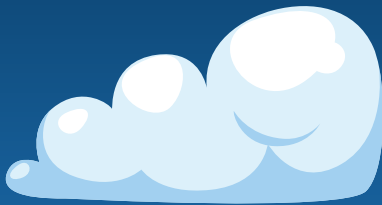
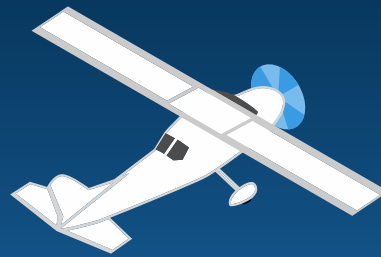
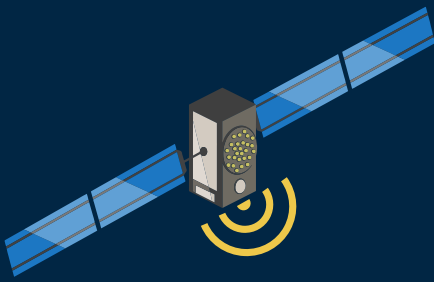




certiflight



# Certiflight survey report

August 2023







# certiflight

Certified E-GNSS remote  
tracking of drone and  
aircraft flights

## Certiflight survey report

August 2023

Granting Authority:



Funded by the  
European Union

This project has been funded by the European Union. However, the views and opinions expressed are those of the Certiflight consortium only and do not necessarily reflect those of the European Union or EUSPA, the European Union Agency for the Space Programme (the "granting authority"). Neither the European Union nor the granting authority can be held responsible for them.

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There is no reliable system to ensure the position and flight path information of UAS and general aviation aircraft with legal validity.

Certiflight proposes a new U-space service that certifies tracks with a digital system.

We conducted an online survey to define the needs of the Certiflight future users.

The online survey was promoted using the project

and partners' social networks and it was also performed by the members of the Advisory Board held in May 2023.

The present document analyses the results of the survey and other feedback received during the Advisory Board workshop. These results will be considered during the design phase of the project.



# certiflight

To know more information about the project CERTIFLIGHT, please contact or follow us at:

 <https://certiflight.info>

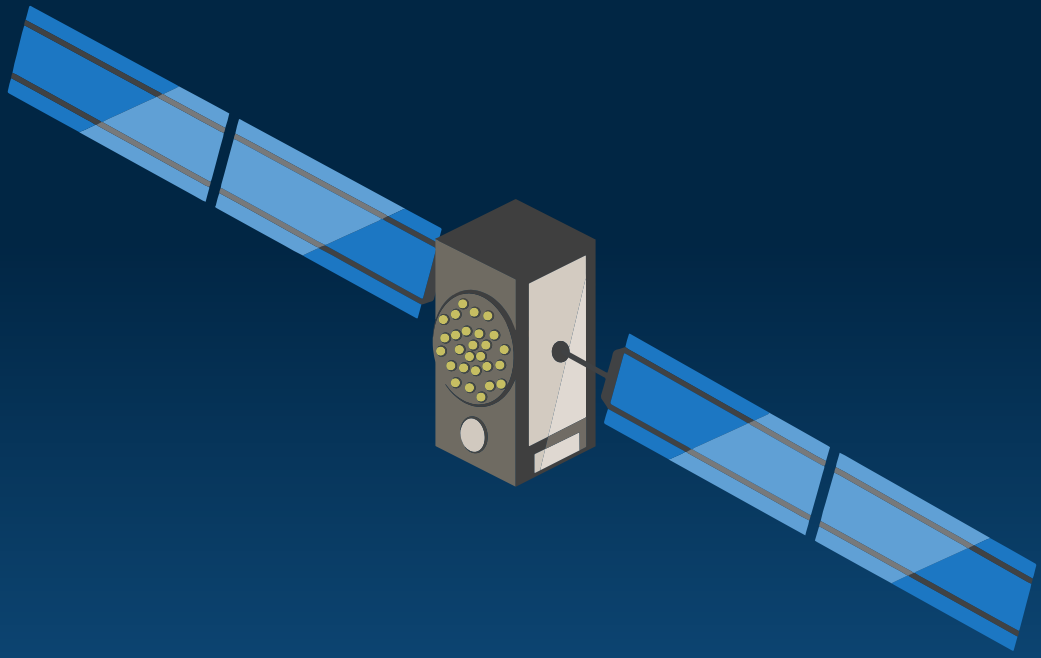
 [info@certiflight.info](mailto:info@certiflight.info)

 [@certiflight](https://twitter.com/certiflight)

 [certiflight](https://www.linkedin.com/company/certiflight)







# Introduction

# About Certiflight

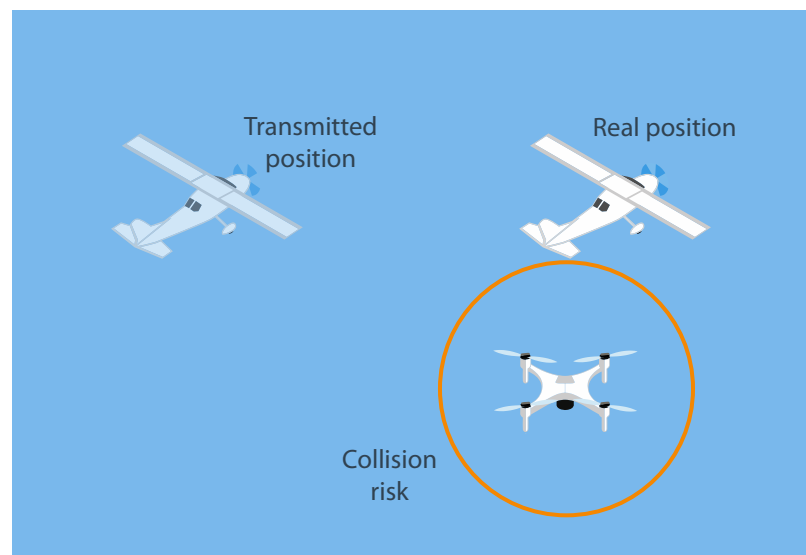
## Why Certiflight?

Currently there is no system capable of reliably ensuring the position and flight path information of UAS and general aviation aircraft with legal validity.

There is a rising number of drones accessing airspace below 120 metres to perform increasingly complex operations and flying alongside manned aviation.

The European Union requires that manned aircraft flying in designated airspace, called U-space, have to detect nearby drones, and be detected by them. This is called electronic conspicuity.

In Beyond Visual Line of Sight operations, drone pilots can only rely on the position transmitted by other users.



## Timeline

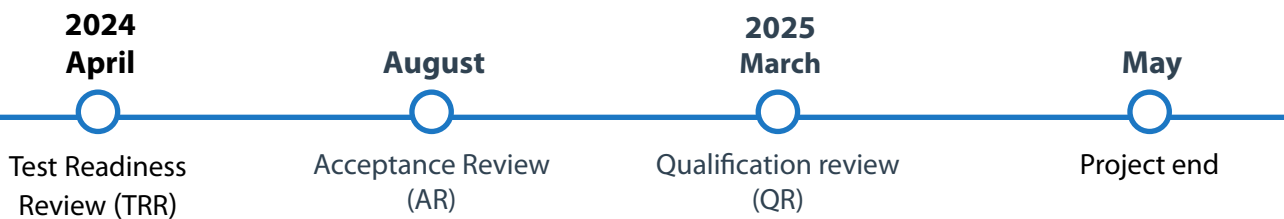
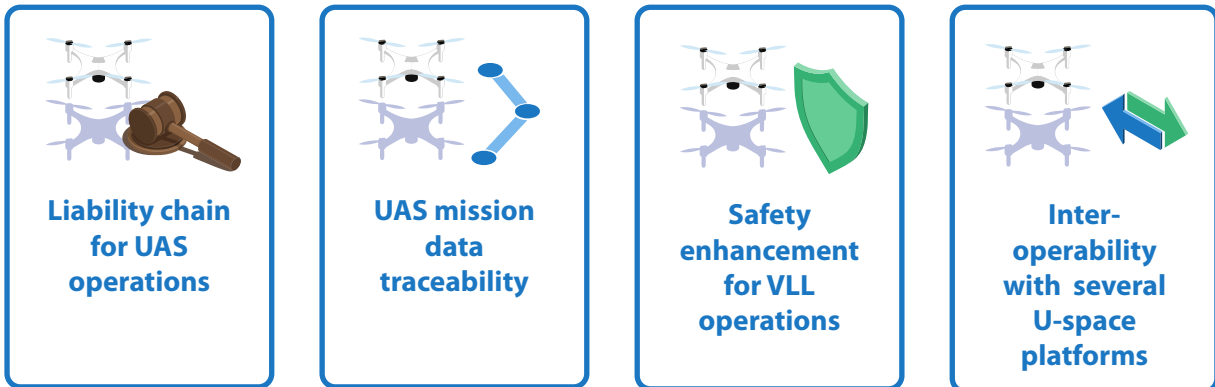


