport	1,67%
21	Manipulation	1,64%
22	Dispensing	1,44%
23	Special Purpose	1,31%
24	Patrolling	1,27%
25	Advertising	1,16%
26	Transport - Goods	1,09%
27	Exploration	0,73%
28	Deterring	0,54%
29	Spraying	0,36%
30	Transport - Persons	0,21%
31	Sky Writing	0,18%
32	Sky Painting	0,13%
33	Water Bombing	0,05%
	Total	100,00%

Graph 4 - Flight Missions
FUTURE



1	Aerial Photography & Film / Video Footage	12,49%
2	Inspection	10,59%
3	Monitoring	7,53%
4	Surveying	7,10%
5	Localisation	5,79%
6	Measuring	5,62%
7	Observation	5,48%
8	Testing	4,72%
9	Validation	4,35%
10	Mapping	3,47%
11	Identification	3,24%
12	Search & Rescue	2,84%
13	Broadcasting	2,73%
14	Spotting	2,36%
15	Surveillance	1,91%
16	Sensing	1,82%
17	Manipulation	1,82%
18	Dispensing	1,71%
19	Tracking	1,54%
20	Transport - Goods	1,51%
21	Security	1,45%
22	Spraying	1,42%
23	Special Purpose	1,41%
24	Relief Flight	1,39%
25	Aerobatics, Special Effects & Sport	1,17%
26	Deterring	1,00%
27	Advertising	0,94%
28	Patrolling	0,89%
29	Exploration	0,69%
30	Water Bombing	0,34%
31	Sky Painting	0,29%
32	Sky Writing	0,29%
33	Transport - Persons	0,23%
	Total	100,00%

UAS OPS - SAFETY RISK ASSESSMENT

Table 9 - Review of Respondent Replies (*in % of the total*)

Has heard of SORA:	81%
Knows what SORA is:	69%
Possesses an electronic copy:	45%
- Has read the English version:	76%
- Has read a translated edition:	24%
Has obtained the SORA guidelines from:	
- EASA web site:	17%
- JARUS web site:	3%
- Its NAA web site:	11%
- Another source:	59%
Its NAA has translated SORA:	37%
Its NAA is in process of translating:	33%
Does not understand the SORA terminology:	51%
Understands the SORA methodolgy:	64%
Currently uses SORA:	35%
Has submitted a SORA to its NAA:	25%

Uses safety risk assessment method (other than SORA):	
- Process approved by its NAA:	56%
- National standard scenario	12%
- Predefined Risk Assessment (PDRA)	7%
- Other means:	23%
Uses a third party to produce safety risk assessment:	14%
Type of third party used:	
- Qualified Entity:	26%
- Notified Body:	3%
- Organisation/Consultant	
• NAA-approved:	31%
• Not-NAA approved:	31%
Would favor an online tool to produce SORA:	92%
Desired language of online SORA tool:	
- National languange:	66%
- English is acceptable:	34%

OPS RISK SURVEY

Table 10 - Review of Respondent Replies *(in % of the total)*

Company/organisation:	
- Has a LUC:	20%
- Plans to apply for a LUC:	75%
Company/organisation conversant in English:	85%
All SORA-related terms are understood:	85%
Is aware of requirements applicable to:	
- Security:	85%
- Privacy & data protection:	100%
- Environmental protection:	95%
- Use of radio frequency spectrum:	85%
Has already:	
- Drawn up a ConOps:	55%
- Used a national standard scenario:	55%
- Used an EU Standard Scenario (STS):	10%
- Used a Predefined Risk Assessment:	25%
- Conducted a SORA:	55%
Is capable of:	
- Conducting a SORA for each mission:	70%
- Applying GRC mitigation strategies:	76%
- Applying ARC mitigations	78%
ARC mitigation measures - Application of standards produced by:	
- RTCA SC-228:	15%
- EUROCAE WG-105:	15%
- ASD-STAN:	10%
Detection of other aircraft in the operational airspace volume:	
- ADS-B:	45%
- FLARM:	10%
- Transponder:	15%
- 4G/5G-based solution:	20%
- Web-based tracking system:	40%
- Other:	35%
Can detect all other air traffic in uncontrolled airpsace:	20%
Drone incidents are reported:	80%
Third parties used when required by the OSO:	
- National Aviation Authority (NAA):	75%
- Organisation approved by NAA:	20%
- Organisation not approved by NAA:	5%
- None:	20%

Entities allowed to authorize drone operations based on SORA:	
- Qualified Entity - Training	40%
- Qualified Entity - Airworthiness	30%
- Qualified Entity - Ops Manual	45%
- Conformity Assessment Body - Training:	0%
- Conformity Assessment Body - Airworthiness	5%
- Conformity Assessment Body - Ops Manual	5%
- Notified Body - Training	5%
- Notified Body - Airworthiness	15%
- Notified Body - Ops Manual	15%
- U-Space Service Provider - Training	5%
- U-Space Service Provider - Airworthiness	10%
- U-Space Service Provider - Ops Manual	15%
From which Standard Development Organisation do you use standards to demonstrate compliance:	
- EUROCAE	25%
- ICAO	20%
- EUROCONTROL	20%
- ASD-STAN	15%
- CEN	10%
- ISO	10%
- ANSI	5%
- ETSI	5%
- RTCA	5%
- Other	40%
Has encountered difficulties to show compliance with required safety objectives due to lack of standards:	40%
Has encountered difficulties relative to the following:	
- Operational Safety Objective (OSO)	100%
- Strategic mitigations	88%
- Technical drone information (manufacturer)	88%

Drone operations associated to SAIL level:

- SAIL 1	20%	- SAIL 5	5%
- SAIL 2	40%	- SAIL 6	5%
- SAIL 3	25%	- SAIL 7	5%
- SAIL 4	15%	- Not known	55%

Currently compliance can be demonstrated up to SAIL level:

- SAIL 1	15%	- SAIL 5	10%
- SAIL 2	35%	- SAIL 6	5%
- SAIL 3	20%	- SAIL 7	5%
- SAIL 4	20%	- Not known	45%

EUROPEAN UAS OPERATIONS
&
OPERATION RISK ASSESSMENT METHODS

Funded By The European Union

In The Context Of The Horizon 2020 Programme

U-SPACE INSIGHT

Survey
On the Perception of U-space

CONCLUSIONS

AW DRONES

Funded By The European Union

In The Context Of The Horizon 2020 Programme

Produced by
Blyenburgh & Co
France

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SURVEY SCOPE, OBJECTIVE & CONDITIONS

SURVEY ORGANISATION

This survey has been created and conducted by Blyenburgh & Co, a private company registered with the Chamber of Commerce in Paris, France, and established at 86 rue Michel Ange, FR-75016 Paris, France - Tel.: 33-1-46.51.88.65 - www.rps-info.com & www.rpas-regulations.com.

This survey was carried out in the context of the AW-Drones Project (www.aw-drones.eu), which is co-funded by the European Union (EU). Blyenburgh & Co is a participant in the AW-Drones Project.

SURVEY OBJECTIVE

The objective of this survey was to

- Evaluate the comprehension of U-space and its relevant services in the Single European Sky (SES) Member State area (and the knowledge level & the expectations of the stakeholders)
- Obtain an opinion on the technical standards required to support U-space implementation
- Identify possible bottlenecks & gaps
- Scope the possible pre-occupations of stakeholders concerning U-Space and its implementation
- Check on the U-space implementation status

COUNTRIES CONCERNED

This survey is aimed at the UAS / RPAS / Drone community principaly in the following countries: Albania, Armenia, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia,Faroe Islands, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom.

Respondents in other countries were also invited to participate.»

NON-ATTRIBUTION OF RESPONSES

The survey responses supplied will not be nominally attributed to the companies/organisations having supplied them.

RECOGNITION OF CONTRIBUTION

A list of names of all companies & organisations having contributed to the survey, and the countries where they are established, is part of this final report.

PUBLICATION OF RESULTS

The conclusions of this survey are being made publically available on a no-cost basis to all interested parties. They are published on www.rps-info.com & www.aw-drones.eu.

DISSEMINATION

The notification of this survey and the invitations to contribute to it were disseminated by Blyenburgh & Co making use of its database and social media, as well as by specialized blogs (UAS Vision, Unmanned Airspace), and various UAS / RPAS / Drone community stakeholders

CONFIDENTIALITY

Personal contact information provided in response to this survey (hereinafter “Personal Data”) will only be processed for the survey within the limits of the survey’s purpose.

Data processing was performed by Blyenburgh & Co and its staff, which was instructed to observe the rules of this confidentiality clause.

Personal Data will not be transmitted to any entity for any purpose whatsoever. Persons having completed this survey may at all times request Blyenburgh & Co (pvb@rps-info.com) to have their Personal Data deleted from its database for any future use by addressing an email with “Delete from database” in the subject box, and indicating their family name, first name & company/organisation as the message text. Non-personal data shall not be subject to such deletion requests. Persons having supplied their contact details can, at all times, obtain a copy of the information concerning them that is registered by Blyenburgh & Co and rectify it by addressing a simple written request to Blyenburgh & Co, 86 rue Michel Ange, FR75016 Paris, France (pvb@rps-info.com).

This statement is in accordance with the EU General Data Protection Regulation (GDPR), which entered into force on May 15, 2018.

REFERENCE DOCUMENTS

For the convenience of the respondents, the following documents were accessible at each step of the survey:

- U-Space Insight Survey – Terms & Explanations - 210104
- EC Draft EU-923-2012 - SERA.6005 - U-space Amendment - 210303
- EC Draft EU-COM – Implementing Regulation – U-space Act - 210303
- EC Draft EU-COM – Implementing Regulation – U-space Act - Annex - 210303

TERMS & EXPLANATIONS

In the context of the "U-space Insight" survey the following terms and explanations apply.

UAS - (ICAO explanation)
''Unmanned Aircraft System'' (UAS) is an aircraft and its associated elements which are operated with no pilot on board.

UAS Operator - (ICAO explanation)
''UAS Operator'' is a person, organization or enterprise engaged in or offering to engage in an aircraft operation.

U-space - (SESAR JU explanation)
''U-Space'' is a set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of drones. As such, U-space is an enabling framework designed to facilitate any kind of routine mission, in all classes of airspace and all types of environment - even the most congested - while addressing an appropriate interface with manned aviation and air traffic control. The SESAR Joint Undertaking blueprint proposes the implementation of 4 sets of services to support the EU aviation strategy and regulatory framework on drones:

U1: U-space foundation services covering: e-registration, e-identification, and "pre-tactical" geo-fencing.

U2: U-space initial services for drone operations management: "tactical" geo-fencing, flight planning management, weather information management, tracking, monitoring, drone aeronautical information management, procedural interfacing with conventional air traffic control, emergency management, strategic de-confliction.

U3: U-space advanced services supporting more complex operations in dense areas such as de-confliction (assistance for conflict detection), dynamic geo-fencing, automated detect and avoid functionalities, collaborative interface with ATC, tactical de-confliction, dynamic capacity management.

U4: U-space full services, offering very high levels of automation, connectivity and digitalisation for both the drone and the U-space system.

UAS Geographical Zone - Source: Implementing Regulation (EU) 2020/639 (amending Implementing Regulation (EU) 2019/947), Article 2: Definitions, point (4)
''UAS geographical zone'' is a portion of airspace established by the competent authority that facilitates, restricts or excludes UAS operations in order to address risks pertaining to safety, privacy, protection of personal data, security or the environment, arising from UAS operations.

U-Space Services - Source: The most recent edition of the U-space draft

- **Network Identification Service**
  A network identification service should provide the identity (registration number) of UAS operators and geo-location & serial number of UAS during operations and in contingency situations, and share relevant information with other U-space airspace users.
- **Geo-awareness Service**
  A geo-awareness service should provide UAS operators with the information about the latest airspace constraints and defined UAS geographical zones information made available as part of the common information services.
- **UAS Flight Authorisation Service**
  A flight authorisation service should ensure that authorised UAS operations are free of intersection in space and time with any other notified flight authorisations within the same U-space airspace.
- **Traffic Information Service**
  A traffic information service should alert UAS operators about other air traffic that may be present in proximity to their UAS.
- **Weather Information Service**
  A weather information service should support the UAS operator during the flight planning and execution phases, as well as improve the performances of other U-space services provided in the U-space airspace.
- **Conformance Monitoring Service**
  A conformance monitoring service shall enable the UAS operators to verify whether they comply with the operator requirements and the terms of the flight authorisation. To this end, it shall alert the UAS operator when the flight authorisation deviation thresholds are violated and when the operator requirements are not complied with by the same UAS operator.

Service Providers

There are two types of service providers:

Common Information Service Provider (CISP)

Member States may designate a single Common Information Service Provider (CISP) to supply the common information services on an exclusive basis in all or some of the U-space airspaces under their responsibility. The CISP will support the exchange of information and the coordination between U-space service providers and air traffic service providers, without discrimination, to enable the safe management of unmanned aircraft traffic and segregation of manned aircraft from unmanned aircraft.

U-space Service Provider (USSP)

U-space service providers will act as gateway with U-space for UAS operators, they will provide at least the following minimum mandatory U-space services: a network identification service, a flight authorisation service, a geo-awareness service, and a traffic information service. UAS operators subject to U-space regulation may only operate in U-space airspace if they use the mandatory U-space services that are indispensable to ensure safe, secure and efficient operations.

