



# STAKEHOLDER WORKSHOP

MAIN FINDINGS REPORT



# THE REPORT

## About AURORA

Urban Air Mobility (UAM) has the potential to overcome challenges like congestion and a lack of surface transport whilst saving infrastructure costs and time. However, making it safe, secure, green, quiet and accepted is challenging due to many factors, related to environment, regulations, and safety-critical technologies. Focusing on emergency-related applications, where UAM brings added value on top of current mobility solutions, the EU-funded [AURORA project](#) aims at connecting technologies and key actors to foster the adoption of UAM. The project works on development of artificially intelligent, urban autonomous flight solutions for Unmanned Aerial Vehicles (UAVs) and self-piloting passenger-carrying VTOL (Vertical Take-Off and Landing) aircraft with flight path planning capability using vision and radar environment perception sensors, including autonomous selection of emergency landing sites and landing capability, interactable with Very Low Level Air Traffic Management and Smart City elements, and utilizing GALILEO High Accuracy Service. The overall research and technological development makes use of a digital twin paradigm, effectively combining the physical world with its digital model for the purpose of safety-critical flight testing of autonomous flight solutions for UAM operations.

## About the Report

Dissemination level: Public

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## Project Partners



# OUR STAKE HOLDERS

34

PARTICIPANTS

COMING FROM

11

COUNTRIES

62  
PERCENT

INVOLVED IN UAM BEFORE

## REPRESENTING KEY SECTORS:

- CIVIL SOCIETY REPRESENTATIVES
- MOBILITY EXPERTS
- MANUFACTURERS & UAM PROVIDERS
- HIGH-LEVEL AUTHORITIES & UAM REGULATORS
- RESEARCH, INNOVATION & ACADEMIA
- EMERGENCY SERVICE PROVIDERS



# THE WORKSHOP

AURORA will involve end-users and relevant stakeholders in all phases of its journey, to ensure that our innovative solutions meet the needs of citizens and stakeholders, resulting in services with added value. To commence our stakeholder engagement activities, AURORA organised a first virtual workshop on Tuesday, September 28th 2021, from 13:00 to 17:00 CEST. The following document presents the approach behind this first stakeholder workshop as well as key outcomes obtained.

## Methodology

With this first workshop, our goal was to showcase AURORA's unique position within the UAM landscape and to stir up a debate on Urban Air Mobility. Aiming for a balanced stakeholder representation, we were interested in key, high-level representatives and regional stakeholders from the AURORA use-cases in Spain, Italy and Czechia. We invited stakeholders representing government institutions, industry, academia, and civil society in order to gain varying perspectives on UAM which could thus enrich the workshop discussions.

Due to the COVID-19 pandemic, the workshop was held virtually.

Making use of the tool Sli.do, we used a combination of open and closed questions in order to promote the debate between stakeholders. Our intention was to have an interactive and engaging workshop.

Because there are many facets to UAM as a whole, we discussed the following topics in the workshop:

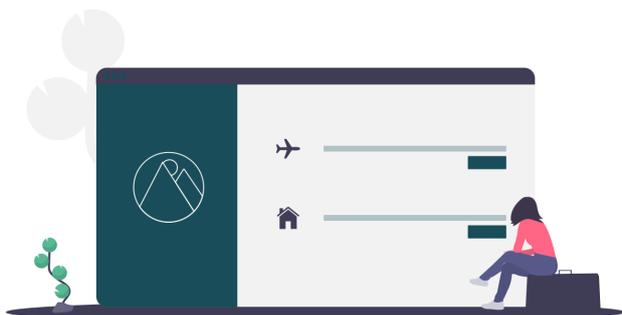
- Integration: needs for integrating the aerial domain with surface mobility counterparts
- Environment: environmental protection requirements and potential environmental impact
- Aviation Safety & Security: safety requirements in urban environments and near-future UAM systems' airworthiness, operations and integration requirements
- Societal Challenges: societal challenges for adopting UAM and strategies for citizen acceptance.