# Project benefits

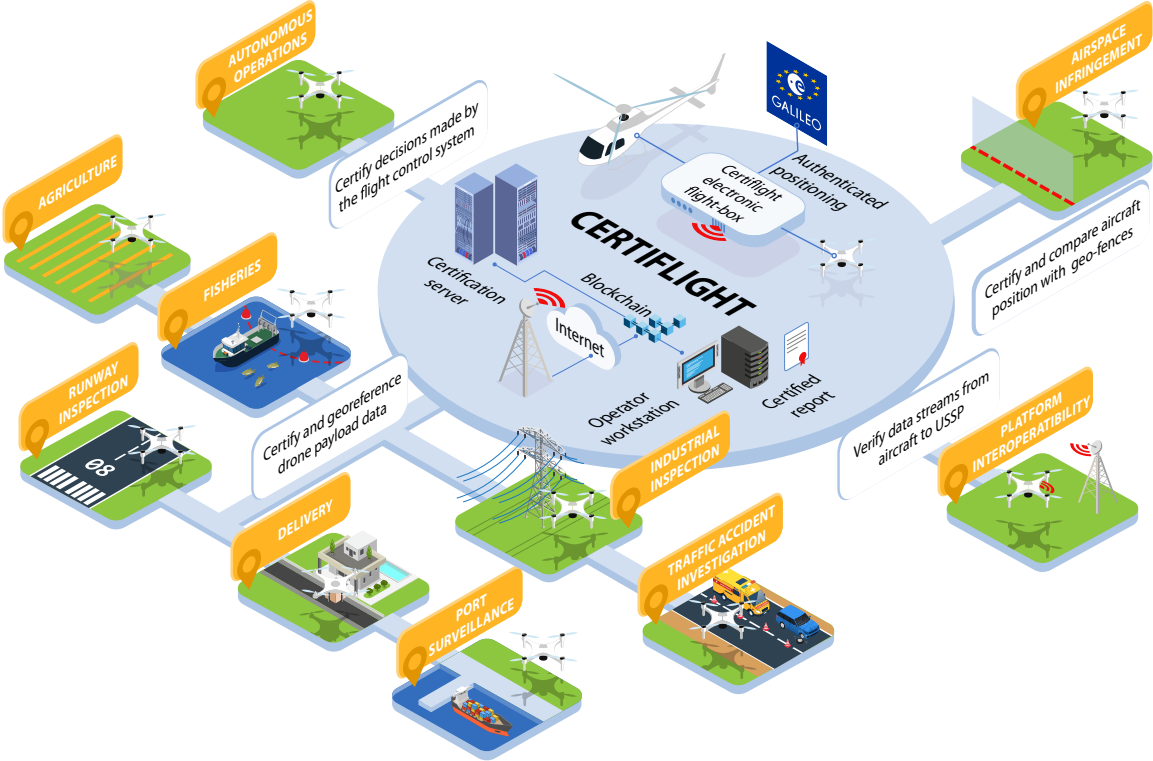
The Certiflight system will establish the "chain of trust" of flight position information of drones and general aviation aircraft

Certiflight will also legitimise the use of "smart contracts", by activating the contractual condition on the basis of particular flight routes and performance

- Certiflight stores flight tracks in a dedicated blockchain ensuring that nobody can change data after it is stored.
- Three U-space service providers will test Certiflight, guaranteeing the interoperability of the system.
- The recorded flight tracks, with associated images and data gathered by the sensors on-board, will be useful for many applications.



# Certiflight concept



# Partners



# Glossary of terms

<b>Acronym</b>	<b>Term</b>
AR	Acceptance Review
CDR	Critical Design Review
CP	Check Point
DGNSS	Differential Global Navigation Satellite System
EGNOS	European Geostationary Navigation Overlay Service
GNSS	Global Navigation Satellite System
MTOM	Maximum Take-Off Mass
OSNMA	Open Service Navigation Message Authentication
PDR	Preliminary Design Review
PPP	Precise Point Positioning
PVT	Position, Velocity, Time
QR	Qualification Review
RTK	Real Time Kinematics
SME	Small and Medium Enterprise
SBAS	Satellite Based Augmentation Systems
TRR	Test Readiness Level
UAS	Unmanned Aerial System
USSP	U-space service provider
UTM	Unmanned Traffic Management





# Certiflight survey

# Participants in the survey

We conducted a survey through an online form hosted on the project’s website: <https://certiflight.info> from April to May 2023. We publicised the survey through the project and partner’s social networks. Also, the members of our Advisory Board conducted the survey during the first workshop that took place in Naples in May 2023.

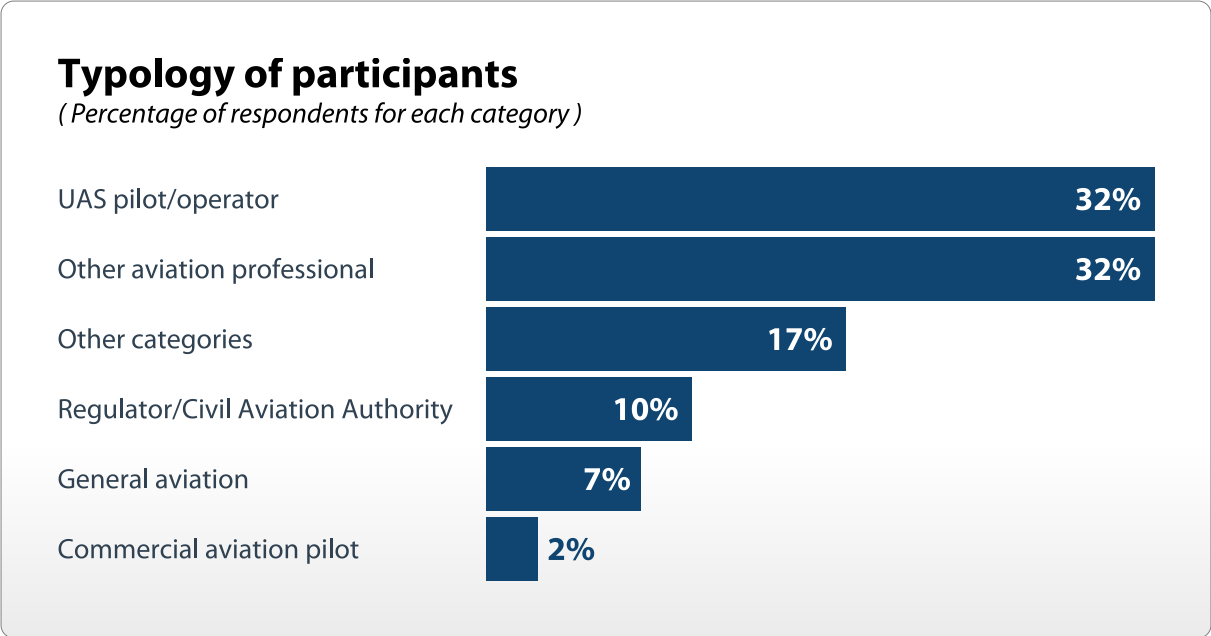
A total of 41 people representing the major target groups for the project completed the survey. We believe the survey has served the purpose of identifying the key aspects under consideration.

## Typology of participants

The chart below shows that “UAS pilots or operators” and “other aviation professionals” got the most responses, around one third each.

We should note that the category of general aviation pilots was underrepresented, with just 7% of the participants belonging to this category. Since general aviation is key to the success of the project, the consortium should find other means to engage with this community.

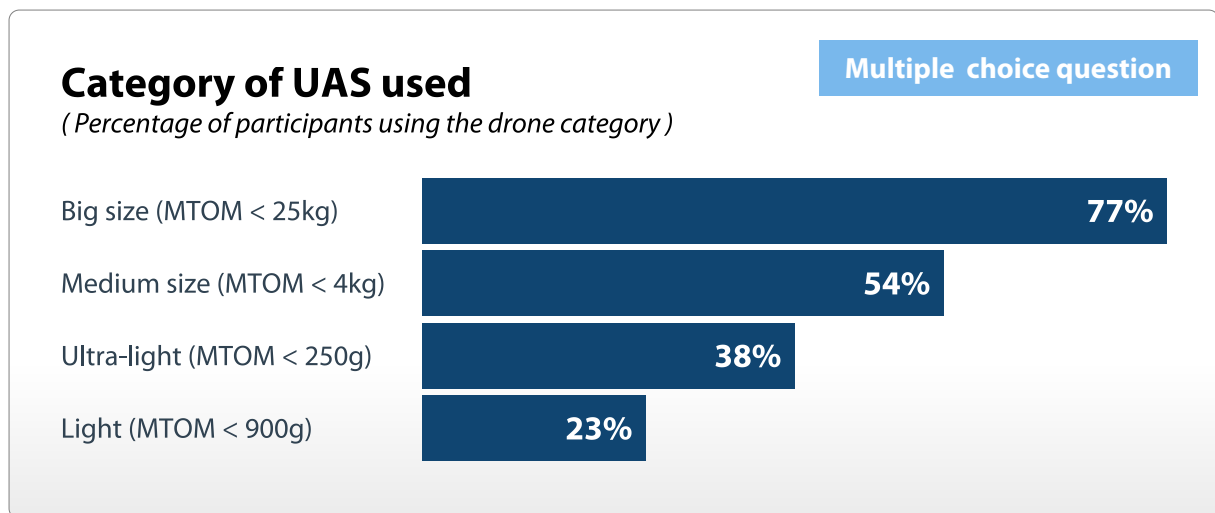
We asked UAS pilots and operators for additional information about their equipment and activities and their responses are described next.



# Category of UAS used

We were interested in knowing the size of the UAS used by the respondents in the survey. The vast majority of respondents (77%) use big size drones (defined as those with an MTOM between 10 and 25 kg). This is good news, meaning that the size of the UAS will not be a concern to accommodate the Certiflight UTM box.

Since this was one of the multiple-choice questions, the participants could select more than one answer to the question. Here, the number of answers per respondent was 1.9. Thus, on average, our participants operate UAS pertaining to two categories of size.



**Multiple-choice questions**

Several questions of the survey accepted multiple answers. For multiple-choice questions, we have added a label to the chart and use the average number of answers per respondent to analyse the results.

# UAS applications

Next, participants from the UAS sector responded to the question regarding the operations they perform.