TARGETED PARTICIPANT CATEGORIES

1. **Aeronautical Information Service** (AIS) **Provider** (e.g. conformance monitoring, geo-awareness, flight autorisation, network identification, weather information)
2. **Air Navigation Service Provider** (ANSP)
3. **ATM/UTM/U-space software development companies** (not supplying services to UAS operators with the software dfeveloped by them)
4. **Common Information Service Provider** (CISP) *(Prospective)*
5. **Communication Service Provider** (e.g. mobile network, satellite communication)
6. **Conformity Assessment Body** (private or public, commercial or not-for-profit entity, national standards bodies, trade association, consumer organisations, organisations that undertake conformity assessment activities (e.g. testing, inspection, certification) in accordance with national regulations
7. **Consultancy specialized in safety risk assessment** (SORA, PDRA, STS), and selling their services to UAS operators, and approved by their national aviation authority (NAA)
8. **UAS Manufacturer / Integrator**
9. **UAS Manufacturer / Integrator & Operator** [commercial – all aircraft types & all flight mission purposes].
10. **UAS Operator [commercial & non-commercial** – all aircraft types - **all flight mission purpose categories (except transport of cargo & persons)**]
11. **UAS Operator** [commercial & non-commercial – all aircraft types - **Transport of cargo & persons**]
12. **General Aviation** (GA) (manned aviation e.g. sport & leisure activities: pilots of balloons, gliders, ultralights; aerial work operators; business aviation; & related associations)
13. **Commercial Manned Aviation** [airlines (passenger & freight carriers; air taxi operators); pilots; related associations).
14. **National Aviation Authority** (NAA) - Regulatory authorities (ministry, directorate, CAA, inspectorate) - National & regional level
15. **Local Authority** (e.g. city/municipality, harbour) & regional authority (e.g. France: department; Germany: Länder; Spain: region; Italy: province/region; Netherlands: province)
16. **Notified Body** (organisation designated by EU country to assess product conformity)
17. **Qualified Entity** (QE) (an entity to which a specific certification task is allocated by and under control of a national aviation authority or EASA)
18. **Standard Development Organisation** (SDO) (national, European, international)
19. **Urban Air Mobility** (UAM) service provider *(Prospective)* [services (incl. infrastructure) required to make the transport of cargo & persons (air taxis) by unmanned aircraft possible in an urban environment]
20. **U-space Service Provider** (USSP) *(Prospective)* (supplying e.g.: network identification service, flight authorisation service, geo-awareness service, traffic information service)

U-SPACE INSIGHT

CONCLUSIONS

Co-funded by the European Union

SUMMARY OF THE PRINCIPLE RESULTS & CONCLUSIONS

- On the average, the survey r**espondents** had significant **knowledge & understanding** of the drone sector (54% with >5 years of experience) and the aviation sector (83% with > 5 years of experience and 66% with >10 years of experience).
- 30% of the respondents are employed by companies/organisations with more than 250 employees. In other words, **70% of the respondents work in SMEs/SMIs**.
- The **principal contributing countries**: Belgium (13%), Germany (13%), France (12%), Spain (10%), Netherlands (7%), Italy (7%)
- Publishing the survey in French, German & Spanish may have resulted in an **increase of 49% of the inputs** to the survey.
- The activity sector segmentation used to categorize the respondents has permitted to **benchmark the drone operations community** and to obtain a **representative & qualified insight** to the views of this community.
- The **top three respondent categories**: UAS Operators (35%), Consultancy Specialized in Safety Risk Assessment (22%), UAS Manufacturer/Integrator & Operator (19%).
- **Less than 50%** of the respondents currently **contribute to standard producing work**.
- The activity sectors with the **largest projected growth**:
  - U-space Service Provider +12%
  - Urban Air Mobility Service Provider +9%
  - Consultancy specialized (safety risk assessment) +6%
  - UAS operator [commercial & non-commercial; All aircraft types - Transport of cargo & persons] +6%
  - UAS manufacturer / integrator & operator [Commercial - All aircraft types & flight missions] +5%
- **Services currently available** in respondent's country (>40% of the positive replies):
  Common Information Service (CIS)
  - ATM Data Service 55%
  - Flight planning 53%
  - Geo-Awareness Data Service 47%
  - UAS Flight Authorisation Service
  - Flight plan/authorisation validation 47%

  Geo-awareness Service
  - Applicable operational conditions 46%
  - Airspace constraints in designated U-space airspace 42%
  - Geographical zones in the designated U-space airspace 41%

  Network Identification Service
  - Data for authorized users 69%

  Traffic Information Services 40%
  Weather Information Services 61%
- Respondents' **preference** or **expression of needs**:
  - Prefer Integration to Segregation 76%
  - Need for further specifications of rules & guidelines in the U-space regulation (e.g. de-conflicting processes) 83%
  - Need for clarification of the roles & responsibilities of Air Navigation Service Providers, Common Information Service Providers, U-space Service Providers 64%
  - Business & financial aspects of U-space should be referred to in the regulation 53%
  - Business & financial aspects of U-space should be a national implementation matter 50%
- The majority of the respondents indicate that the **U-space is not mature** and that the **available information/ documentation** is insufficient.
- Respondents with an **above average or total comprehension** of the following topics:
  - The U-space concept 74%
  - Relations between service suppliers 56%
  - Data supplied by each service provider 41%
  - To whom the data is supplied 37%
  - Legal responsibilities & liabilities of service providers 29%
  - How the data is supplied 22%
  - Format of the supplied data 18%
- The **10 most urgently required services**:
  - Flight Authorisation Request Processing 56%
  - Geo-graphical Zones in the Designated U-space Airspace 48%
  - Geo-Awareness Data Service 47%
  - Authorization Request Service 45%
  - Applicable Operational Conditions 45%
  - Supply of Flight Authorisation 44%
  - Flight Plan/Authorisation Validation 42%
  - Airspace Constraints in the Designated U-space Airspace 42%
  - Weather Information Service 42%
  - Dynamic Airspace Restrictions 40%
- The majority of respondents (>50%) **do not know when the required services will be available** in their countries.
- Principal currently **missing U-space-related aspects** are:
  - Required technical standards 73%
  - Required operational standards 69%
  - Detailed additional information on U-space 62%
  - Detailed additional regulatory information 57%
  - Costing aspect of U-space services 56%
  - Responsibilities & liabilities relative to U-space services 55%
  - Definition of «dynamic reconfiguration of the airspace» concept 48%
  - Defined communication interface between ANSP & USSP 38%
  - Defined communication interface between CSP & USSP 37%
  - Defined communication interface between CSP & ANSP 35%
  - Definition of «Notified Body» & applicable criteria/standards 28%

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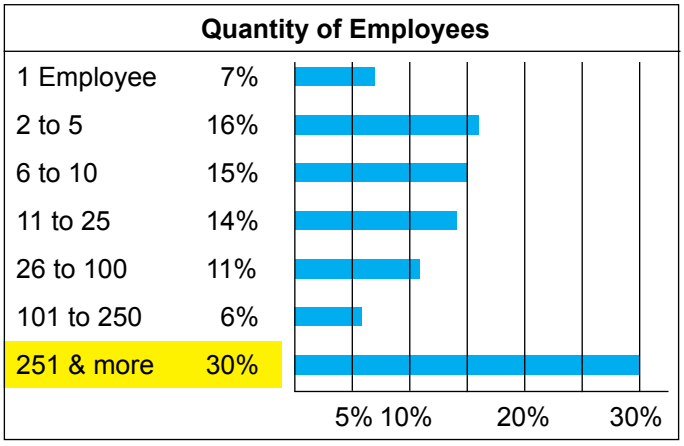
- The **principal concepts** that are considered **based on immature or non-existent technologies**:
  - Detect & Avoid 80%
  - Collaborative interface with ATC 51%
  - Surveillance & communication technology for manned aviation VLL flights 51%
  - Dynamic geo-fencing 47%
  - Tactical de-confliction 47%
  - Communication methods – 5G 41%
  - Procedural interface with ATC 40%
  - Strategic de-confliction 40%
- The **principally required European-wide standards**:
  - Pilot Training & Qualification: Theoretical 85%
  - Detect & Avoid 84%
  - Electronic conspicuity methods (UAS position transmission) 82%
  - Pilot Training & Qualification: Practical 81%
  - Command & Control integrity 78%
  - Cybersecurity 78%
  - Drones for Transport - Cargo/Goods 77%
  - Drones for Transport – Persons 76%
  - Population density definition/calculation 67%
  - UAS «black box» recorder (on aircraft) 60%
  - Person-identifiable imagery 55%
- 80% of the respondents indicate that **E-registration is available in their country**.
- 61% indicate that **E-registration is free-of-charge**.
- The **minimum age** is principally 16 or 18 years.
- France, Italy & Spain have 3 classes: 14, 16 & 18 years
  Denmark has 2 classes: 15 & 16 years
  Germany has 2 classes: 16 & 18 years
- 65% of the respondents indicated that **geo-zones had been established in their country**.
- The responsibility for **management of the Geo-zones** and **Geo-awareness Service Provision** belongs to:
  - National aviation authority 76%
  - Governmental agency 38%
  - Regional authority 25%
  - Municipal authority 14%
  - Independent company 14%
- The majority of the respondents indicate that a **Geo-awareness Service Provider** should have a **designated accountable geo-awareness manager**.

Fig. 1 - SECTOR INVOLVEMENT

	Quantity of Years				
	<1	1-2	3-5	5-10	>10
Respondent organisation's involvement with drones	4%	12%	30%	34%	20%
Respondent's personal involvement with drones	5%	10%	26%	27%	33%
Respondent's personal involvement with aviation	3%	3%	11%	17%	66%

Fig. 2- SIZE



< 251 employees = SMEs/SMIs

Fig. 3 - PARTICIPATING COUNTRIES

		%
1	Albania	0,83
2	Australia	1,65
3	Austria	2,48
4	Belgium	13,22
5	Bulgaria	2,48
6	China	0,83
7	Czech Rep.	0,83
8	Denmark	2,48
9	Estonia	0,83
10	Finland	4,96
11	France	11,57
12	Germany	13,22
13	Ireland	0,83
14	Italy	6,61
15	Jamaica	0,83
16	Kenya	0,83
17	Lithuania	0,83
18	Netherlands	7,44
19	New Zealand	0,83
20	Norway	0,83
21	Poland	2,48
22	Portugal	0,83
23	Spain	9,92
24	Sweden	1,65
25	Switzerland	2,48
26	Ukraine	0,83
27	United Kingdom	2,48
28	U.S.A.	4,96
	Total	100

Fig. 4 - LANGUAGE USED TO COMPLETE SURVEY

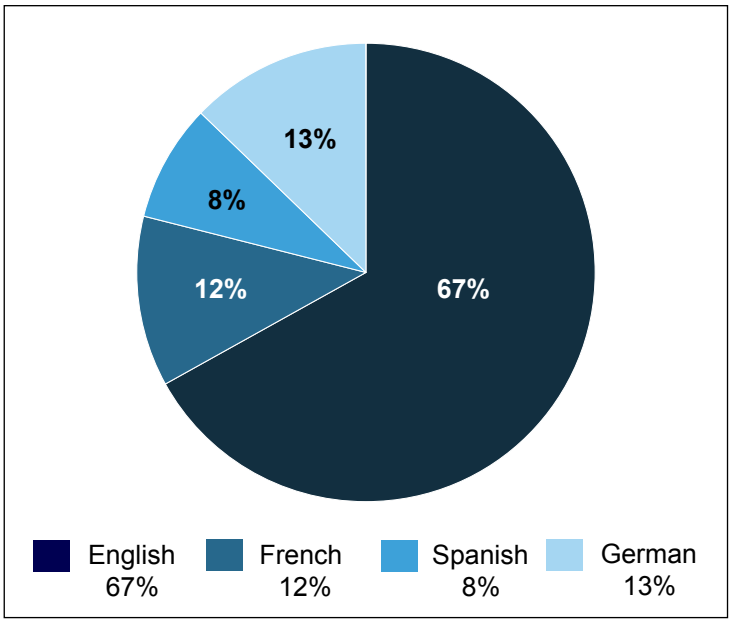
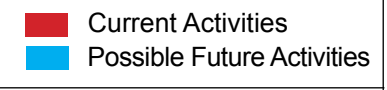


Fig. 5 - CURRENT & POSSIBLE FUTURE RESPONDENT ACTIVITIES

Activity Sectors — ***Multiple Replies were possible***



	Activity Sectors	Current Activities	Possible Future Activities
1	**Aeronautical Information Service** (AIS) **Provider** (e.g. conformance monitoring, geo-awareness, flight autorisation, network identification, weather information)	5%	6%
2	**Air Navigation Service Provider** (ANSP)	7%	7%
3	**ATM / UTM / U-space software development companies** (does not supply services to UAS operators with the developed software)	13%	15%
4	**Provider of Common Information Service** (CISP) *(Prospective)*	5%	9%
5	**Communication Service Provider** (e.g. mobile network, satellite communication)	1%	2%
6	**Conformity Assessment Body** (private or public, commercial or not-for-profit entity, national standards bodies, trade association, consumer organisations, organisations that undertake conformity assessment activities (e.g. testing, inspection, certification) in accordance with national regulations	7%	10%
7	**Consultancy specialized in safety risk assessment** (SORA, PDRA, STS), and selling their services to UAS operators, and approved by their national aviation authority (NAA)	22%	28%
8	**UAS Manufacturer / Integrator**	17%	18%
9	**UAS Manufacturer / Integrator & Operator [commercial – all aircraft types & all flight mission purposes].**	19%	24%
10	**UAS Operator [commercial & non-commercial – all aircraft types - all flight mission purpose categories (except transport of cargo & persons)]**	35%	33%
11	**UAS Operator [commercial & non-commercial – all aircraft types - Transport of cargo & persons]**	13%	19%
12	**General Aviation** (GA) (manned aviation e.g. sport & leisure activities: pilots of balloons, gliders, ultralights; aerial work operators; business aviation; & related associations)	10%	9%
13	**Commercial Manned Aviation** [airlines (passenger & freight carriers; air taxi operators); pilots; related associations).	2%	5%
14	**National Aviation Authority** (NAA) - Regulatory authorities (ministry, directorate, CAA, inspectorate) - National & regional level	7%	9%
15	**Local Authority** (e.g. city/municipality, harbour) & regional authority (e.g. France: department; Germany: Länder; Spain: region; Italy: province/ region; Netherlands: province)	2%	2%
16	**Notified Body** (organisation designated by EU country to assess product conformity)	1%	4%
17	**Qualified Entity** (QE) (an entity to which a specific certification task is allocated by and under control of a national aviation authority or EASA)	3%	7%
18	**Standard Development Organisation** (SDO) (national, European, international)	2%	5%
19	**Urban Air Mobility** (UAM) **Service provider** *(Prospective)* [services (incl. infrastructure) required to make the transport of cargo & persons (air taxis) by unmanned aircraft possible in an urban environment]	12%	21%
20	**U-space Service Provider** (USSP) *(Prospective)* (supplying e.g.: network identification service, flight authorisation service, geo-awareness service, traffic information service)	12%	24%