# MAIN RESULTS

To already gauge workshop participants' attitudes toward and knowledge about UAM, we sent participating stakeholders a pre-workshop survey. That way, we could collect information to discuss in more detail during the workshop. The survey was sent 1.5 weeks before the scheduled workshop, and there were 23 participants.

Key outcomes from this survey included:

- UAM will likely play a key role in urban mobility in the future.
- UAM can improve emergency services through its accessibility and flexibility.
- Main concerns in terms of UAM adoption include noise and visual pollution and safety.
- More attention should be given to user needs and sustainability with regard to UAM services.



## Main Results

### Integration:

Integrating UAM in the overall transport system is a key enabler for its success. Therefore, we wanted to assess with our stakeholders what are the opportunities and challenges of such integration.

Our stakeholders were divided when thinking if UAM would help reduce fatalities in transport. Around 56% thought that UAM could help. Even though the human element would be removed in autonomous flying, there would still be other services and means of transport counting on human action that could even be distracted by seeing the autonomous vehicle. New business opportunities would emerge from this integration, but with it more complexity to our systems.

Emergency response time would be reduced by having a faster reaction time, but this would only be able to work fluently when all systems are coordinated.

# MAIN RESULTS

U-space integration is seen by 58% of our stakeholders as the top key enabler for integration of UAM with current transportation services. Integration of systems are seen by all our participants as vital if UAM is to be successful. This depends largely on the willingness to assess current legal frameworks and adapt them to upcoming innovations. However, this is still far from a reality in our cities today and questions related to data management, overall integration with current infrastructure and the creation of landing sites still appear very challenging in the decision-making process.

## Environment:

Environmental impact is another facet of UAM that cannot be disregarded. For this reason, we asked stakeholders to assess the impact of UAM on different factors like emissions, noise, and visual pollution. We dug deeper into these themes by asking participants to compare UAM services in general to emergency-related UAM services to see if there would be any differences in perception.

**Participants generally agreed that they would tolerate higher noise levels for UAM operations if these services were emergency related.**

We then asked participants about UAM in relation to motorized vehicles. About half noted that UAM is not a sustainable or energy-efficient substitute for motorized vehicles, although UAM emissions and energy consumption were perceived as quite low compared to motorized traffic. Furthermore, when comparing the visual impact and noise hindrance of UAM to motorized traffic, participants generally did not see a big difference either way.

Furthermore, most participants were still concerned with noise, both regarding volume and duration, in addition to the frequency and altitude of vehicles passing by. However, noise levels would be more tolerable if these operations were emergency-related.

Important to note is that even though participants were concerned about noise levels in general, in their view UAM noise levels would not be significantly different from current noise levels of motorized traffic. Perhaps this is due to the fact that motorized traffic is also noisy and visually polluting.

# MAIN RESULTS

## Aviation Safety & Security:

Conducting UAM operations in a safe and secure manner is crucial for public acceptance and gradual shift to the integration of the U-space in our cities.

Several hazards can make UAM operations difficult or even stop them. Severe meteorological conditions was seen by most of our stakeholders as one of the most difficult issues to tackle and the one putting more barriers to the operations.

The “human” factor (unpredictability of human actions), the loss of Very Low Level Air Traffic Management (VLL ATM) service and the degradation of Communication-Navigation-Surveillance (CNS) infrastructure were also considered as important hazards that would impact the safety of UAM. When thinking of other hazards that can cause a great impact to the operations, cyber attacks were repeatedly pointed out, this can not only create collisions but even provoke situations of terrorism against pedestrians.

Several other interesting points were raised as: the Urban airspace (limited) capacity, possible collisions and conflicts, software malfunctions, the possible lack of maintenance of these systems and privacy issues.

To achieve the operational safety of UAM, 62% of our participants agreed that we cannot only rely on the autonomous flight system, but also consider the aircraft performance, operating procedures, human factor and the overall environment, as these also impact the general safety.