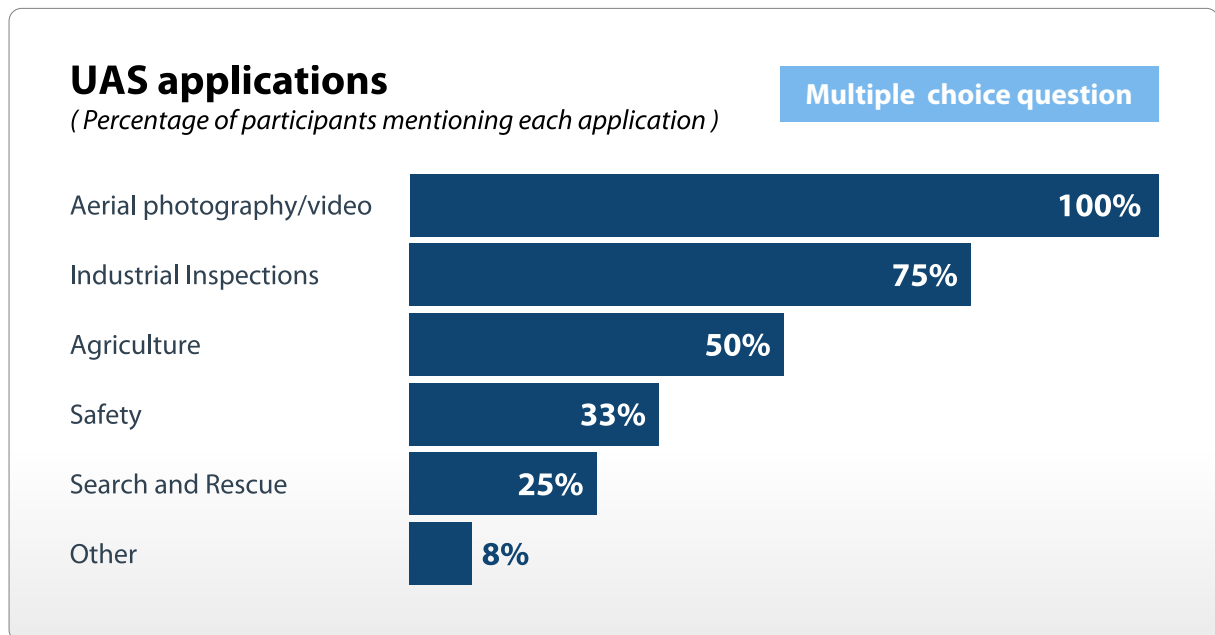
Remarkably, all the participants declared to be engaged in Aerial photography or video recording operations, followed by industrial applications (77%), and agriculture applications (50%).

Since this question was also multiple choice, we can infer from the answers received that UAS pilots and operators are engaged in nearly three categories of operations on average (2.9 answers per participant).

This signifies that the UAS sector is still immature, since it lacks the specialisation that is common in more mature markets. As the market develops, we expect that operators will focus on the application in which they have more expertise.

Two of the use cases planned for the Certiflight validation process correspond to the second and third more popular applications (i.e., industrial inspections and agriculture). This is good news.

See also the section on the advisory board for more information regarding the valuation of our planned use cases.



Even though the number of participants in the survey was low, we consider that we have obtained relevant information

# Use of U-space

Certiflight is developing a U-space service. For that reason, we wanted to gather information

regarding the use of U-space by the community.

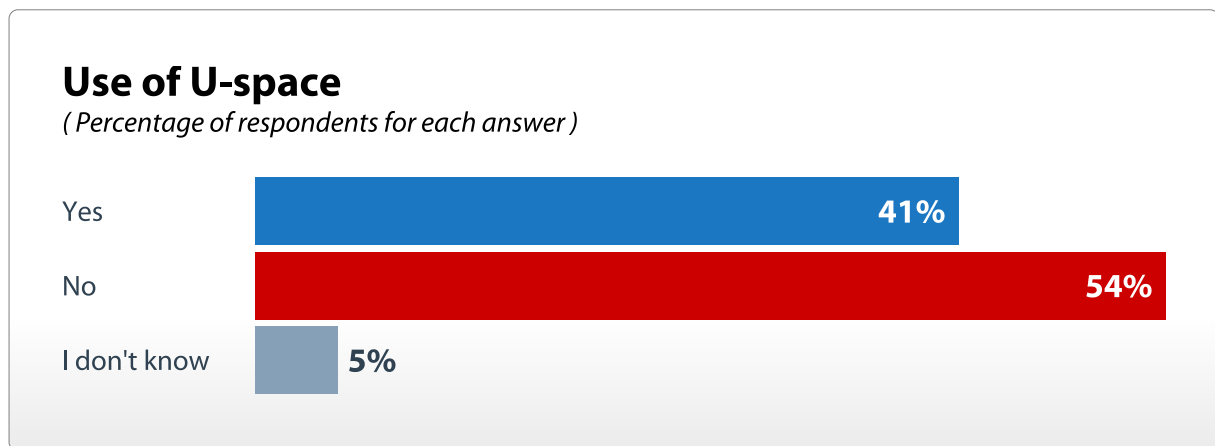
## Use of U-space

We asked the participants "Have you used at least one U-space service for your operations?"

41% of the respondents had a positive answer. This is remarkable considering only 32% of the respondents belong to the UAS category (see the previous section).

Only 5% of the respondents were not sure of whether they have used U-space.

Based on the previous section, even those that are not directly involved in aviation (17% of the total) are aware of U-space. This implies that knowledge about U-space is already widespread in the community.



# U-space services

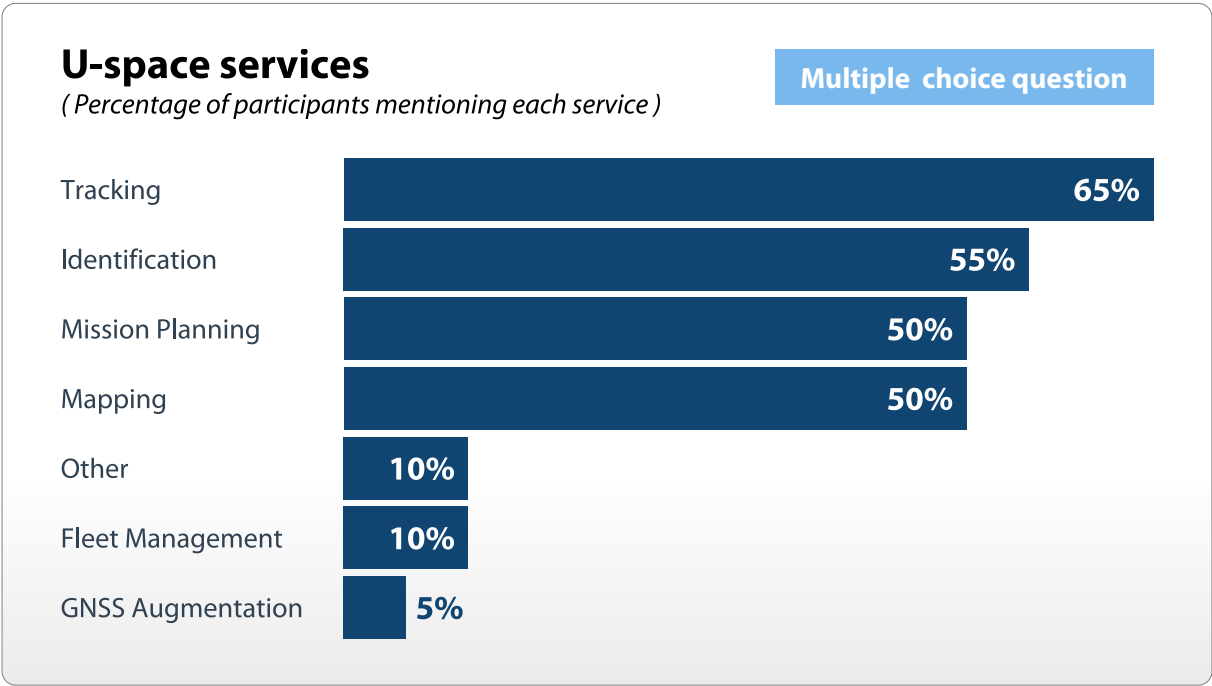
To those that affirmed the previous question, we inquired about the U-space services they have used.

Tracking, identification, mission planning, and mapping are the top four services, used by two-thirds to half of the respondents. On average, each user uses three services (2.9 answers per respondent).

10% of the participants mentioned the registration service. We did not include registration as one of the default answers (we

show it as "Other" in the chart below). Certain EU countries require registration of the aircraft before engaging in UAS operations. This makes this U-space service mandatory for their operators.

It is relevant that only 5% of the respondents checked the GNSS augmentation service. We discuss this issue further in the next section.



U-space has matured. Users know it and use the services that are most appropriate for their needs.

# GNSS issues

GNSS is a key component of the Certiflight solution. For that reason, we had an entire

section dedicated to issues related to GNSS, EGNOS and the OSNMA Galileo service.

