FREQUENTLY ASKED QUESTIONS ON UAM

A - GENERAL QUESTIONS ON URBAN AIR MOBILITY (UAM)

What is Urban Air Mobility (UAM)?

Urban Air Mobility is a new air transportation system for passengers and cargo in and around densely populated and built-up environments, made possible by vertical take-off and landing electric aircraft (VTOL) equipped with new technologies, such as enhanced battery technologies and electric propulsion. These aircraft will have a pilot on board or be remotely piloted.

When will Urban Air Mobility (UAM) appear in European cities?

In Europe, UAM solutions are currently being tested through pilot projects and demonstrators. Commercial UAM operations in the EU could happen within 3 to 5 years.

3-5 years is really soon – is EASA confident about that timeline?

3 to 5 years is the time indicated by the manufacturers and the operators for initial operations in Europe. These operations require first that the aircraft are certified, and operators are approved. For the time being, this time horizon appears realistic.

What can UAM be used for?

UAM aircraft could be used for various operations: transport of persons (e.g. air taxi, airport shuttle, sightseeing, medical/emergency transport of patients or first aiders, etc.), transport of goods (last mile delivery of small goods, cargo, medical/emergency equipment, etc.).

Which use cases can be expected to take place in cities of the European Union?

Some UAS operations are already taking place in European cities, such as for the maintenance or repair of buildings or large infrastructure. In the domain of UAM, a limited number of pilot projects are already ongoing in few EU cities to test the delivery of goods or medical equipment, or for future transportation of passengers.

Which cities do you expect to see UAM first?

Any EU city or region may be a market for UAM services. The decision will depend on the decision of the UAM service operators based on market considerations, and on the decision of local and/or

national authorities to authorise it. The study performed by EASA has identified around 90 EU cities where UAM could develop first, taking into account the size and characteristics of each local market. Only large cities appear in this list, but it does not preclude others based on different criteria applied.

What about mobility in the remote/rural areas?

UAM relates mainly to transportation of people and goods in urban areas. However, UAM use cases can also include transportation between a city and a remote area or connecting two cities by flying over rural areas. UAM can help reaching remote areas currently not well connected with the ground transport network. The operations in densely populated and built up areas raise particular risks, e.g. on safety, security, noise and environmental impact. They call for specific precautions that may also be beneficial to aerial mobility outside of cities.

What kind of vehicles will be used for UAM?

The carriage of goods and passengers will be done by new vertical take-off and landing electric (VTOL) aircraft, with a pilot on board or remotely piloted. The shapes, sizes and level of automation may vary greatly from one aircraft to another, depending on the design and intended use case. The aircraft could be either of vectored thrust, lift and cruise or wingless types. To measure societal acceptance, the survey took as an assumption delivery drones with an average wingspan of 3m and air taxis with an average wingspan of 12m, all flying at an average altitude of 150m. These measures were indicative and do not exclude different prototypes and sizes.

Will UAM aircraft fly manned and/or unmanned?

The drones used for the transport of goods will be remotely piloted. The aircraft used for the transport of persons will initially have a pilot on board. At a later time, maybe in 10 years from now, we expect to see the human pilots on board air taxis being gradually replaced with remote pilots on ground. And in a further evolution we may see air taxis operating autonomously, without any human intervention during flight.

Why do we need urban air mobility at all? What are the hopes?

Several benefits can be expected from UAM. Since two thirds (i.e. around 340 million citizens) of the EU population will live in cities by 2030, UAM can offer a complementing safe, cleaner and faster mode of transport in cities. It could help creating 90,000 new jobs, reduces the risk of being involved in a fatal accident while travelling in the city (compared to conventional road transport on a passenger per kilometer basis), reduce the duration of standard city trip by 30 to 75%, and reduce to zero local polluting air emissions attributable to UAM.

What are possible negative aspects of UAM solutions? How will you avoid them?