Regarding cybersecurity threats, the navigation signals (GNSS), the U-space service and the communication link were seen as the most relevant aspects to take into account when looking for these threats. The human factor is the most referred element that could potentially be behind cybersecurity threats in UAM operations.

Lastly, regarding the certification of the vehicles, our stakeholders were divided on how this should happen, some referring that UAM should be treated as any other aerial vehicles, but others referring that there's no easy comparison as they are different not only in their structure but also regarding their purpose. The certification of certain UAM-vehicle's safety is even more complicated when assessing their autonomous nature.

# MAIN RESULTS

## Societal challenges:

In this session, we aimed to identify key factors that can potentially improve or hinder the social embracement of UAM. We asked questions around how UAM can benefit society as well as the methods for overcoming barriers to public acceptance of UAM services.

As UAM is still being developed and researched, most participants felt that it is still part of a higher agenda.

However, we should not discount the fact that some participants mentioned that it also relates to the common citizen and local authorities. This is because citizens and authorities should already begin thinking about UAM and future mobility services.

Stakeholders in this session confirmed that a user-centric, inclusive approach is fundamental to the success of UAM services, with 40% of stakeholders stating that citizen & stakeholder engagement can improve public acceptance of UAM.

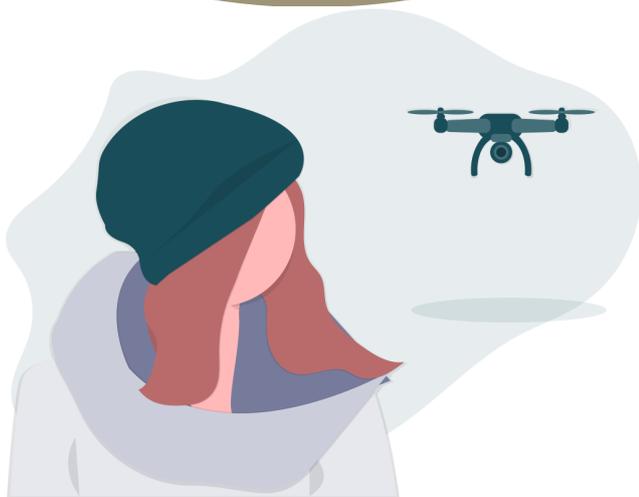
Citizens should be involved at an early stage in the UAM lifecycle so that services meet real needs.

Therefore, accessibility can and should always be considered, as 70% of participants stated that UAM can benefit vulnerable groups and build bridges where current services fail.

On the other side of the spectrum, barriers for social acceptance included visual annoyance, operational concerns and reduced privacy. Participants noted that the public should be involved from an early stage. Leading by example was therefore mentioned as an important factor for overcoming barriers and improving public acceptance.

When considering the many use cases of UAM for emergency-related services, stakeholders rated fire extinguishing and rescue missions as most beneficial. Participants were therefore able to justify the costs of UAM adoption due to saved time and access to remote areas or difficult to reach places.

# CONCLUSION



## Conclusion

UAM's success seems to depend on many factors: social acceptance, balancing the environmental costs of its operations, achieving a smooth integration with other transport systems and removing safety and security concerns that could cause accidents.

The stakeholders that participated in our workshop represented different areas of society that would be interested in or impacted by the technological developments in UAM and autonomous vehicles in general.

Their input made it clear that if these technological developments are to be sustainable and accepted in the future, there has to be a good balance between the social benefits and the risks that those operations might cause. We need to fit the innovative services offered by UAM in the greater picture, integrating it in the wider context, addressing possible environmental impacts and striving for the greatest level of safety possible.

Understanding the time limitations that a workshop like this might have, our team will further explore the topics covered by inviting a selected number of stakeholders to be interviewed and further develop their opinion on the workshop discussions and the four topics above. The full contents of the workshop will be compared with the interviews' outcomes and will be put together in a report that will then be made available to the participants.



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