## GNSS equipment

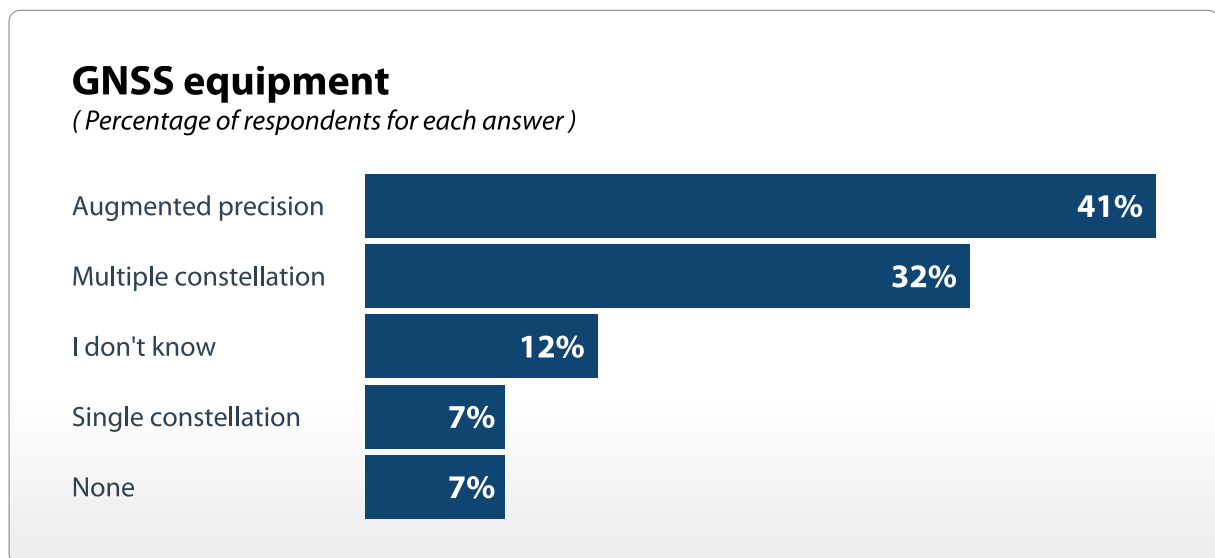
The first question in this section enquired about the equipment used by the respondents.

The more popular answer was “Augmented precision”, followed by “Multiple constellation satellite positioning”. Together, the two more advanced equipment comprise three-fourths of the total answers.

This contrasts with the answer to the use of the U-space augmentation service (see the

“participants in the survey section”). 41% of the respondents use a hardware-based augmentation system such as RTK, PPP, DGNSS or SBAS, while only 5% use a U-space based augmentation service.

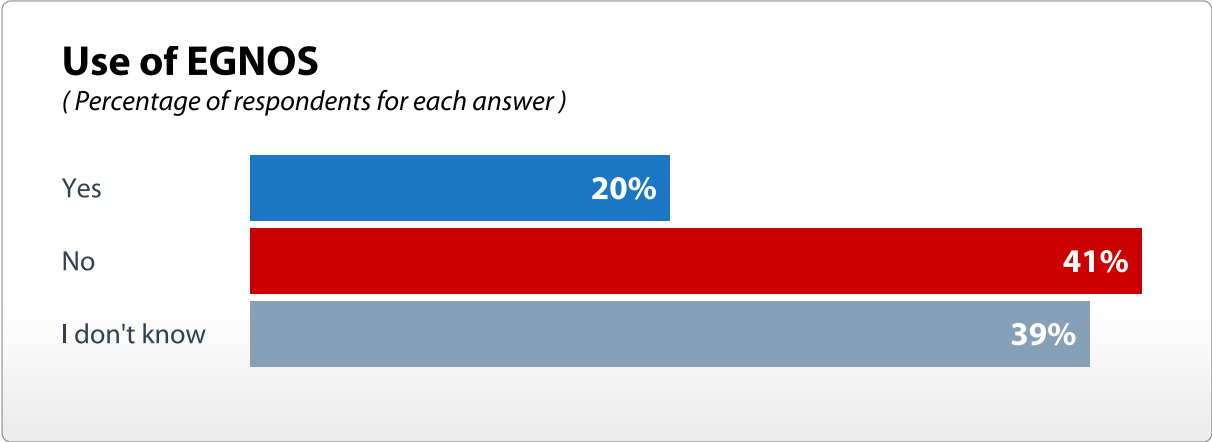
We can infer that there is a need for augmented precision positioning, but USSPs are not providing a viable solution. This is an opportunity for Certiflight that combines a hardware solution with the certification service.



# Use of EGNOS

Next, we asked the participants if they use EGNOS. Only 20% answered positively. Even considering that 39% were unsure, it somewhat contradicts the results of the previous question (73% reporting the use of advanced GNSS equipment).

Perhaps, the conclusion is that EGNOS is not yet well known by the community. In consequence, we shall strive to promote the EGNOS service as part of our communication and dissemination efforts.



# EGNOS features

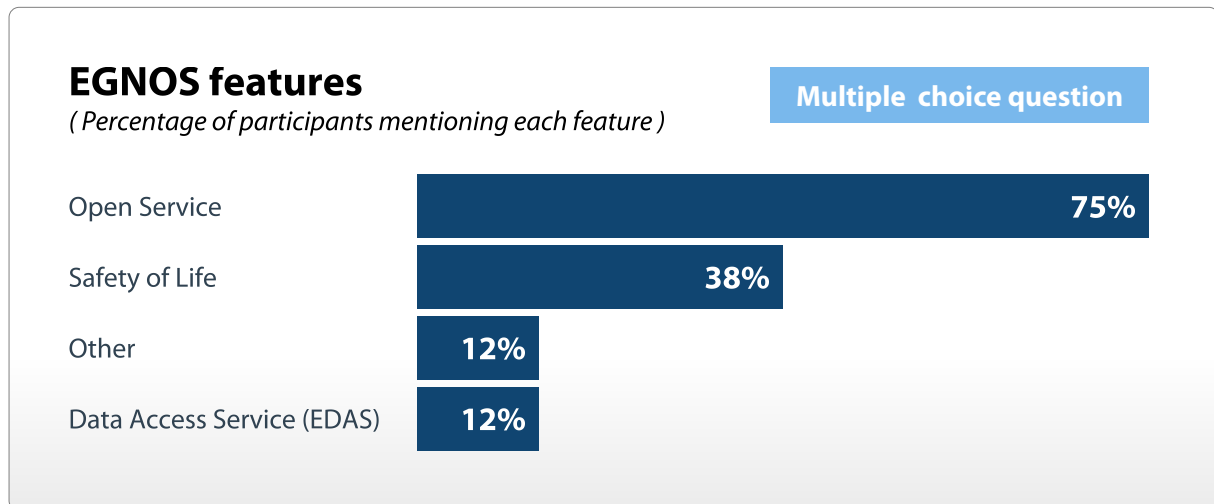
Those that answered positively the previous question were asked what specific features of EGNOS they use. A vast majority, 75%, reported using "Open Service", followed by "Safety of Life" used by 38% of the respondents.

As a control, we added the option "None of the above", which was selected by 12% of the respondents. Since EGNOS currently only offers the three listed features, this result further

confirms the lack of understanding of EGNOS by the community.

The "Data Access Service" (EDAS) was the least popular service with just 12% of the participants reporting using it.

Also of note is that being a multiple-choice question, we can determine that the average user only uses 1.4 EGNOS services.



**Ranking questions**

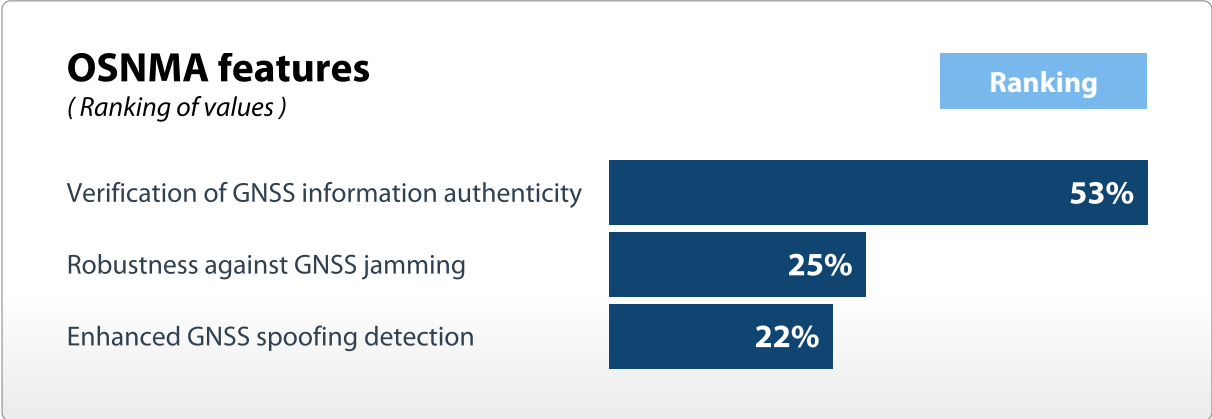
The survey had two questions where participants ranked service features by moving labels up and down. To interpret the results, we have applied a standardisation operation to ensure that the "weights" got add up to 100%. As a reference, if there were three equally valued features, they would get a 33% weight each.

# OSNMA features

We completed this section with a ranking of the three key features of OSNMA, getting the following result:

- Verification of GNSS information authenticity: Weight 53%
- Robustness against jamming: Weight 25%
- Enhanced GNSS spoofing detection: Weight 22%

The authentication feature ranked the highest as expected. But jamming and spoofing had less variation in rankings than we would have thought. Unfortunately, the sample was too small to draw firm conclusions.



Participants in the survey use advanced GNSS equipment to get high confidence in their position to carry out their operations. To achieve it, they prefer hardware-based solutions to EGNOS, which is poorly understood.

# E-conspicuity issues

In this section, we enquired the participants about their preferred method to comply with the future requirement to ensure electronic conspicuity (EC) in their operations.

Electronic Conspicuity is an umbrella term for a range of technologies that in their most basic form, transmit the position of the host aircraft to other airspace users operating compatible equipment. More advanced devices can transmit and receive the drone’s position, displaying and alerting pilots to air traffic

conflicts with compatible EC devices. EC devices modify the traditional aviation method for pilots to *see and avoid* other aircraft, into *be seen and avoid*.