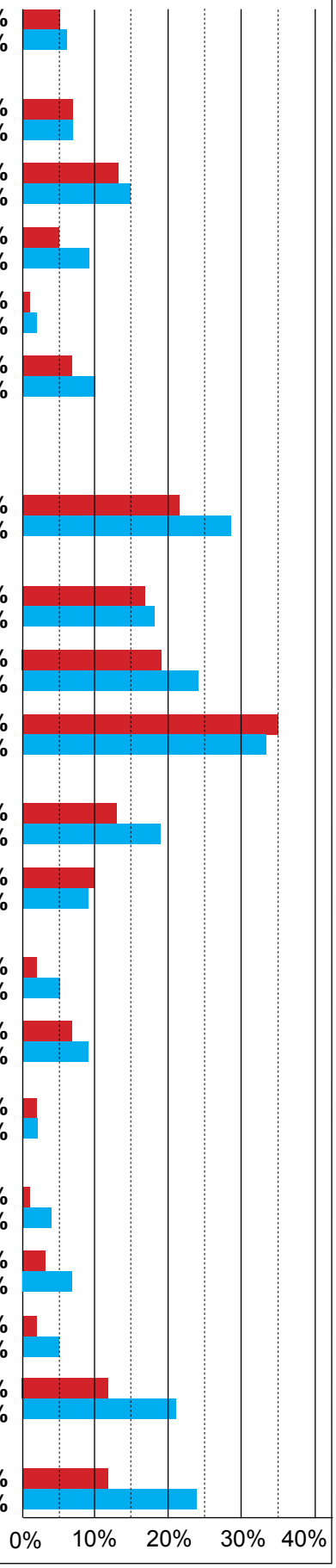


FIG. 6 - GENERAL COMPREHENSION

	Not at all	Slightly	Partially	Above Average	Completely
Is the general concept of U-space clear to you?	1%	3%	22%	**46%**	28%
Are the relations between the service suppliers clear to you?	4%	12%	27%	**45%**	11%
Is it clear what data is supplied by each service provider?	7%	10%	**41%**	34%	7%
Is it clear in what format the data is supplied?	21%	16%	**46%**	16%	2%
Is it clear to whom the data is supplied?	11%	12%	**40%**	30%	7%
Is it clear how the data is supplied?	18%	11%	**48%**	20%	2%
Are the legal responsibilities & liabilities of the service providers clear to you?	15%	13%	**43%**	23%	6%
Is the 5G mobile network coverage in your country sufficient to supply the data?	27%	25%	**30%**	15%	2%

The following concerns 26% of the respondents

Why is U-space not clear to you?	
- Have not read all the relevant information	**39%**
- The U-space documents were not detailed enough	**34%**
- My English was insufficient to understand the documents	4%
- U-space documents were not available in my native language	3%
- Other (including no answer supplied)	20%

FIG. 7 - PARTICIPATION IN STANDARD PRODUCING ORGANISATIONS

Multiple answers possible

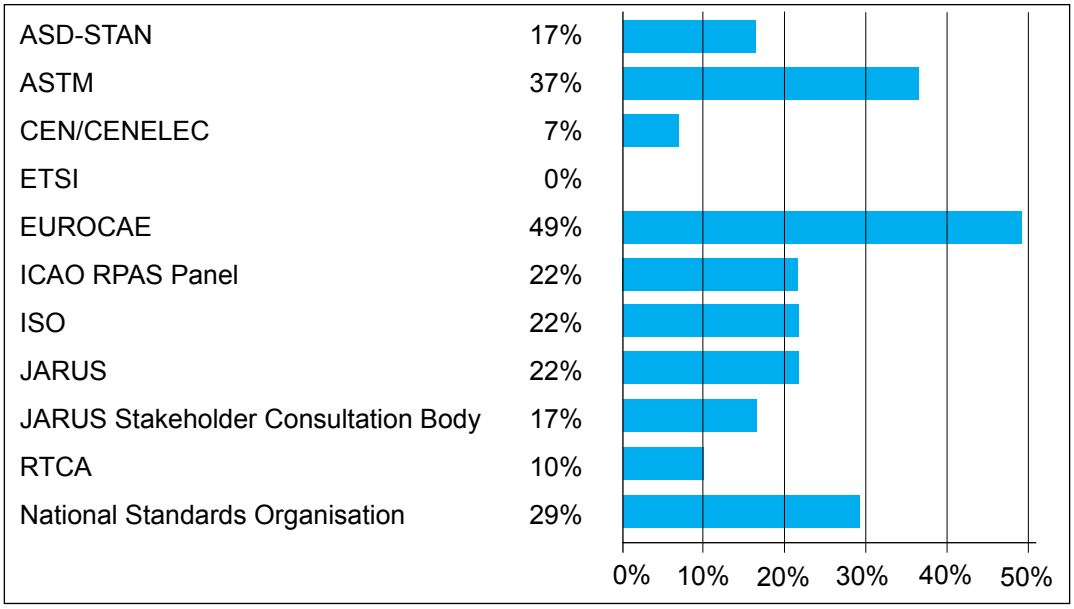


FIG. 8 - THE RESPONDING COMPANIES & ORGANISATIONS

- 5D Konsulterna AB, Sweden
- ADSE Consulting & Engineering, Netherlands
- Advanced Protection Systems, Poland
- AED, France
- Aero Enterprise GmbH, Austria
- AéroTronique EIRL CROZE V., France
- AESA, Spain
- Airial Robotics GmbH, Germany
- Albadron shpk, Albania
- Almende B.V., Netherlands
- Ampell Consultores Asociados, Spain
- ANRA Technologies UK, United Kingdom
- ANS CR, Czech Republic
- ANWB Medical Air Assistance, Netherlands
- Archiflight, Belgium
- Asociacija DRONEA, Lithuania
- ASTM International, United States
- BP SOLUTIONS, France
- BULATSA, Bulgaria
- BVdrone Oy, Finland
- CAA, Jamaica
- CAA, New Zealand
- CAA, Poland
- Capgemini, France
- Lanseau, France
- CIRA, Italy
- Clearance, France
- Cognitive Technologies and Services, Italy
- Delta Aadvise GmbH, Germany
- Distretto Tecnologico Aerospaz, Italy
- DJI, China
- DJI, Denmark
- DJI, Germany
- dlapilota.pl Sp. z o.o., Poland
- Drone Class, Netherlands
- Drone Manufacturers Association Europe (DMAE), Belgium
- DroneQ Aerial Services, Netherlands
- Droniq GmbH, Germany
- Dronotique, France
- EDA, Belgium
- ENAIRE, Spain
- ENAIRE, Spain
- ENAIRE/CRIDA, Spain
- ESSP-SAS, Spain
- EUROCONTROL, Belgium
- European Commission, Belgium
- EuroUSC Italia ltd, Italy
- Everis Aerospace and Defense, Spain
- FACIL'ETIC, France
- FH Joanneum, Austria
- FlyingBasket, Italy
- Flyover di Vania Di Francesco, Italy
- FLY-R, France
- flyXdrive GmbH, Germany
- Freelance Operator, Kenya
- General Atomics aeronautical Systems, United States
- Globe UAV GmbH, Germany
- Goldy Aviations, Belgium
- Griff Aviation AS, Norway
- GUTMA , Belgium
- Haw Trade & Consulting GMBH, Germany
- HELISEO SAGL, Switzerland
- HEMAV, Spain
- Holding The Drones, Netherlands
- IATA, Germany
- Icarus Aerospace, United States
- ICTD Bulgaria, Bulgaria
- Individual Expert, Germany (not on behalf of employer)
- Individual Expert, Finland (not on behalf of employer)
- Individual Expert, France (not on behalf of employer)
- ITG, Spain
- KNVvL, Netherlands
- Landesluftfahrtbehörde Hamburg, Germany
- Leitek Innovative Solutions, Portugal
- Leonardo, Italy
- Linköping University (LiU), Sweden
- Local Police Belgium, Belgium
- Naviair, Denmark
- Nokia, Finland
- NUAIR, United States
- OUAS, Urban Air Mobility Oulu, Finland
- Pilgrim Technology, France
- Poladrone, Malaysia
- RadarBasedAvionics, Netherlands
- Rigi Technologies SA, Spain
- Ripper Corporation, Australia
- RMIT University, Australia
- SAAU, Ukraine
- SDIS de Seine-et-Marne, France
- senseFly, Switzerland
- SGS, Germany
- sicherfliegen.com, Germany
- SkeyDrone, Belgium
- SkeyDrone, Belgium
- Skycorp OÜ, Estonia
- Skydio, Inc., Germany
- SkyeBase BV, Belgium
- SOGITEC, France
- stsi², France
- Stüker Consult, Denmark
- Survey Drones Ireland, Ireland
- Tecnofly Canarias, S.L., Spain
- Toni Eiser Innovation, Austria
- Topview SRL, Italy
- Traficom, Finland
- TruWeather Solutions, United States
- TruWeather Solutions, United States
- UAS Consulting, Belgium
- UAV+, Netherlands
- UAVDACH-Services, Germany
- UIC2, Germany
- Unifly, Belgium
- Unifly, Belgium
- Unifly, Belgium
- Unmanned Systems Bulgaria, Bulgaria
- UPC, Spain
- VIVES University - DroneLab, Belgium
- Volocopter GmbH, Germany
- Volocopter GmbH, Germany
- VTOL Technologies Ltd, United Kingdom
- Wing Aviation Finland Oy, Finland

Remarks: Companies/organisation indicated more than once = More than one person completed the survey.
12 Respondents interrupted the survey completion and did not resume it (not included in list above).
5 Respondents submitted incorrect respondent information and were disqualified.

FIG. 9 - RESPONDENT ORGANISATIONS & RESPONDENTS - REVIEW

Respondent Experience (>5 years)

Organisation's involvement in drone sector	54%
Personal involvement with drones	60%
Personal involvement with aviation	83%

Quantity of Employees

1 - 25	52%
26 - 250	18%
<251 (SMEs/SMIs)	70%
>250	30%

Participating Countries

European Union	17
EU-associated	4
Other	7

Language Used to Complete Survey

English	67%
German	13%
French	12%
Spanish	8%

Respondents' Principal CURRENT Activities (>10%)

UAS Operator [commercial & non-commercial - all aircraft types - all flight mission purpose categories (*Except transport of cargo & persons*)]	35%
Consultancy specialized in safety risk assessment	22%
UAS Manufacturer / Integrator & Operator [commercial - all aircraft types & all flight missions]	19%
UAS Manufacturer / Integrator	17%
ATM / UTM / U-space software development companies	13%
UAS Operator [commercial & non-commercial – all aircraft types - *Transport of cargo & persons*]	13%
Urban Air Mobility (UAM) Service Provider	12%
U-space Service Provider	12%
General (Manned) Aviation	10%

Respondents' Principal FUTURE Activities (>10%)

UAS Operator [commercial & non-commercial - all aircraft types - all flight mission purpose categories (*Except transport of cargo & persons*)]	33%
Consultancy specialized in safety risk assessment	28%
UAS Manufacturer / Integrator & Operator [commercial - all aircraft types & all flight missions]	24%
U-space Service Provider (USSP)	24%
Urban Air Mobility (UAM) Service Provider	21%
UAS Operator [commercial & non-commercial - all aircraft types - *Transport of cargo & persons*]	19%
UAS Manufacturer / Integrator	18%
ATM / UTM / U-space software development companies	15%
Conformity Assessment Body	10%

COMMENTS

A significant majority of the survey participants had the required experience, expertise and competence.

70% of the respondents are Micro & Small/Medium-sized companies.

U-space is followed outside of the EU.

The majority of the survey participants (67%) master English.

Less than 50% of the survey respondents currently contribute to standard producing activities.