The study conducted by EASA with support of the consultant shows that EU citizens have several concerns regarding mainly the risks of collisions/accidents, the environment including the protection of wildlife, the integration of the necessary infrastructures into current city landscapes, noise pollution which is expected not to exceed acceptable levels of familiar city sounds, and potential security threats. A comprehensive action plan to address those issues is being drafted that will involve several European institutions and stakeholders. EASA is already drafting new regulations considering those results.

Will there be drones and air taxis everywhere in EU cities soon? Are we not just moving congestion into the air?

The EU is putting in place a comprehensive regulatory framework to ensure orderly and safe operations of UAM in EU cities. For instance, it has recently adopted a regulation on U-Space[1] to organize how the UAM aircraft will fly in the airspace above the city. More regulations can be expected to ensure that the risks related to safety, security, noise, environmental impact and visual pollution are reduced. UAM will first be a complementing means of mobility, will start slowly at low scale and unlikely to significantly reduce congestion on the ground. It can however cater for a faster transport in emergency situations, for instance.

What about traffic rules? Will there be 'highways in the skies'?

Yes, that's intended. For safety reasons, at the beginning, the rules will not aim for full integration of air taxis into the existing airspace, but for a gradual approach on the basis of segregated airspace volumes (corridors) that are reserved for UAM only. These routes, or corridors, will preferably be established above areas already used for mobility or less densely populated (e.g. road highways, rivers) to reduce possible nuisances.

Which pilot license is needed to fly an air taxi?

Initially, only fully licensed and experienced pilots of aeroplanes or helicopters will be allowed to fly air taxis. They will need to undergo a specific training and examination before obtaining their additional qualification for flying air taxis with passengers. Later, a new pilot qualification and licensing scheme aimed specifically at piloting air taxis will be established. The operations will start with the proven system currently in place, relying on fully qualified pilots.

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[1] https://www.easa.europa.eu/document-library/regulations/commission-implementing-regulation-eu-2021664,
https://www.easa.europa.eu/document-library/regulations/commission-implementing-regulation-eu-2021665-0
https://www.easa.europa.eu/document-library/regulations/commission-implementing-regulation-eu-2021666

What does it take to fly my own private air taxi in my city?

Initially, privately owned and used air taxis are not envisaged. This is mainly due to operators requiring a so-called 'Air Operator Certificate' (AOC) to qualify for such operations. The technical requirements for obtaining and maintaining such an AOC cannot typically be met by a private *individual*, but are aimed at commercial air transport *organisations*, such as commercial air transport operators. Also, air taxis will not initially be offered for sale to private individuals by European manufacturers.

Will UAM be an additional mobility mode or replace others?

Quite realistically, UAM will complement but not replace existing mobility modes. It is an emerging sector, and there's a lot to learn for all involved. Mass transportation at scale should not be expected within the first years of UAM implementation.

Where will I find UAM operating sites in cities?

UAM aircraft will start and land from infrastructures called "Vertiports". These will probably come in different sizes – depending on the expected traffic volumes and may be comparable to helicopter landing pads, but probably smaller in size. Their location may differ from dedicated infrastructures, to rooftops of buildings or parking garages, to pontoons in rivers, or airports and train stations. In addition to certified aircraft, the location and number of urban vertiports will probably be a decisive factor for the success of UAM. But this is something that largely up to local authorities.

Who develops such vertiports?

Now, the development of vertiports is mostly done in collaboration between experienced infrastructure developers and UAM vehicle manufacturers, although some vehicle manufacturers also develop their own concepts. Some infrastructure operators also explore concepts open to various UAM vehicle manufacturers, but the interoperability of these concepts is difficult to assess. EASA will provide guidance containing the technical requirements for the vertiport developers.

May it happen that there comes a vertiport close to my house?

The initial set of vertiports and air taxi routes will probably be restricted to a fairly limited number of fixed routes, for instance connecting a convenient city transport network node (e.g., a main train or a bus station) with the next one or with an airport outside of town. UAM could also connect two airports outside of town.

Who will decide if my city / my country will make use of UAM?