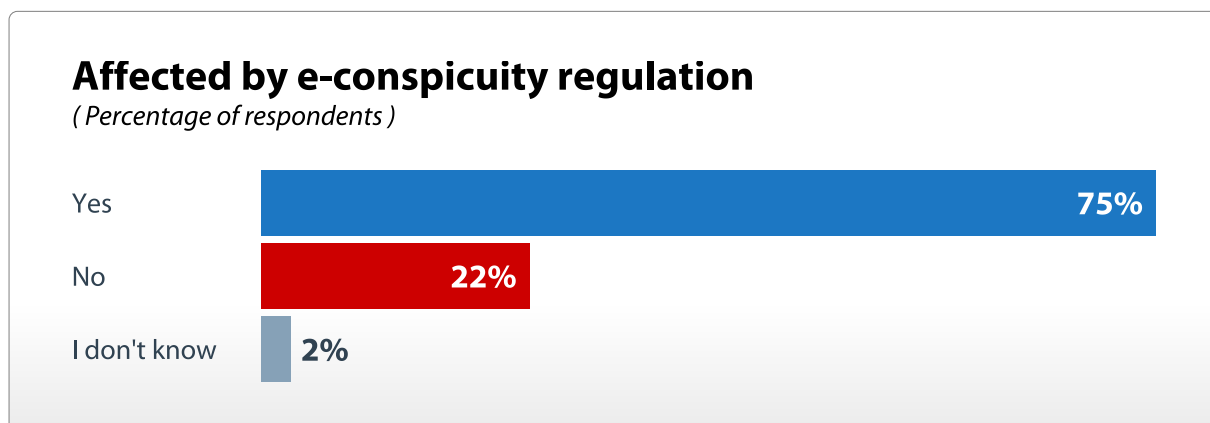
The regulation will make compulsory the use of an approved EC method compulsory to operate in certain sections of the airspace where there are no traditional ATM procedures available.

## Affected by e-conspicuity regulation

We surveyed participants to find out if they were aware of the future impact of electronic conspicuity regulation.

75% of the respondents answered it would and only 2% were not sure. The participants’

knowledge of future regulations affecting future U-space operations is a positive outcome of the survey.



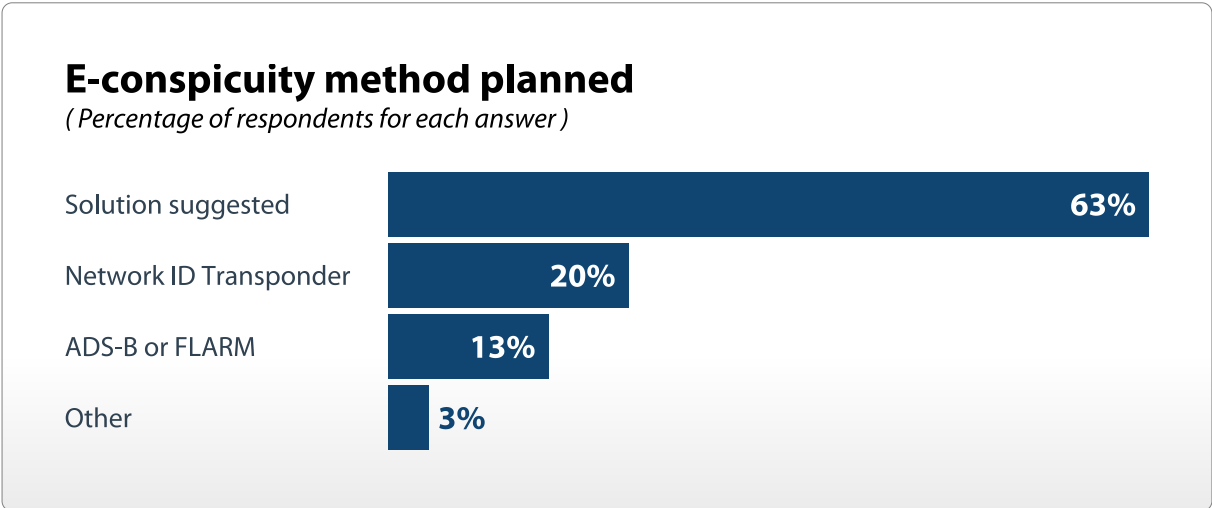
# E-conspicuity method planned

Those that reported it would affect them were further asked about the method they consider to complying with the requirement.

About two-thirds of the respondents (63%) had not formed an opinion and would use whatever method was suggested by their USSP or civil aviation authority.

For those that had an opinion (one third of the respondents), 20% were planning to use a Network ID transponder and 13% ADS-B or FLARM.

These results suggest Certiflight has a fair chance if we can gain support from enough USSPs and develop our solution on time.



Participants are aware of the future electronic conspicuity requirement. They have not yet chosen the technology they will use, providing an obvious opportunity for Certiflight.

# Liability issues

Those that reported it would affect them were further asked about the method they consider to complying with the requirement.

About two-thirds of the respondents (63%) had not formed an opinion and would use whatever method was suggested by their USSP or civil aviation authority.

For those that had an opinion (one third of the respondents), 20% were planning to use a Network ID transponder and 13% ADS-B or FLARM.

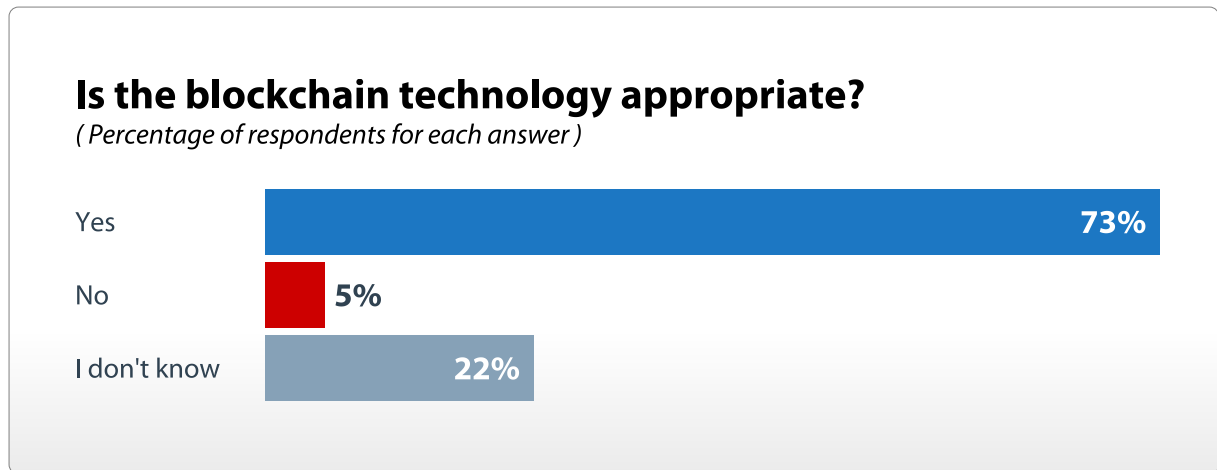
These results suggest Certiflight has a fair chance if we can gain support from enough USSPs and develop our solution on time.

## Is the blockchain technology appropriate?

We included this question to make sure using blockchain will not hinder Certiflight’s future adoption.

The 73% positive answers we received dispel any concern, showing that the community does not have concerns about the blockchain technology.

Conversely, the high percentage (22%) of respondents that did not express an opinion show that we have to educate potential users about the advantages of the blockchain ledger through our communication and dissemination activities.



## Do liability issues limit complex scenarios?

The aim of the next question is twofold:

- To determine if the respondents perceive liability related issues as a blocking matter that limits the development of the drone market, and if so,
- Whether we could use this argument successfully to promote the Certiflight concept?

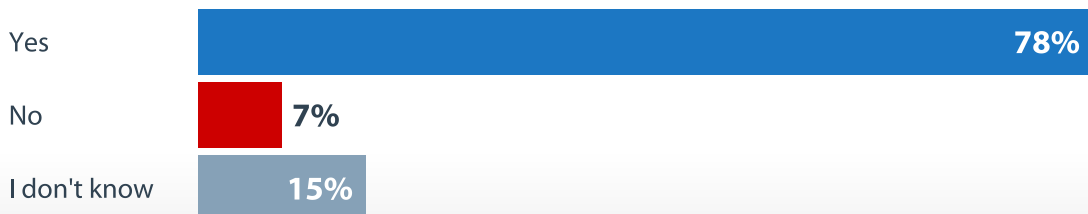
Based on the response, the community perceives liability issues as a limiting factor with 78% positive answers, although the percentage of participants not expressing an opinion was comparatively high (15%).

To further qualify the result, we gave participants a space to mention other blocking issues besides liability, after the direct question. We present the more significant answers received in the "Other feedback received" section.

We discuss in the next section other aspects related to the matter of liability in drone-based operations.

### Do liability issues limit complex scenarios?

(Percentage of respondents)



There are no concerns regarding the blockchain technology. Liability is considered a limiting factor for the development of the market.

# Certiflight features

The last section of the survey focused on the Certiflight proposed solution. The key objective of the questionnaire was to determine the perceived value of the different aspects of our solution. Gathering this information will help us determine project development and communication priorities.