The activity sectors with the largest projected growth are:
- U-space Service Provider (USSP) +12%
- Urban Air Mobility (UAM) service provider + 9%
- Consultancy specialized in safety risk assessment + 6%
- UAS operator [commercial & non-commercial - all aircraft types - Transport of cargo & persons] + 6%
- UAS manufacturer / integrator & operator [commercial - all aircraft types & all flight missions] + 5%

COMPREHENSION

Percentage of the respondents indicating that they have an **above average** or **total** comprehension of the following:

The U-space concept	74%
Relations between service suppliers	56%
Data supplied by each service provider	41%
Format of the supplied data	18%
To whom the data is supplied	37%
How the data is supplied	22%
Relevant legal responsibilities & liabilities of service providers	29%

FIG. 10 - CURRENT AVAILABILITY IN RESPONDENT'S COUNTRY

Common Information Service (CIS)	**Yes**
ATM Data Service	55%
Geo-Awareness Data Service	47%
Autorisation Request Service	
Communication Service (infrastructure for)	
Conformance Monitoring Service	27%
UAS Flight Authorisation Service	
Flight planning	53%
Flight autorisation request processing	
Flight plan assistance	
Flight plan processing	
Flight plan/authorisation validation	47%
Priority management	18%
Strategic de-confliction	16%
Supply of flight authorisation	
Geo-awareness Service	
Applicable operational conditions	46%
Airspace constraints in the designated U-space airspace	42%
Geographical zones in the designated U-space airspace	41%
Dynamic airspace restrictions temporarily limiting the area in the designated U-space airspace	26%
Network Identification Service	
Continuous processing of the remote identification of the UA throughout the whole duration of the flight	23%
Remote identification of the UA (Open category) to authorised users	23%
Data (operator registration nr, unique serial number, geographical position & flight alt. of UA, route course, geographical position pilot or take-off point, UA emergency status, time stamp) for authorized users	69%
Traffic Information Services	40%
Weather Information Services	61%

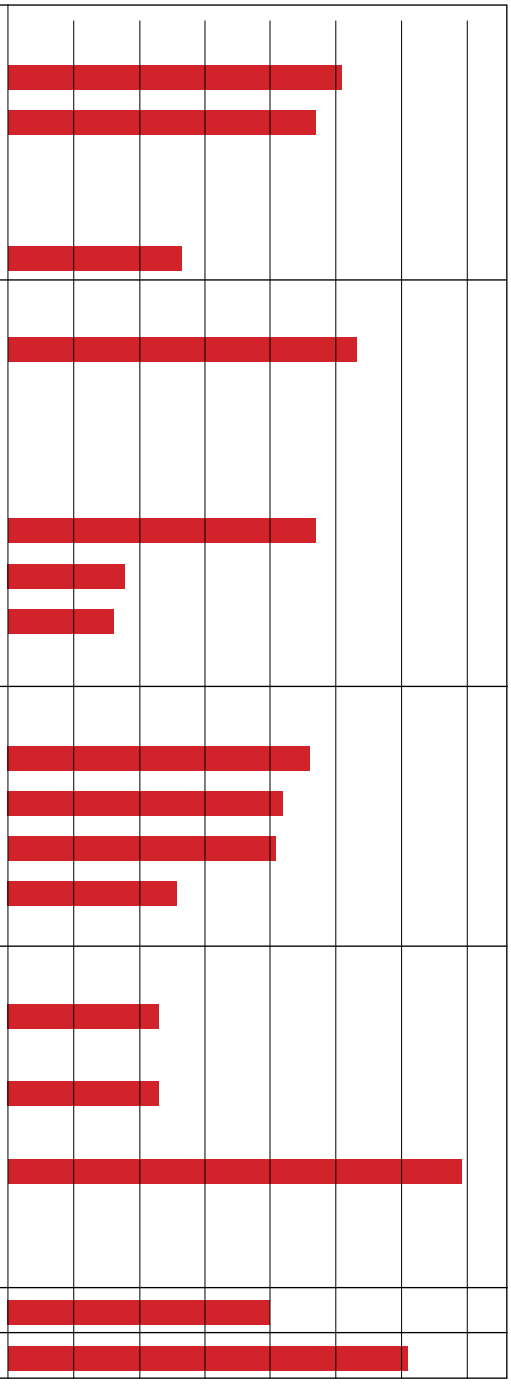


FIG. 11 - SERVICES CURRENTLY SUPPLIED BY RESPONDENTS

Common Information Service (CIS)	
ATM Data Service	45%
Geo-Awareness Data Service	68%
Autorisation Request Service	55%
Communication Service (infrastructure for)	18%
Conformance Monitoring Service	36%
UAS Flight Authorisation Service	
Flight planning	71%
Flight autorisation request processing	71%
Flight plan assistance	71%
Flight plan processing	71%
Flight plan/authorisation validation	46%
Priority management	21%
Strategic de-confliction	46%
Supply of flight authorisation	29%
Geo-awareness Service	
Applicable operational conditions	65%
Airspace constraints in the designated U-space airspace	70%
Geographical zones in the designated U-space airspace	61%
Dynamic airspace restrictions temporarily limiting the area in the designated U-space airspace	48%
Network Identification Service	
Continuous processing of the remote identification of the UA throughout the whole duration of the flight	63%
Remote identification of the UA (Open category) to authorised users	75%
Data (operator registration nr, unique serial number, geographical position & flight alt. of UA, route course, geographical position pilot or take-off point, UA emergency status, time stamp) for authorized users	63%
Traffic Information Services	33%
Weather Information Services	36%