EASA sets a common European enabling regulatory framework. But it will be up to national and local authorities, and therefore to local communities, to take the decisions as to whether implementing it locally. It will also depend on the interest of UAM operators.

What are the next steps to get started with UAM in Europe?

The next step belongs to the UAM aircraft manufacturers, operators, vertiport developers and operators and the regulatory authorities. First aircraft need to be certified and then operators need to be approved. In parallel, the EU and the national regulators must establish the regulatory framework to enable these operations.

Where is Europe on UAM, compared to the US/Asia?

Europe is well placed at global level on the development of UAM, with several aircraft projects being led by European companies and start-ups. Several research and demonstration projects are also ongoing, at EU or national level. The regulatory authorities at EU or national level pay a particular attention to these developments and are preparing a comprehensive regulatory framework. For example, on 20 April 2021 the EU has adopted the first regulation establishing rules for the traffic of drones in the airspace ("U-Space" regulation).

B - QUESTIONS ON EASA SURVEY ON SOCIETAL ACCEPTANCE OF UAM

Where can I find the results of the study?

The full results of the study will be available on our website www.easa.europa.eu/UAM

What is the reason for the study?

EASA has the responsibility to develop proposals for a full set of rules enabling UAM intra- and inter-city services. EASA will also certify the aircraft – manned and unmanned – following comprehensive design verifications. In doing so, EASA needs to anticipate what will be the acceptable limits for EU citizens and for future users of this new mode of transport. The rules will have to ensure that UAM services meet citizens expectations, whether they are using them themselves or simply living and working nearby. This acceptance will be essential as without it, the UAM services will not develop.

How was the study conducted?

This study has been carried out for the European Union Aviation Safety Agency by McKinsey & Company upon award of a specific contract implementing a framework contract for the provision of consultancy services. The study was conducted over a period of six months from November 2020 until May 2021. It included thorough research, literature review, urban market analysis, a quantitative survey, a qualitative survey and noise testing.

How many citizens participated in the survey? Is the survey sufficiently representative of European citizens' views?

The societal acceptance survey was comprised of three main parts. A large quantitative survey, a series of in-depth interviews and a noise perception assessment.

The quantitative survey was conducted with approximately 600 residents in each of the six selected cities, representative of the cross-sections of the local population of each city. To ensure that participants were sufficiently representative of the populations of the surveyed cities, nationally representative distributions were chosen regarding gender, age, and employment status. As a sample can never be perfectly representative of a population's distribution, technical criteria were used to ensure the margin of error was kept as small as possible. Screening questions were used at the beginning of the questionnaire to ensure the fulfilment of quotas and to identify other demographic features. The six cities part of the survey were selected with a view to ensure a sufficiently balanced representation of European geographical and cultural diversity.

The qualitative survey was conducted in the form of detailed interviews with around 40 major stakeholders at local, national and European levels to deepen the findings and get insights from influential stakeholders relevant for UAM introduction.

As noise turned out to be a major acceptance factor during both the quantitative survey and the interviews, a smaller noise study was additionally conducted, exposing residents to typical UAM sounds. The objective was to get an initial indication of citizens' acceptance related to noise.

How many and what kind of questions have been covered?

The quantitative survey questionnaire was designed to assess, understand, and measure the most important societal-acceptance drivers for UAM, including perceived benefits and concerns and what it would take to increase societal acceptance. The questionnaire included 36 questions; the response time was estimated at twenty-five minutes. The qualitative survey was based on a less detailed questionnaire, addressing however similar questions. The questionnaires of the quantitative and qualitative surveys are available on EASA's website www.easa.europa.eu/UAM

Which cities were chosen for the survey and why?

Through a market analysis methodology, the project identified, for six main UAM use-cases, the most attractive EU urban target markets– from a business perspective – for UAM original equipment manufacturers (OEMs) and UAM operators. The application of defined KPIs led to a long list of 90 EU cities (6 times 15 cities) which will possibly see the first deployments of commercial UAM services and were therefore deemed to be important candidates for societal acceptance analysis. Six cities were selected out of this long list, representing different European regions and cultures: Barcelona, Budapest, Hamburg, Milano, the cross-border Öresund region and Paris.