## Certiflight features

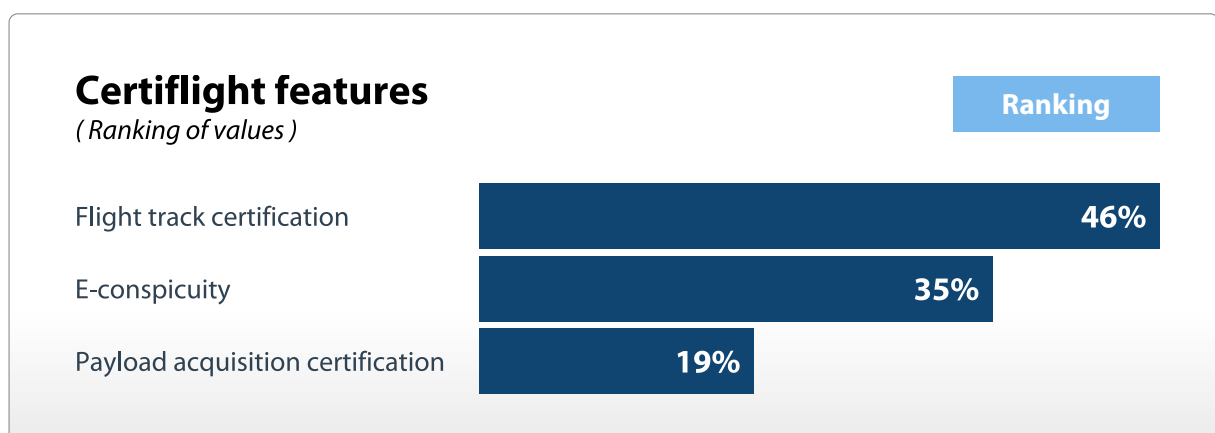
In the first question of this section, we asked the participants to rank the three key features of Certiflight:

- Flight track certification
- E-conspicuity
- Payload acquisition certification

The results show that the first one is the highest valued with a weight of 46%. E-conspicuity, the only feature that will be mandatory, ranked in the second position with an almost neutral weight of 35%. Remember that if there were no preferences, the three answers would get a weight of 33.3%.

It is also interesting to note that “certification of payload acquisition” had a very low weight of only 19%. This result, combined with the last question, which we will discuss below, means that the community does not yet consider the advantages of “smart contracts”.

Certiflight provides sufficient value beyond smart contract facilitation, but we believe that promoting this concept will increase the potential of our solution, even if the market is not yet ready. Therefore, we will endeavour to explain the advantages of smart contracts, both to operators and potential clients.



# Complex scenarios and insurance

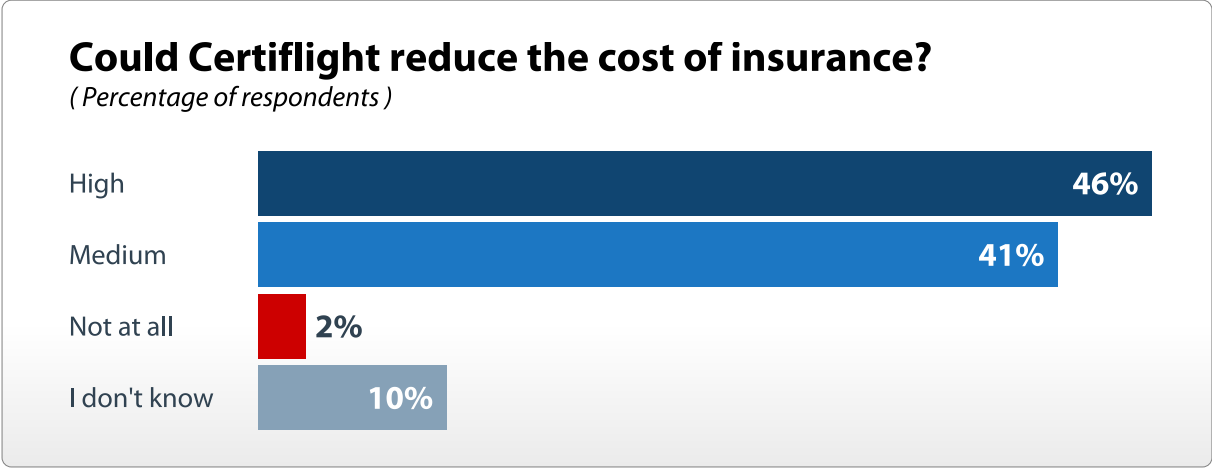
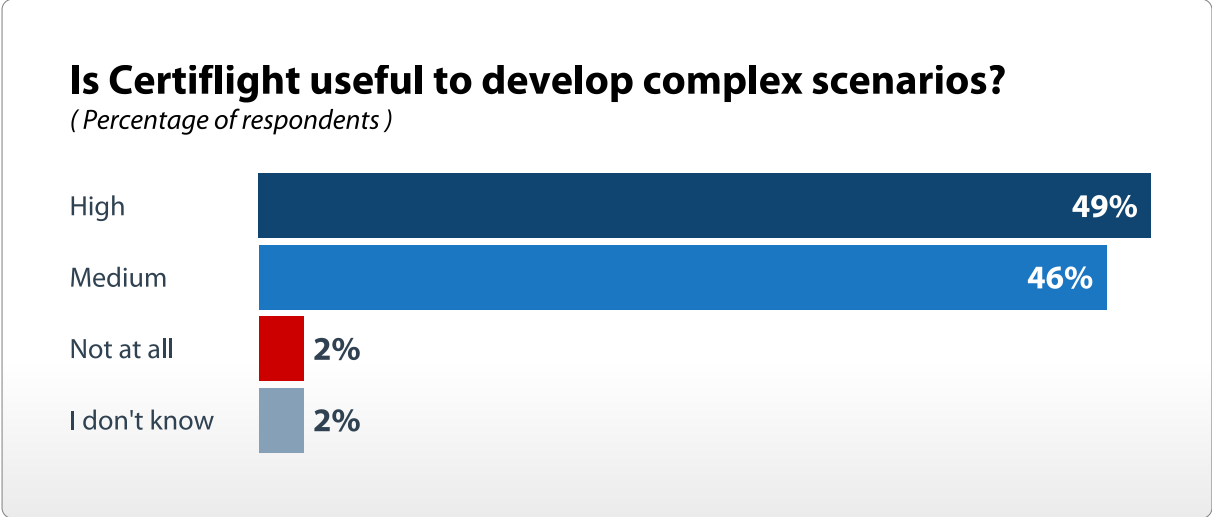
The next two questions are related to the liability issue described in the previous section. Thus, we should analyse them together.

In the previous section, we asked if liability could limit complex scenarios and we received a positive answer. In this section, we ask if Certiflight could be useful in developing complex scenarios, possibly by reducing these liability uncertainties.

To check that this is indeed the case, the next question is whether Certiflight could reduce the cost of insurance.

As seen in the following charts, both questions got very positive answers, confirming that the participants value the capability of Certiflight to promote the development of the market through the reduction of liability uncertainties which was already detected as an important blocking factor.

We should note that the participants were slightly less sure about the capacity of Certiflight to reduce the cost of insurance (up to 10% did not express an opinion).



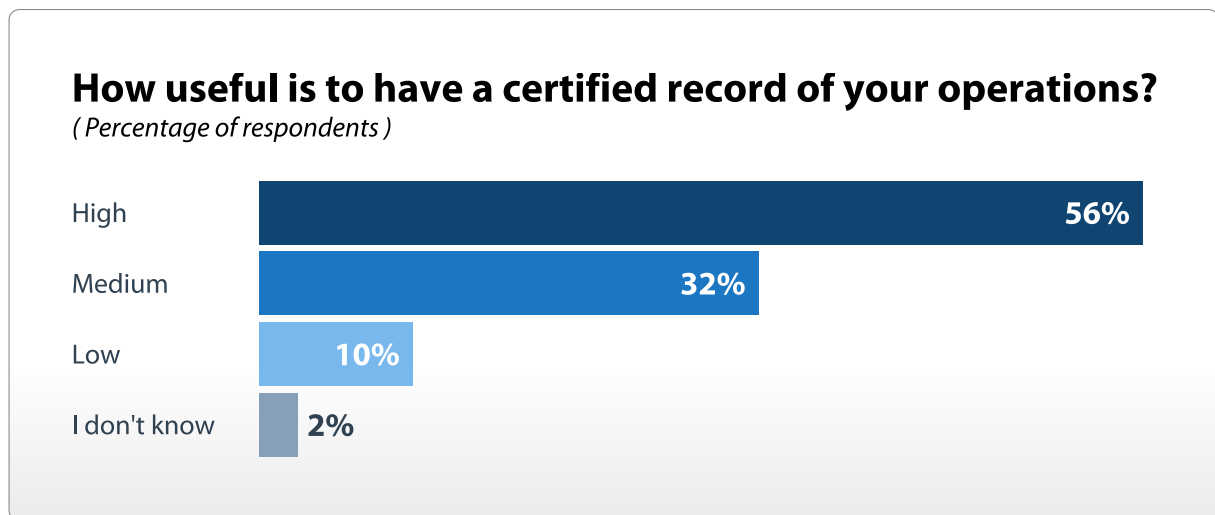
# How useful is to have a certified record of operations?

With this question, we wanted to know if the respondents see a value in having a certified record of their operations for different purposes. We provided a few examples:

- Training
- Licensing
- Accreditation
- Showcase for future clients

All the participants valued this feature, with no negative answers and only a 2% of respondents without expressing an opinion.

We should note that this is the feature that got the maximum percentage of "High" responses.