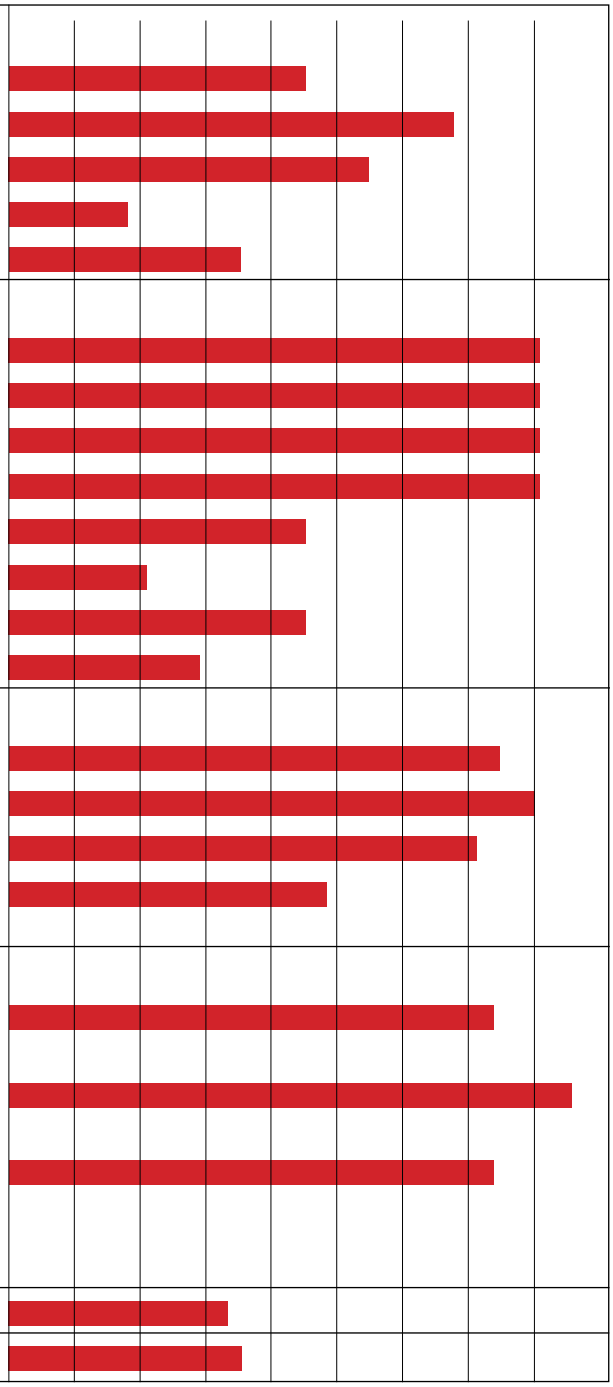


FIG. 12 - SERVICES MOST URGENTLY REQUIRED

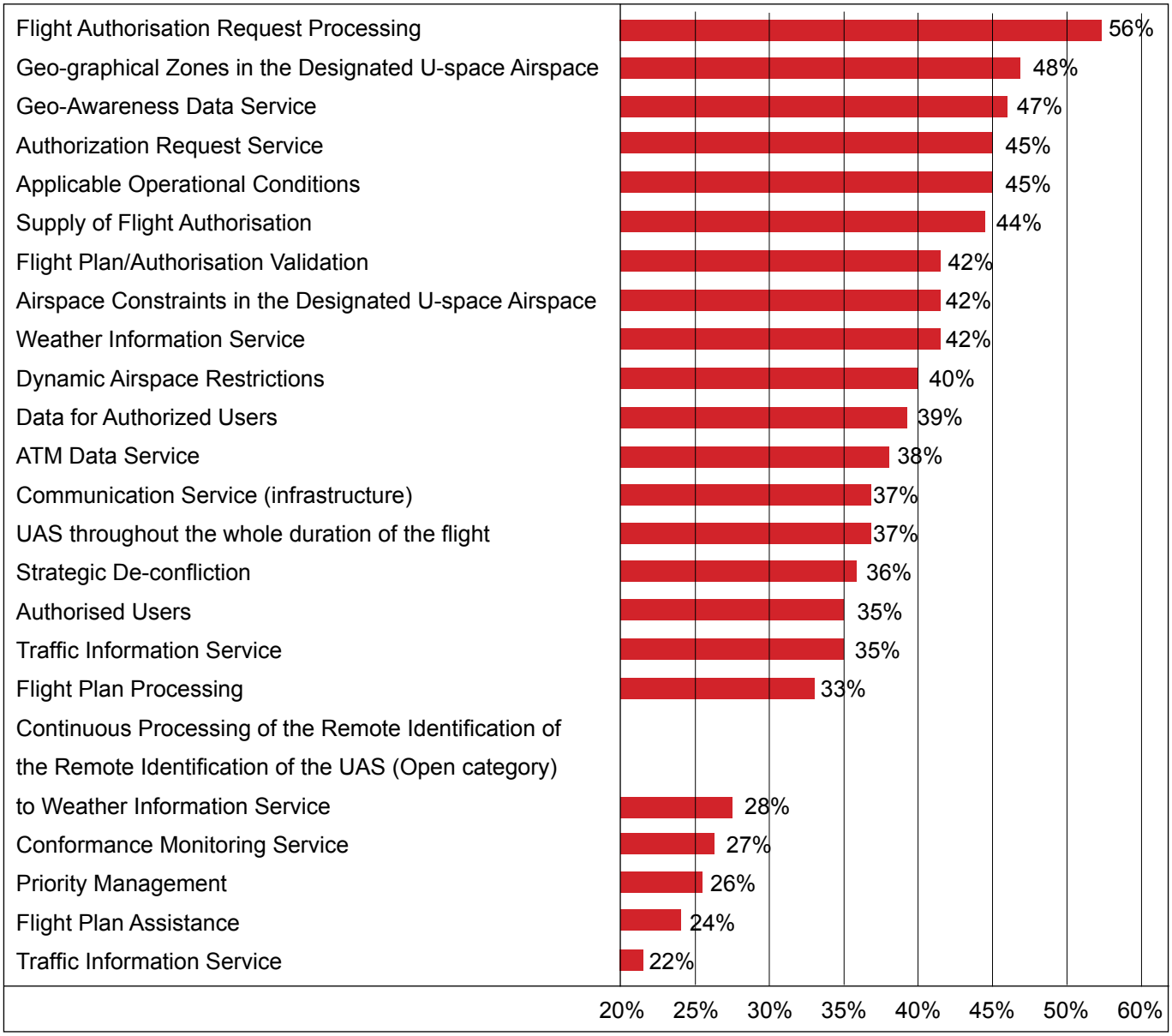


FIG. 13 - WHEN WILL THE FOLLOWING SERVICES BE AVAILABLE IN YOUR COUNTRY

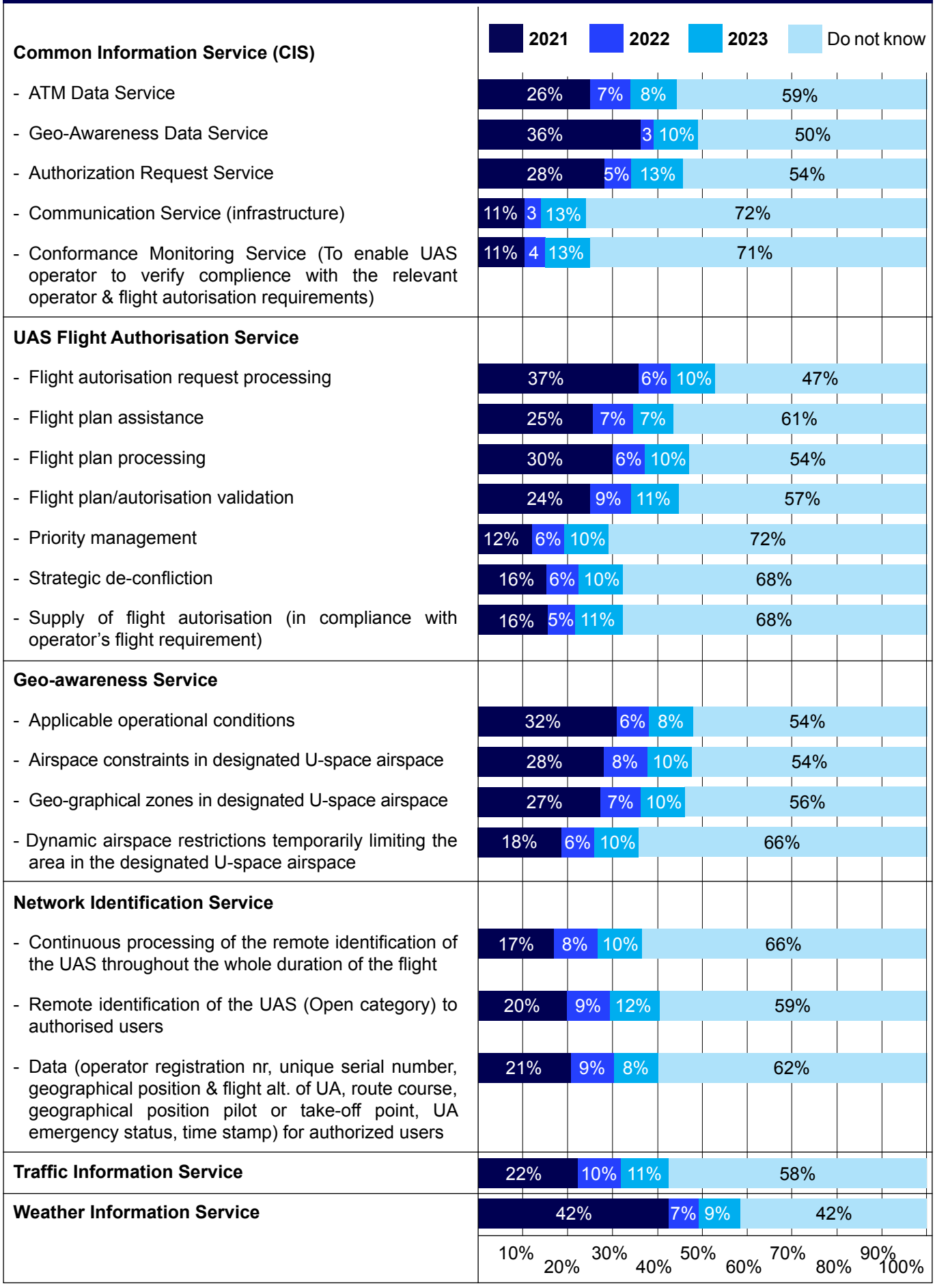


FIG. 14 - DESIRED URGENCY TO MAKE SERVICES AVAILABLE

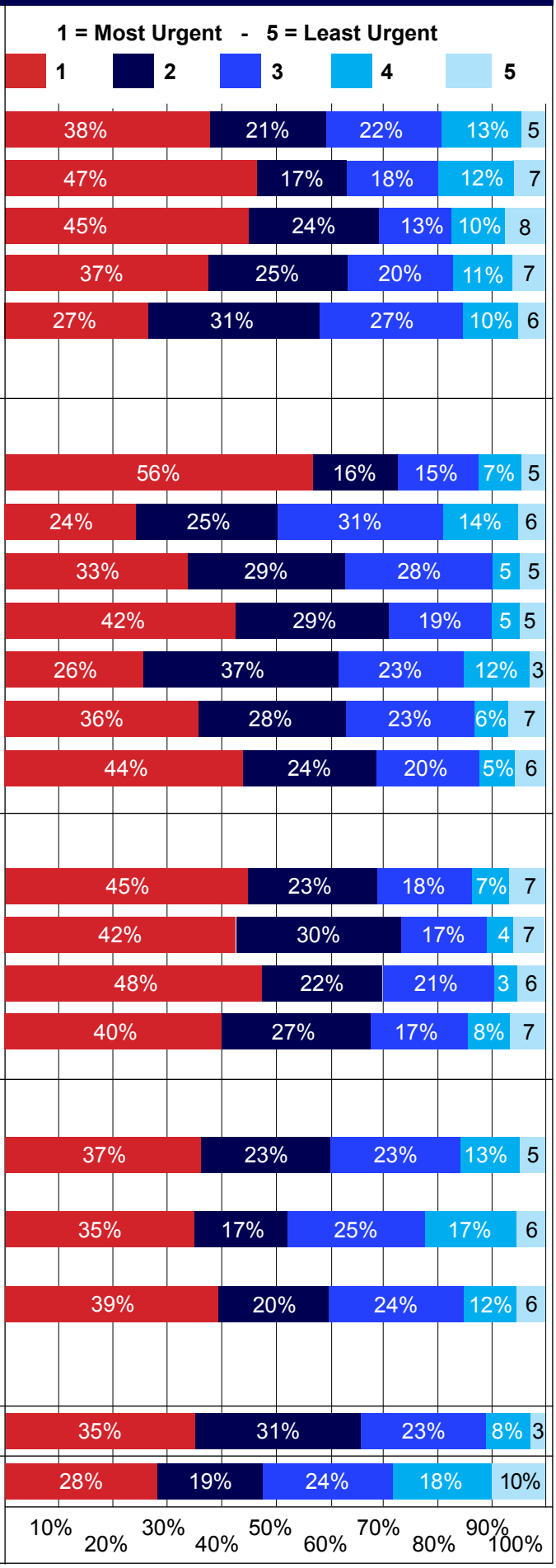


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FIG. 15 - PREFERRED AIRSPACE RECONFIGURATION CONCEPTS

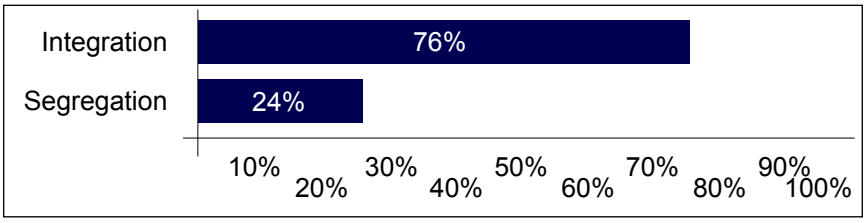


FIG. 16 - RULES & REGULATIONS - NEED FOR SPECIFICATIONS

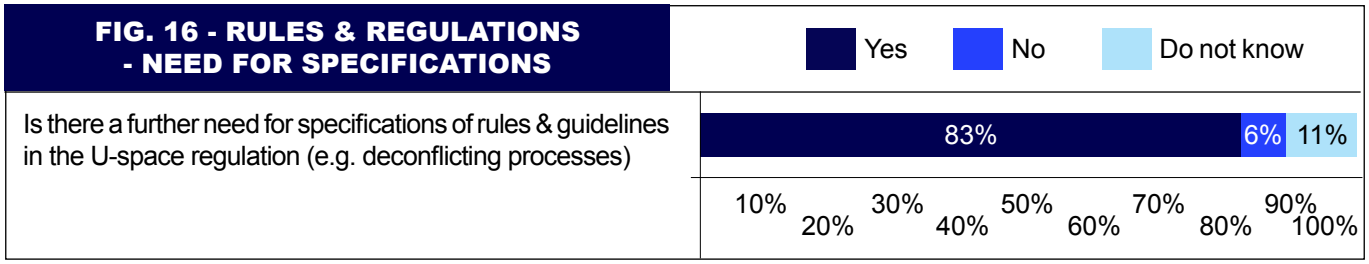


FIG. 17 - ROLES & RESPONSIBILITIES - NEED FOR CLARIFICATION

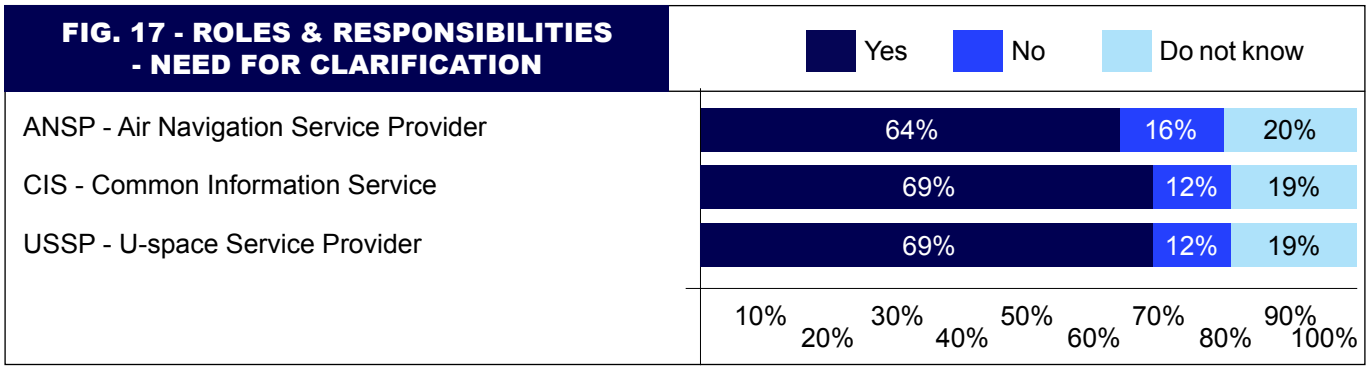


FIG. 18 - BUSINESS & FINANCIAL ASPECTS

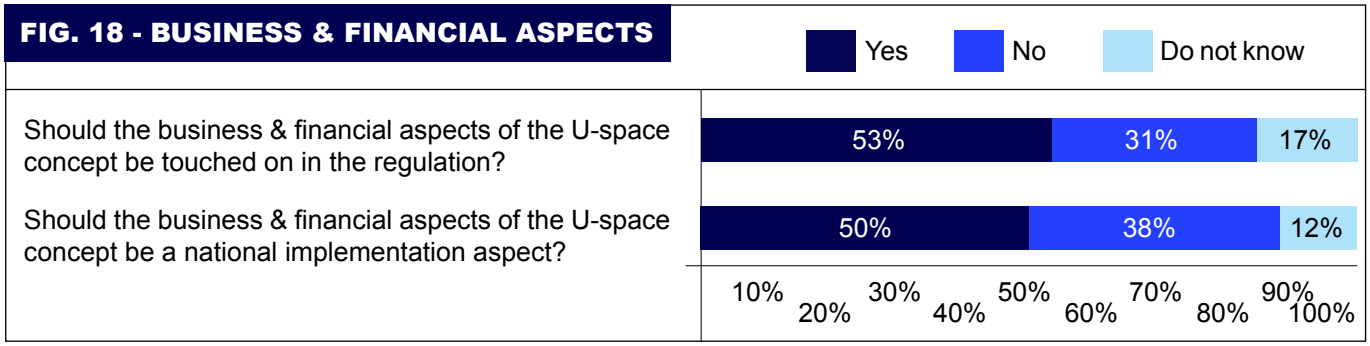


FIG. 19 - THE U-SPACE CONCEPT - DEGREE OF MATURITY

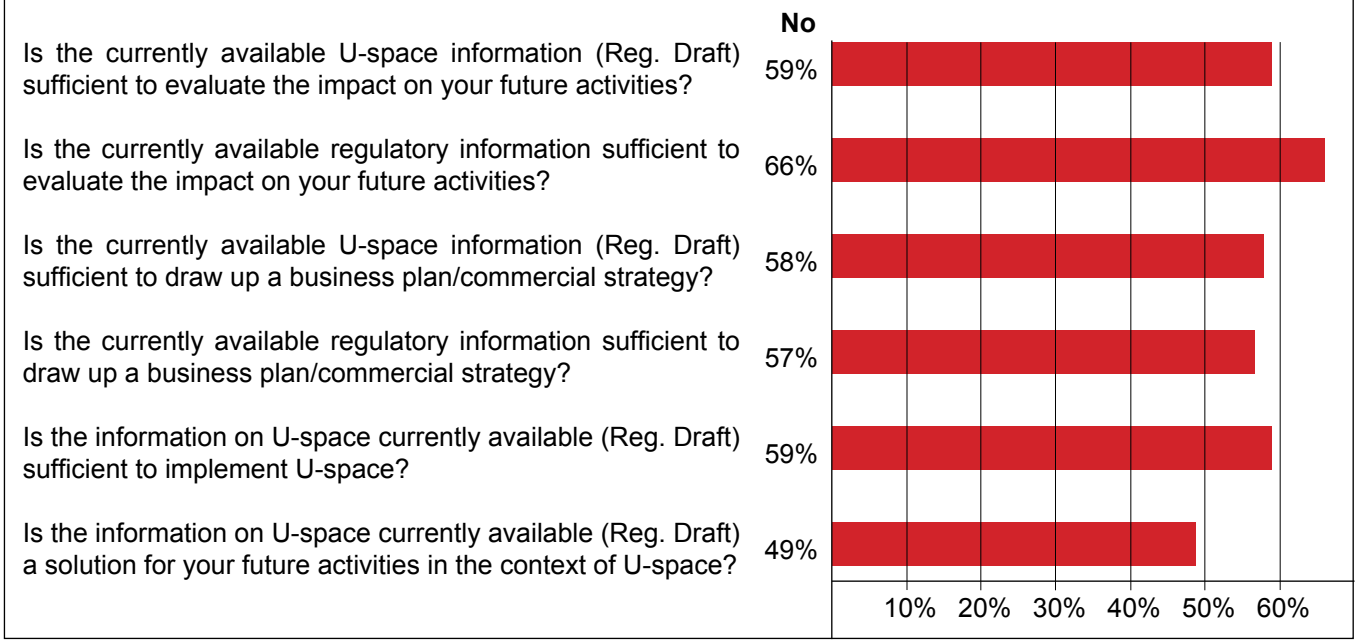


FIG. 20 - THE U-SPACE CONCEPT - WHAT IS CURRENTLY MISSING?

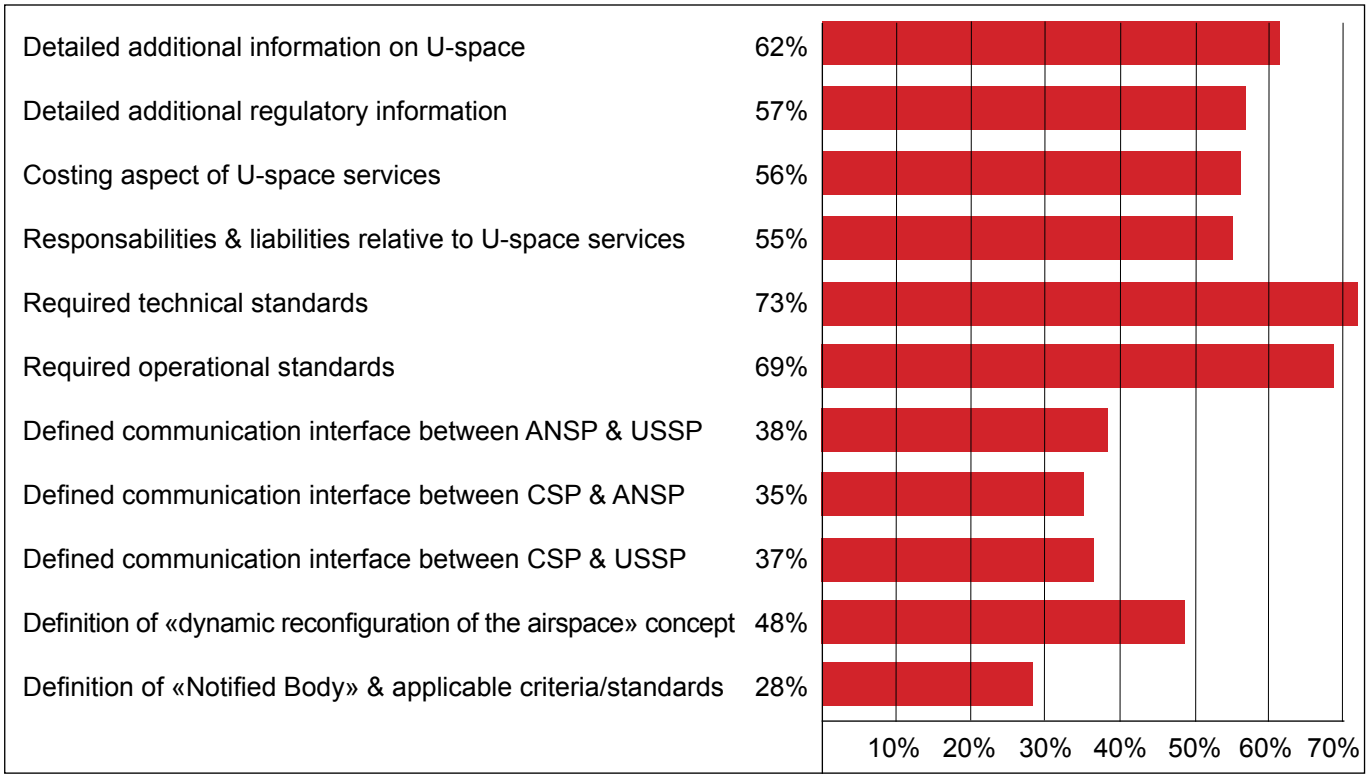


FIG. 21 - CONCEPTS BASED ON IMMATURE OR NON-EXISTENT TECHNOLOGIES

(Multiple answers were possible)