**Standardised questions**

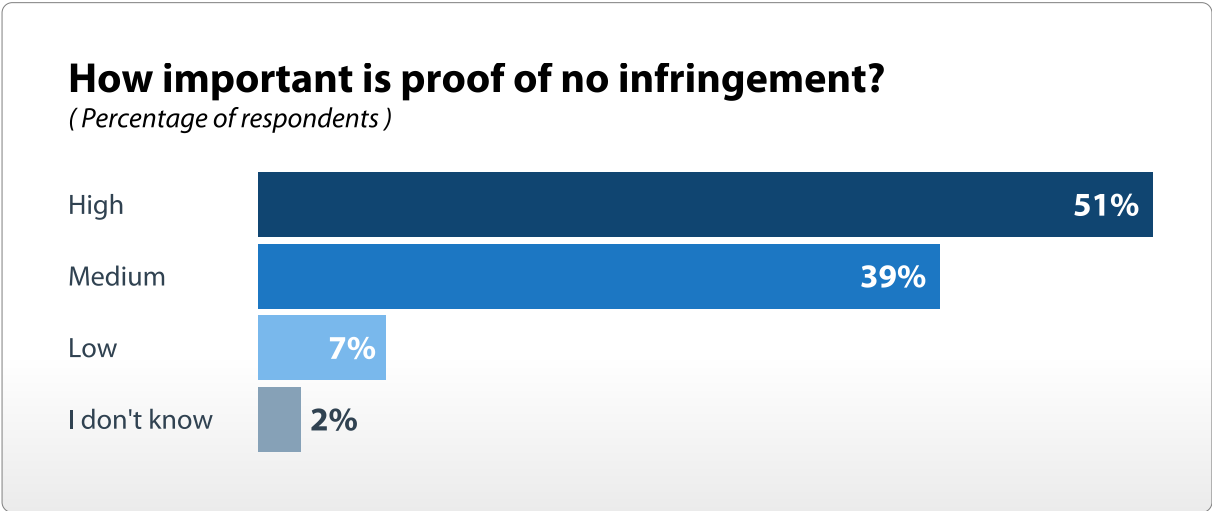
Most of the questions in this section asked for the agreement with the text of the question being asked. We provided different answers expressed differently to match the question, such as "Very important", "Very useful", etc.

To facilitate the comparison, we replaced the text of the answers with the standard levels: High, medium, low, and not at all.

# How important is proof of no infringement?

The following question enquired about the value of Certiflight to provide a proof of no infringement. For example, to show a drone stayed out of the controlled airspace while operating nearby.

It got also very positive answers, slightly lower than the previous question. This shows that proof of no infringement is a highly valued feature of Certiflight.



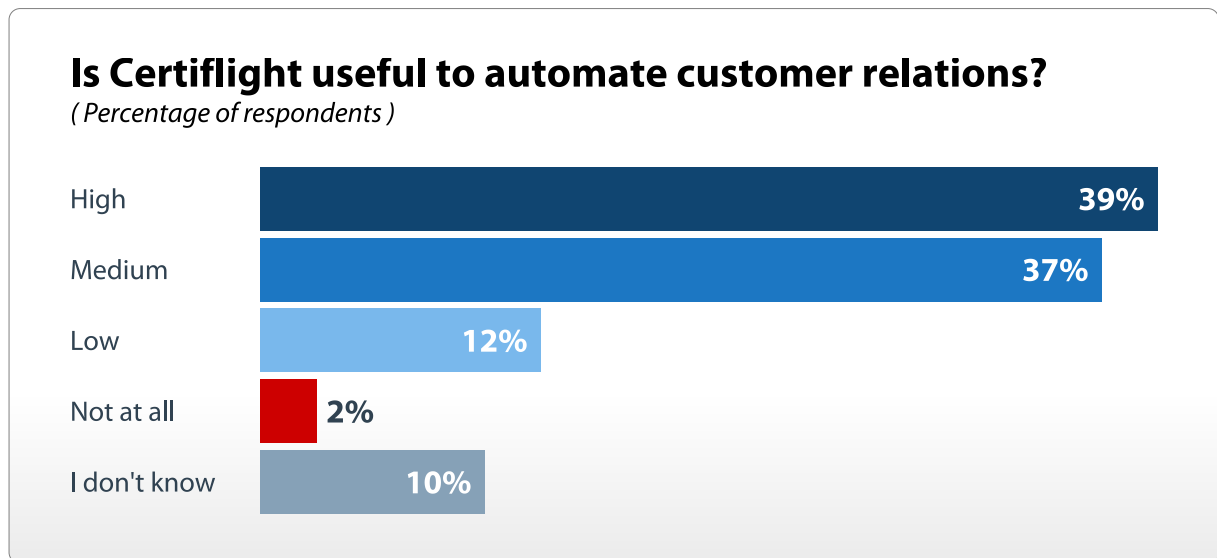
# Is Certiflight useful to automate customer relations?

The last feature of Certiflight assessed in the survey was business oriented. As we mentioned in the comments to the first question in this section, the participants in the survey have not evaluated the advantages of a service such as Certiflight to increase the value of the operations being carried out.

Even if the overall response was positive, this was by far the feature that got the lowest

ranked responses and a high percentage of respondents unable to provide an opinion.

This result reinforces the notion that we should strive to communicate business oriented benefits of Certiflight, besides the safety and regulatory oriented benefits.



The participants ranked very high the features of Certiflight, but we need to show that the proposed service can provide added value to the current operations.

# Other feedback received

We provided respondents with the possibility of sending us feedback through a few open-ended questions. We made them voluntary because usually people avoid writing lengthy answers online.

proportion of written comments, proving the interest of the participants in our project.

For their relevance, we present most of these comments with the minimal editorial changes.

For that reason, one of the positive outcomes of the survey is that we received a much higher

## Blocking issues

Lack of automation of processes, such as authorisation for simple operations.

Cost.

Lack of a Common Altitude Reference System (CARS).

Proper training and education.  
Misunderstandings between UAS and GA pilots.  
Need for simplified acceptable means of compliance and guidance material.

A certified USSP should be adopted and shall be mandatory to fly.

Reluctance to change.

Lengthy authorisation processes by national aviation authorities.  
Cumbersome and fragmented regulation and standards.

Liabilities come second. First there is the problem of blending manned air traffic and unmanned traffic into each other without conflicts. Depending on the scenario, this can be much more difficult than determining who is responsible in case of an accident.

Privacy. Undeveloped market.

Other airspace users that won't use e conspicuity.

Civil Aviation Authorities

Access to airspace, UAS overall reliability

Separation

Access to geozones. Information in 4-D manner.

Flight safety related to propulsion.

Implementation, regulation.

Authorization procedures requires time often incompatible with operational and business needs.

## General remarks

CERTIFLIGHT solution provides UAS and GA position to USSP. The 'be seen' part of conspicuity. I miss an effective solution on the 'see' part. How U-space users become aware of surrounding traffic without removing attention to their GCSs in case of UAS Remote Pilots, or their cockpit in case of GA pilots?

When will I be able to buy this service/product?

Certification flights are very useful for the flight of drones.

Cost of the service, including the device. Shall be accessible and tailored to the drone used, and the operations performed.

If finally developed and implemented, I think it should be mandatory for all flying devices, maybe the basic features of it, to enhance safety of all participants in the increasingly congested airspace.

Very interesting project indeed.

Typically, the GNSS sensor onboard a drone that provides PVT to the autopilot is multi-constellation so the non-Galileo satellites may still be vulnerable to (undetected) spoofing.

Very useful and meaningful implementation.

It might also be possible to assess CHIMERA for GPS to have authentication on both Galileo (with OSNMA) and GPS.

Trustable PVT may only be derived using exclusively signals from authenticated GNSS satellites.

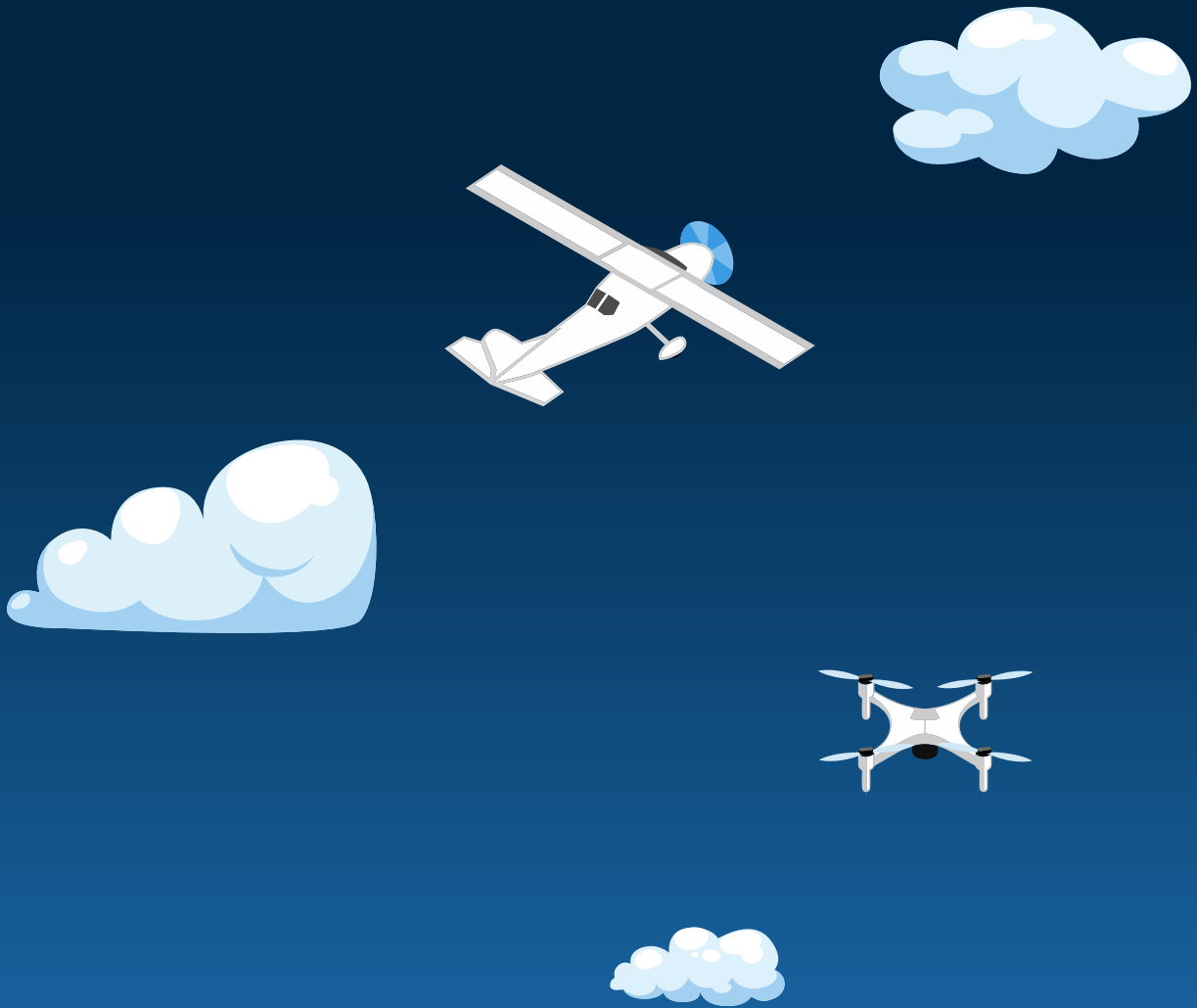
I don't know much about Certiflight's service, therefore couldn't answer many of the questions.

Very good idea!

Very important application for future fly work and fun.

The project would become more visible or get a bigger impact if it could perform an analysis on the current OSNMA receivers, the ideal configurations for each UAS mission, and if the flight data could be shared with the initial results, to discuss with the potential operators of similar use cases.





# Feedback from the advisory board

# Certiflight Advisory Board

The Certiflight Advisory Board is composed by stakeholders, end-users, and experts in the specific UTM/U-space domain with different expertise. The Advisory Board advises and directs the project to meet users' needs and promote the results.

We foresee three workshops to be held during the project at the following stages:

- A first meeting to present the concept of the project and consolidate user needs.
- An intermediate meeting to receive feedback on the developed solution.

- And a final meeting to share the results and lesson learned during the project.

The Advisory Board members will also have the opportunity to contribute to the results by delivering input to papers and concepts.

The board has representatives from institutions, associations, and SMEs who represent end-users and the UTM/U-space community.

## Members of the Advisory Board

Organisation	Category
AOPA Italia	Association
Aria United	Partner
ASNG	Industry
D-Flight	Partner
DTA Apulia	Partner
ENAC	Air Traffic Management
ENAV	Civil Aviation Authority
Eurocontrol	Aviation
European Commission	EU Public Institution
EUSPA	EU Agency
SIO	Partner
Tecnoln Spa	Industry
Tecnoln Spa	Partner
TopView	Partner
TSP Srl	Partner
Unifly	Partner
Università degli Studi di Napoli Federico II	Academia
Unmanned4You	Industry
Way4Ward	Partner

# Feedback received

As mentioned above, the first Advisory Board meeting took place in hybrid form (in person/online) in May 2023. The event was hosted at the Reale Yacht Club Canottieri Savoia in Naples and was attended by over 50 experts, including representatives of the European Commission, EUSPA (EU Agency for the Space Programme and funder of the Certiflight project), ENAC (Italian National Civil Aviation Authority), EUROCONTROL, drone associations, pilots and general aviation, as well as the project partners.

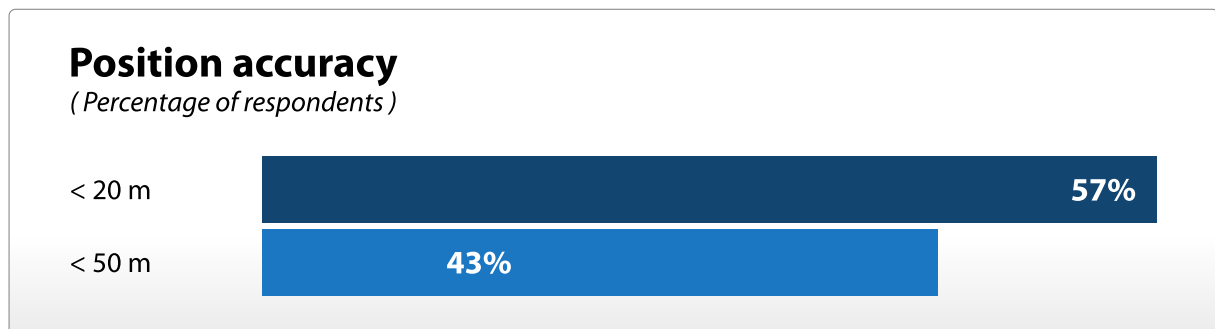
The workshop had constant interactive discussion aimed at collecting stakeholders' feedback, including specific real-time polls and the certiflight survey discussed in the previous chapter.

The consolidated data is presented below.

## Position accuracy

To determine the minimum level of horizontal position accuracy, we asked the members of the Advisory Board: "What is the minimum position accuracy needed to certify that a drone operation has been done in a specific area". We provided the following alternatives: <20 m, <50m, <70m and <100m.

As seen below, all the participants considered that the minimum accuracy should not exceed 50 m, and a majority considered it should be less than 20 m.



# Certification levels

Then, we asked about the drone certification level needed, considering these options:

- Certification of epoch
- Certification of epoch and place
- Certification of epoch, place, and data collected

Nearly 9 out of 10 participants (89%) thought the highest level was needed, but a small group (11%) believed only the certification of time and place was necessary.



# Safety alerts

We also asked the members of the Advisory Board if any safety alert generated by the UTM box were to be included in the final flight report.

All the participants expressed it was indeed necessary to include it.



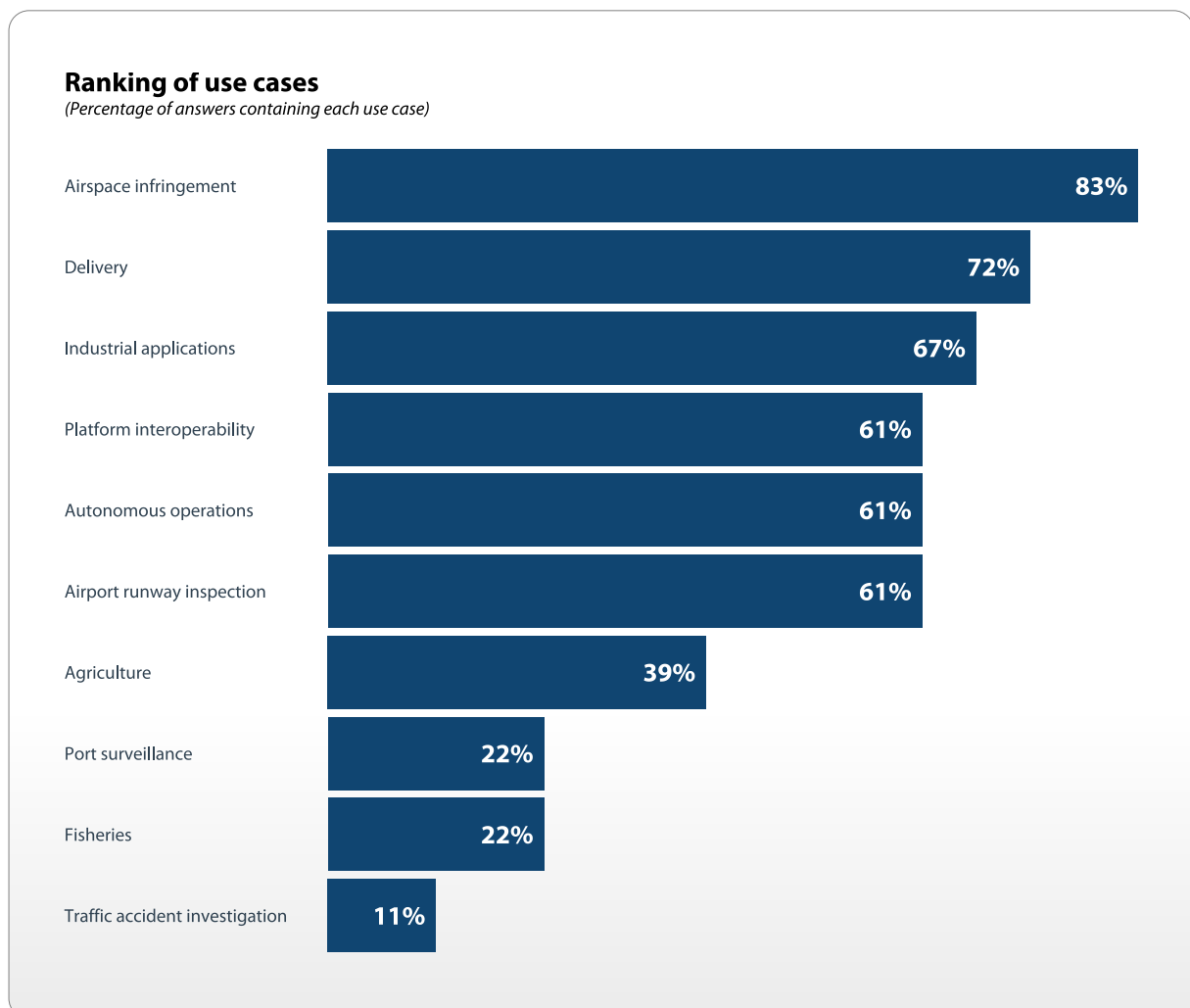
## Use case ranking

Finally, we asked the members of the Advisory Board to choose 5 use cases out of the 10 to be developed and tested during the project. The following chart, counting the proportion of uses cases checked by the participants, provides an effective ranking of them.

The advisory board members cited airspace infringement, delivery, and industrial applications as the top three use cases. Platform

interoperability, autonomous operations, and airport runway inspections were also popular.

Agriculture, port surveillance, fisheries, and traffic accident investigation had less perceived value.







To get more information about the project CERTIFLIGHT, please contact or follow us at:



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