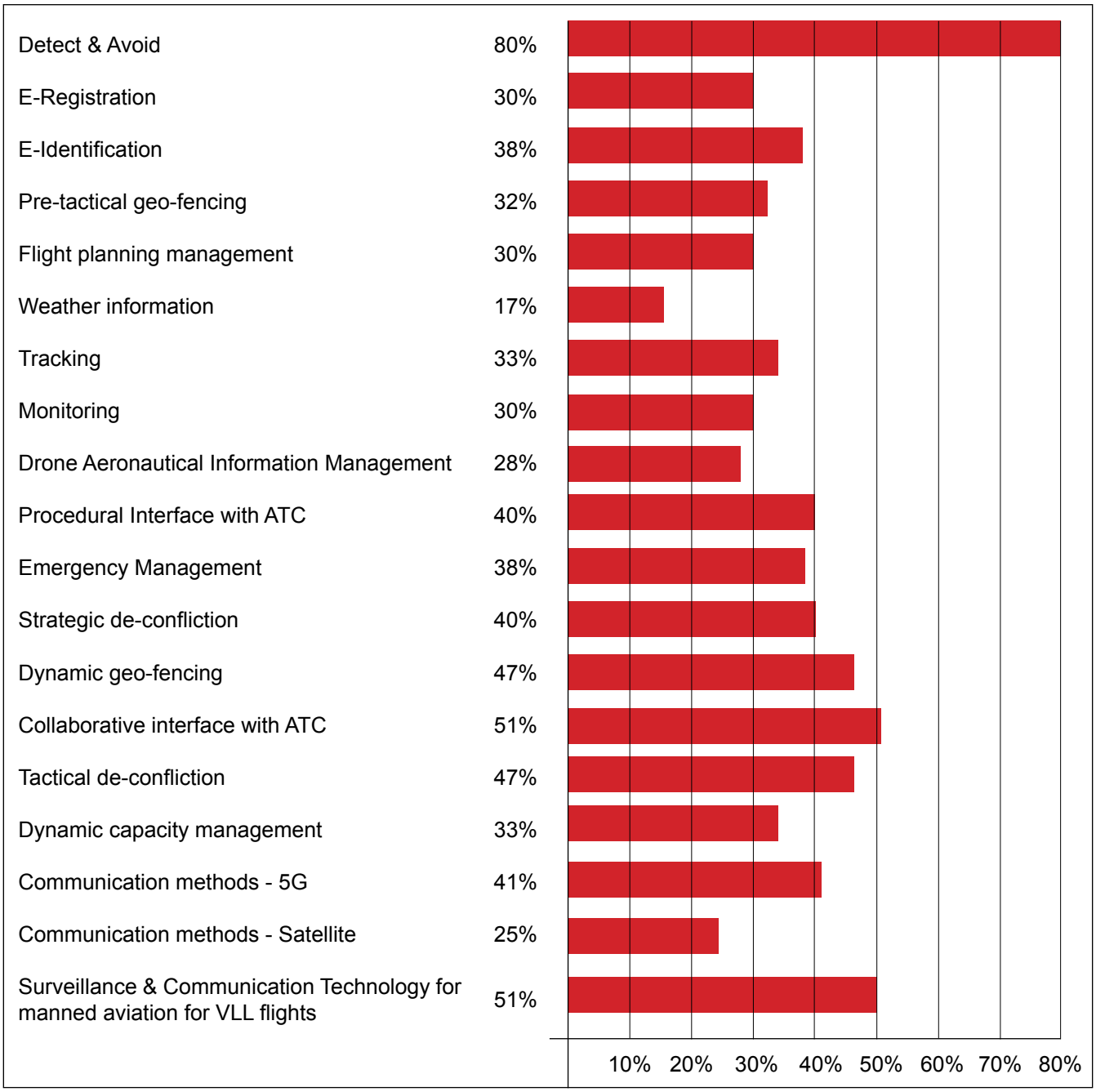


FIG. 22 - STANDARDS - POSSIBLE PARTICIPATION

Work relative to the definition of the following standards is currently ongoing.

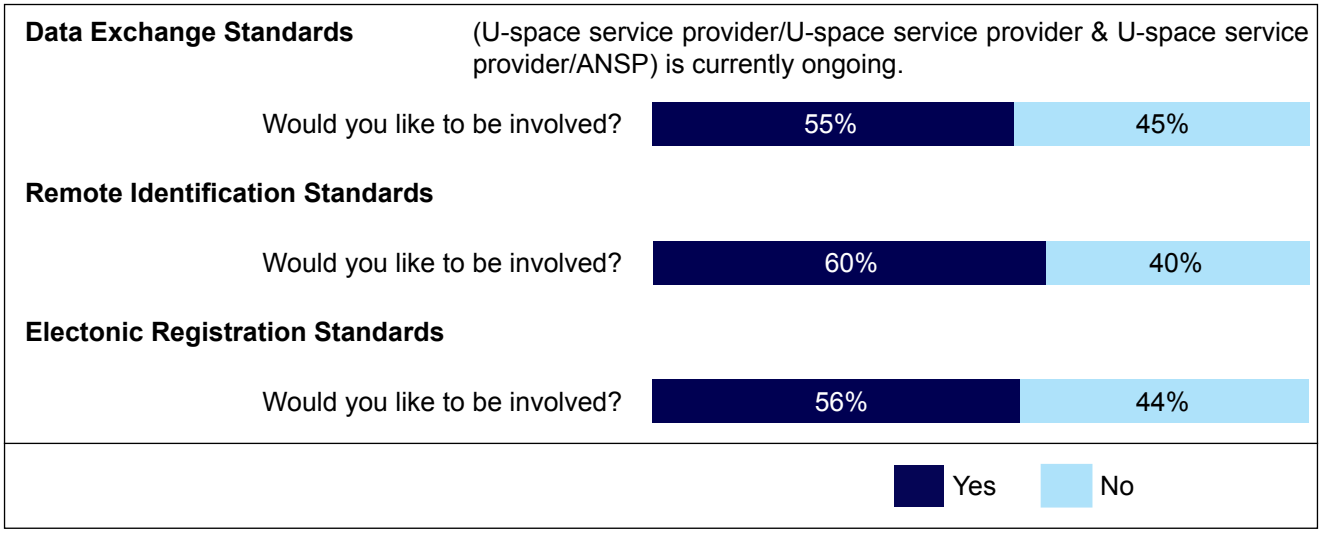


FIG. 23 - GENERAL STANDARD-RELATED MATTERS

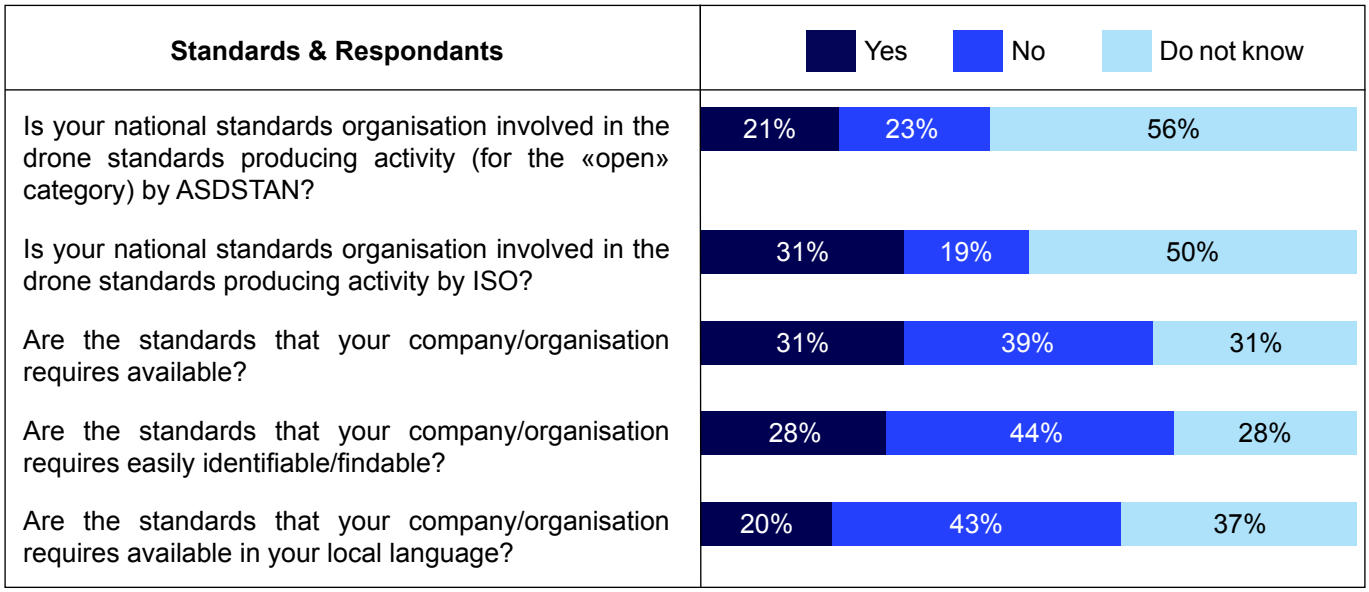


FIG. 24 - DO THE REQUIRED STANDARDS FOR THE FOLLOWING SERVICES EXIST?

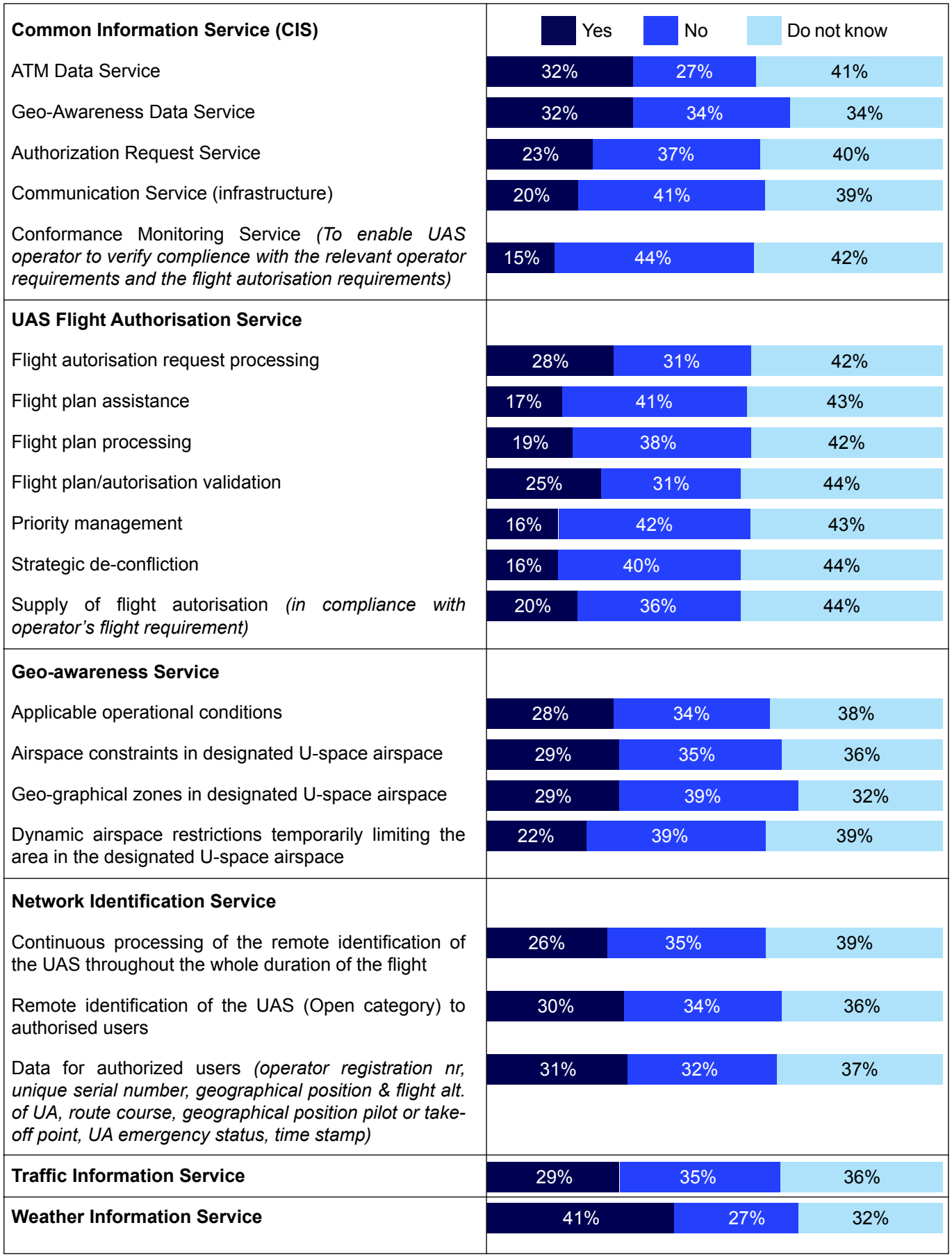


FIG. 25 - STANDARDS - REQUIREMENTS

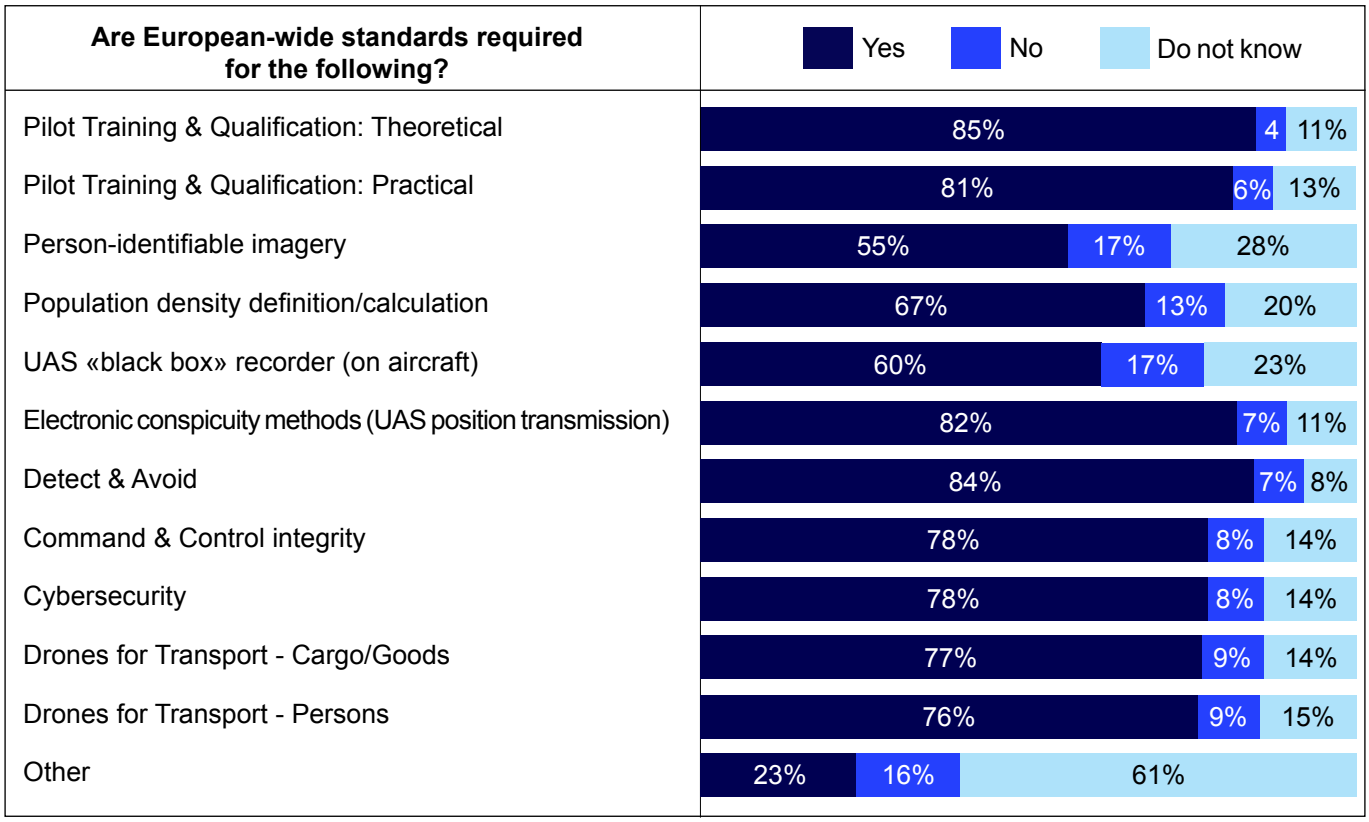
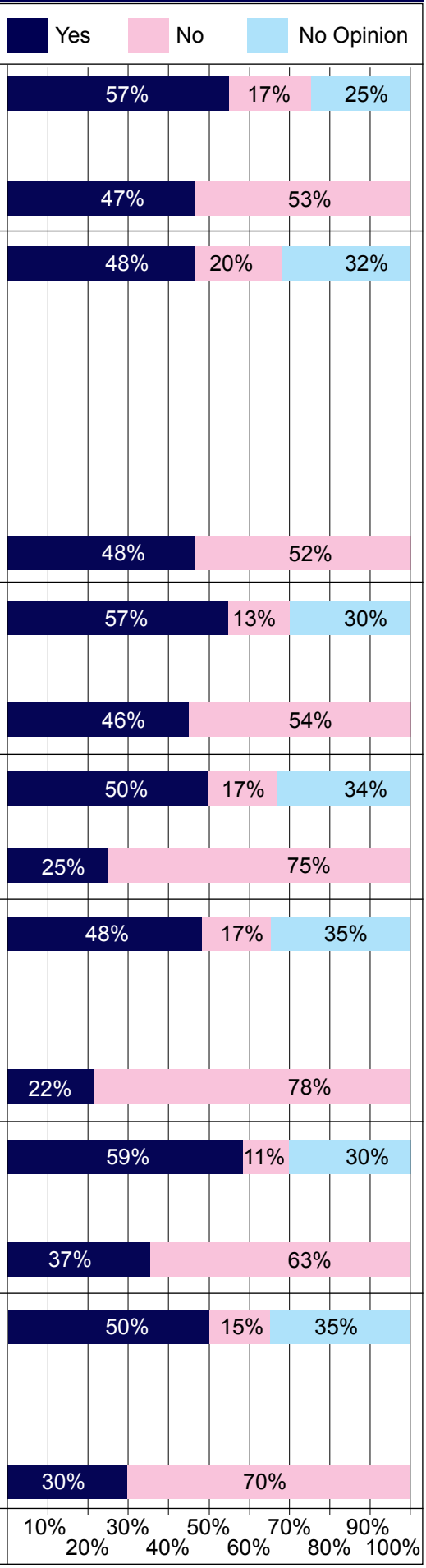


FIG. 26 - SUGGESTED ADDITIONAL EUROPEAN-WIDE STANDARDS

1 Accident/incident reporting
2 All the 30 UTM services in ISO 23629-12.
3 Area of Buffer dynamic calculation
4 ATS/ATC service provided by ANSP to UAS/U-space entities
5 ATM/UTM communications
6 ATM/UTM contingency management Radio emission power
7 Cross-border Interoperability or systems (avoiding national implementations)
8 Data exchange from different sources
9 Drone-to-Drone communication
10 Drone-to-Infrastructure Communication
11 eInsurance Card
12 ePilot Licence
13 GNSS use for drones (in particular EGNOS)
14 Human-Autonomy Teaming and Human-Machine Interactions
15 Night operations ie. lights
16 SMS communications
17 Surveillance observation
18 System design
19 UTM integration

FIG. 27 - IS THERE A REQUIREMENT FOR THE FOLLOWING *(CURRENTLY NON-EXISTENT)* STANDARDS UNDER CONSIDERATION BY ISO?



Collaborative Interface with ATC (CIA)
Objective: Provide automated digital means (e.g. app) for UAS crews to communicate with ATS, different from VHF radiotelephony, when flight is in controlled airspace.

Would like to be involved in the standard production process

Dynamic (airspace) Capacity Management (DCM) Service
Objective:
a) Calculate the traffic accommodation capacity in the Designated Operational Coverage (DOC) based on the UTM services availability, taking into account aspects that are specific to the relevant operational area [e.g. flight near airports, protected airspace, near hospitals) and environmental constraints (e.g. visual & noise pollution)], and provide this information to FCS, vertiport operators and to authorised UTM users.
b) Activate and deactivate temporary segregated areas or other airspace structures in its DOC.

Would like to be involved in the standard production process

Tactical Conflict Management Service (TCM)
Objective: Provide management of conflicting flights in the UTM DOC at tactical level (after take-off), based on real time information provided by other UTM services, such as CMS, NIS and TRS.

Would like to be involved in the standard production process

Communication Coverage Information Service (CCI)
Objective: Provide information on UTM COM coverage (excluding VHF radio-telephony coverage)

Would like to be involved in the standard production process

Electro-Magnetic Interference Information Service (EMS)
Objective:
a) Provide information on known electro-magnetic interferences to radio navigation signals or other signals supporting safe flight in its DOC, during the flight planning phase and during the flight; and
b) Provide any issued EM alerts to LRS Provider.

Would like to be involved in the standard production process

Geospatial Information Service (GIS)
Objective: Provide UTM users and other UTM SPs geospatial information, including terrain, buildings and other obstacles, useful to plan operations before submission of the operation plan.

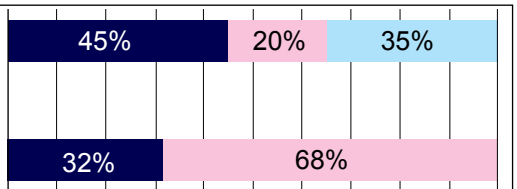
Would like to be involved in the standard production process

UTM Communication Service (LCS)
Objective: Provide communication services for UTM purposes connecting all UTM users, UTM SPs and involved aircraft with the UTM Platform, through links or networks among fixed points on the ground and through terrestrial or satellite mobile communication services with aircraft.

Would like to be involved in the standard production process

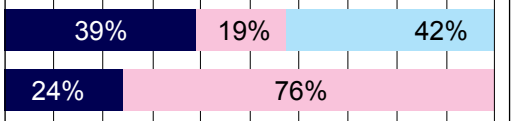
UTM Route Design Service (URD)
Objective: Design, document, validate, maintain and periodically review air routes necessary for the safety, regularity and efficiency of air navigation of unmanned aircraft in the UTM context.

Would like to be involved in the standard production process



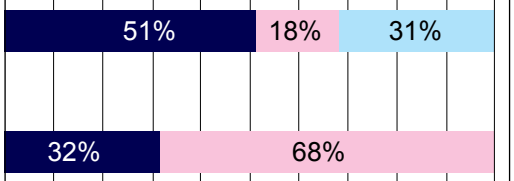
Navigation Coverage Information Service (NCI)
Objective: Provide information on coverage of radio navigation signals.

Would like to be involved in the standard production process



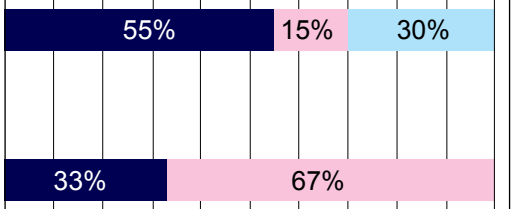
Population Density Information Service (PDI)
Objective: Provide UAS operators, other UTM Service Providers (SPs) and competent authorities with static or dynamic maps on the density of population in each portion of its DOC.

Would like to be involved in the standard production process



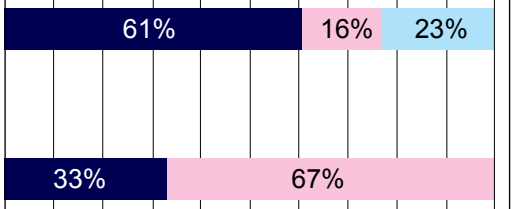
Procedural Interface with ATC (PIA)
Objective: Provide automated digital means (e.g. app) for UAS crews to communicate with ATS, different from VHF radiotelephony, when flight intends to enter controlled airspace, between submission of the operation plan and take-off.

Would like to be involved in the standard production process



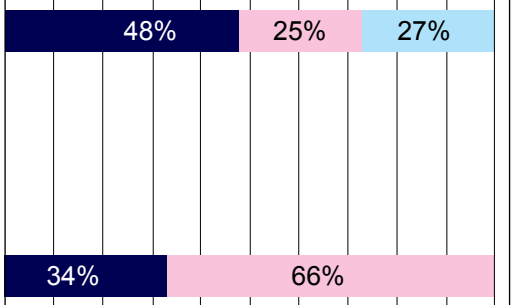
Accident and Incident Reporting Service (ARS)
Objective: Provide web-based tools to facilitate mandatory and voluntary reporting of safety, security or privacy related occurrences and transmits these reports to the involved organisation and to competent authorities.

Would like to be involved in the standard production process



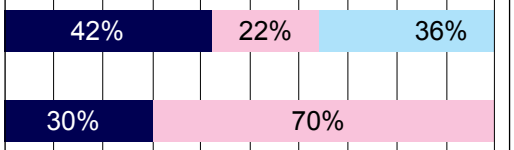
Digital Logbook Service (DLB)
Objectives:
a) Provide UAS operators and their crews, web-based tools to log, as minimum, the information required by law or regulations to record the activity; and
b) Collect and stores the logged information; and
c) Distribute this information to involved operators, crews or competent authorities.

Would like to be involved in the standard production process



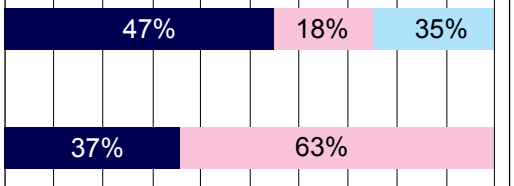
Maintenance Management (MMN)
Objective: Provide UAS operators with web-based tools to support development & application of UAS Maintenance Programmes.

Would like to be involved in the standard production process



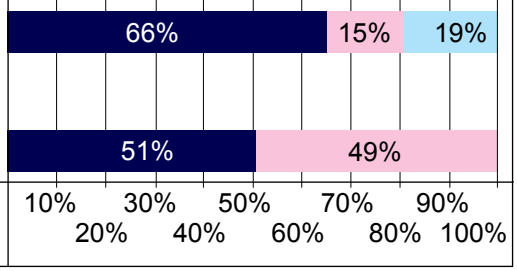
Operational Plan Preparation (OPP)
Objective: Based on information provided by other UTM SPs, provide web-based tools to UAS operators for
preparation and optimisation of the operation plan before submission.

Would like to be involved in the standard production process



Risk Analysis Assistance (RAA)
Objective: Provide to UAS operators and to civil aviation authorities web-based tools to support development and evaluation of risk assessments prior to operations.

Would like to be involved in the standard production process



E-REGISTRATION

FIG. 28 - AVAILABILITY & COST

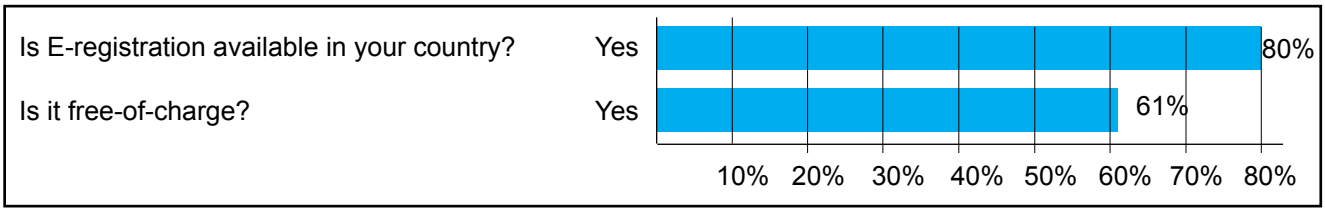


FIG. 29 - ANNUAL COST IN €

Albania	30 €
Austria	31,20 €
Belgium	100 €
Denmark	10 €
Finland	30 €
Italy	6 / 24 / 98 €
Jamaica	Not Applicable
Kenya	200 €
Lithuania	10 €
Malaysia	45 €
Netherlands	10 / 25 / 70 €
New Zealand	Not Applicable
Norway	18 €
Spain	50 €
UK	10 €
USA	4,20 €

7 Respondents did not know
4 Respondents indicated that E-registration was not applicable in their country
Respondents from 6 countries did not reply

FIG. 30 - MINIMUM AGE

Albania	16
Australia	18
Austria	18
Belgium	16
Bulgaria	16
China	12
Czech Rep.	18
Denmark	15/16
Estonia	16
Finland	18
France	14/16/18
Germany	16/18
Italy	14/16/18
Jamaica	Not Applicable
Kenya	18
Lithuania	16
Malaysia	18
Netherlands	16
New Zealand	Not Applicable
Norway	18
Poland	16
Portugal	16
Spain	14/16/18
Sweden	16
Switzerland	18
UK	16
USA	16/18

21 Respondents did not know
2 Respondents indicated that a minimum age was not applicable in their country

UAS GEOGRAPHICAL ZONES (GEO-ZONES)

FIG. 31 - EXISTING GEO-ZONES

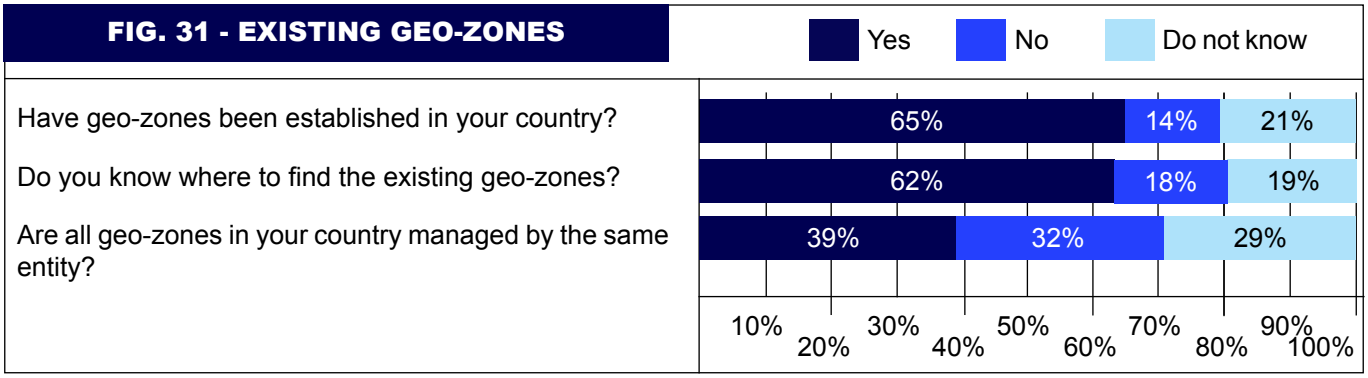


FIG. 32 - RESPONSIBILITY - MANAGEMENT OF GEO-ZONES & GEO-AWARENESS SERVICE PROVISION

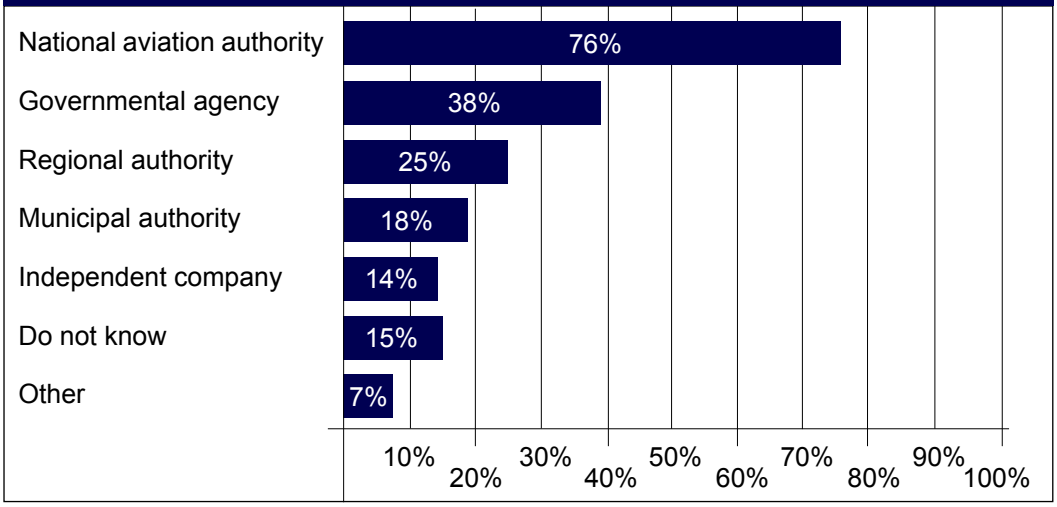


FIG. 33 - ACCOUNTABLE GEO-AWARENESS MANAGER

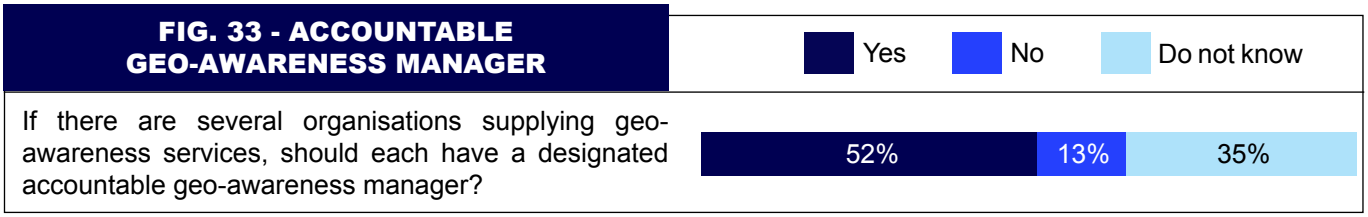
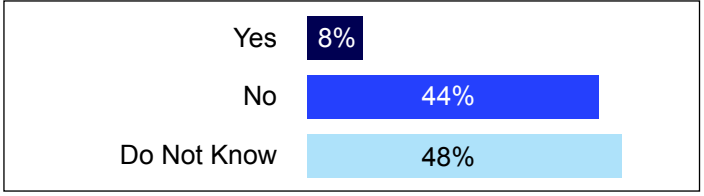


FIG. 34 - IS THERE A CHARGE FOR THE GEO-AWARENESS SERVICE?



AW DRONES

AW-DRONES

Harmonising drone standards to support the ongoing EU regulatory process

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A **reliable regulatory and standardisation framework** for drones could generate potentially

100,000 jobs*

**European Drones Outlook Study, issued by SESAR*

AW-Drones fosters the rulemaking process to enable safe and reliable civilian drones operations in the European Union.
To this end, the project collects drone technical standards, rules and procedures already developed worldwide and assesses their compliance to EU regulatory requirements, showing the coverage of **EASA's SORA and U-space regulatory requirements and airworthiness design, and in the end proposing a set of rules, technical standards and procedures for drone operations to comply with EU regulation.**

OBJECTIVES

The project will achieve this target through 2 sub-goals:

1

PROVIDING A REPOSITORY OF TECHNICAL STANDARDS AND "BEST PRACTICES" TO THE DRONE COMMUNITY.

The project has produced an Open Repository of existing standards and "best practices" to support the European Aviation Safety Agency and the European Commission in their rulemaking process.

2

PROPOSING AND VALIDATING WITH RELEVANT STAKEHOLDERS A SET OF TECHNICAL STANDARDS TO COMPLY WITH EXISTING REGULATION FOR DRONE OPERATIONS.

AW-Drones will propose the most suitable technical standards for all relevant categories of drones operations.

METHODOLOGY

TOP-DOWN AND BOTTOM-UP APPROACH

In order to propose best practices and standards, AW-Drones adopts a twofold approach:
a top-down collection and assessment of rules, procedures and standards already developed worldwide, and a bottom-up consultation with key stakeholders and end-users to ensure that standards are adequate and as agreed upon as possible to fulfill regulatory requirements.

MULTICRITERIA ANALYSIS

In order to assess the standards, AW-Drones adopts a Multi Criteria Analysis methodology, a tool used to compare and rank different options, especially when involving conflicting objectives. It is often used when the effects of an option on multiple aspects must be considered (for example, the effect of a proposed new regulation on safety, cost, the environment and society).

EASA uses Multiple Criteria Analysis in the Preliminary Rulemaking Impact Assessment.

The method used by AW-Drones is in line with the EASA pre-RIA method as well as with the guidelines for impact assessment provided by the European Commission (EC).

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AW DRONES

OUTCOMES

Aiding European aviation in conquering the challenges of drones

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Recommended standards

For each requirement stemming from SORA, U-space regulations and the Special Condition Light-UAS, AW-Drones identified a set of recommended standards. Each standard has been assessed against a number of parameters to determine if it is suitable to be used as a Means of Compliance. Depending on the score of the supporting standard, each requirement is classified as:

- **green if the recommended standards fully cover the requirement and their individual score is sufficiently high;**
- **yellow if the recommended standards do not fully cover the requirement or if their individual score is not sufficient to recommend them;**
- **red if the requirement is not covered by existing standard;**
- **no standard required.**

SORA Ground Risk Mitigations – Requirements coverage

REQUIREMENT	TITLE	ROBUSTNESS COVERAGE		
M1 - NON TETHERED	Strategic mitigations for ground risk	L	M	H
M1 - TETHERED	Strategic mitigations for ground risk	L	M	H
M2	Effests of UA impact dynamics are reduced	L	M	H
M3	An emergency Response Plan is in place, operator validated and effective	L	M	H

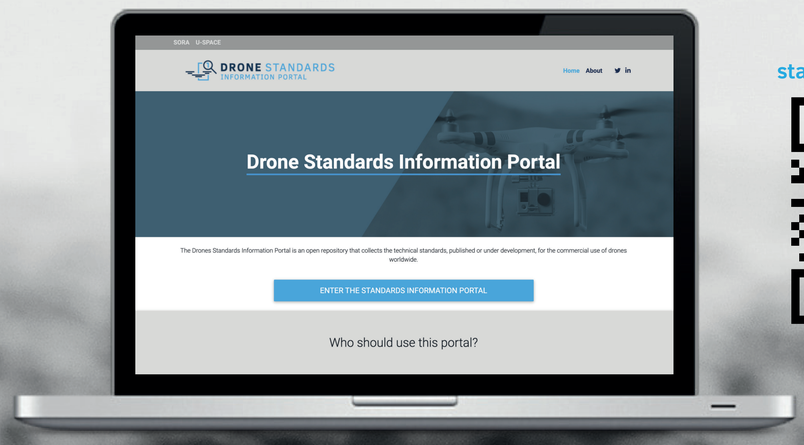
The AW-Drones final report will contain a synthesis of the results, with the above color-coding and a detailed assessment of all standards supporting each requirement.

Drone Standards Information Portal

The **Drones Standards Information Portal** is an open repository that collects the technical standards, published or under development, for the commercial use of drones worldwide that the project is collecting and assessing against existing and foreseen regulations. It is aimed at becoming a single point of access, offering relevant information about:

1. **rules, procedures and technical standards developed for civilian drones.**
2. **information on standards' maturity level, coverage of regulation, and identified gaps.**
3. **technical standards for each category of drone operations.**

Target: the tool benefits drones operators in the risk assessment and implementation of mitigations, and the European Aviation Safety Agency (EASA) and the European Commission (EC) in the rule-making process.



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standards.aw-drones.eu

Surveys on the operator's perspective of drones

During the last two years, AW-DRONES carried out two surveys with the aim to explore the drone operator's perspective of SORA and U-space.

Put together with the assistance of experts with complementary expertise from various countries, the surveys meant to collect insight from the whole UAS community, including operators and manufacturers, also welcoming feedback from other aeronautical stakeholders.
The surveys examined the current and near-future situation for multiple market sectors in the European UAS industry.

The survey on the operator's perspective of SORA

In May 2020, AW-Drones launched a survey on the operator's perspective of SORA. The UAS OPS survey on drone operations & safety risk assessment gave the European drone operators community a chance to provide their opinion on current and future drone operational matters. It identified the market sectors in which drone flight operations were taking place in compliance with the applicable rules or regulations, and their mission purposes.

The survey on the operator's perception of U-Space

In April 2021, the project promoted another survey, meant to collect insight on U-space.
After evaluating the comprehension of U-space in the Single European Sky (SES) Member State area, it assessed the knowledge level, expectations and concerns of the UAS community about U-space and its implementation. It also gathered opinions on the technical standards required to implement U-space and identified bottlenecks and gaps.

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