How was it ensured that the survey participants understand what is meant by UAM, as it is not yet here?

An informational video of 1.5 minutes was presented before the online questionnaire or the interview to give participants prior information as well as general and common understanding of UAM. The vehicles depicted in the video were invented and did not correspond to any industrial product existing or in development. The objective was to give a general feeling and idea, rather than to reflect actual technical accuracy.

The survey was based on certain use-cases: how were they selected?

The review of international literature identified six categories of principal use cases for UAM deployment. For each of these use case categories, societal risks and benefits were evaluated to identify those with the highest risks and benefits, and a framework was created to break down benefits and risks into categories. The following three categories were retained: (1) commercial passenger transport by electric vertical take-off and landing (eVTOL) with a pilot onboard, (2) emergency services use cases (both medical equipment by drone and people transport by eVTOL with a pilot onboard), 3) delivery transport by drones for commercial and industrial applications. They correspond to the scope of the study initially defined by EASA limited to transport/mobility cases.

Didn't you just show UAM from its good side? You haven't shown negative cases and aspects in your case examples?

Deep dive questions on concerns and risks were included in the quantitative and qualitative surveys, explicitly listing potential negative effects of UAM. Participants were invited to freely add their own views.

What are the main societal concerns on UAM deployment in the EU?

The main concerns expressed by participants relate to safety, security, environmental impact and noise. The results were rather homogeneous across the cities and in the quantitative interviews.

What where the most often mentioned positive and negative expectations of UAM?

The expected positive impact from UAM relates to a better local air quality, a reduction of traffic jams and congestion on the ground and faster mobility, notably in urgent situations.

The expected negative impact from UAM would relate to the safety and security risks, to the environmental impact, both in terms of noise and visual impact. The possible negative impact on wildlife was also one of the most mentioned risk by respondents.

Which findings from the survey will have the greatest impact on the work EASA is doing? What will change as a result?

The main concerns expressed through the survey relate to matters falling at least partly under EASA's competence: safety, (cyber)security, environmental protection and noise. EASA will take the study results into account to further build the regulatory framework for UAM. These results reveal the boundaries of citizens' acceptance of future UAM operations. They will have to be translated into norms and standards, through the coming regulatory process. Since UAM is not yet existing, future rules will not be about change but about anticipating and proactively preventing possible negative impacts.

C - NEXT STEPs FOR UAM / EASA's ROLE

What will EASA do with the survey results? How will you use them? Will they be precise enough?
These results are important input for EASA to understand the EU citizens' main concerns, so that the EU can make an informed decision for a proportionate regulation that takes into consideration the main societal expectations.

What regulations have already been put in place and when?

EASA has started working on a regulatory framework to enable UAM quite a while ago:
On airworthiness, for instance, EASA has been the first in the world to publish in July 2019 a Special Condition to certify small VTOL aircraft operations, in 2020 for Light Unmanned Aircraft Systems

operating in medium risk situations, and in 2021 Guidelines on the design verification of UAS operating in the 'specific' category;

On <u>operations and pilot licencing,</u> in early 2019, EASA launched preparatory activities that will lead to rules for the pilots/remote pilots of these vehicles, their operators and for the infrastructure, e.g. vertiport operators. Proposals will be published for consultation in 2022.

On <u>airspace integration,</u> EASA has developed a world-first U-Space/UTM regulatory package, adopted by the European Commission on 22 April 2021; this package will become applicable early 2023 and will enable the safe integration of UAS operations in urban environment.

Why is the new regulation on U-space important for UAM?

The U-Space refers to a set of services relying on digital services and automation of functions designed to support safe, secure and efficient access to U-space airspace for a large number of unmanned aircraft systems (UAS). U-Space provides a framework to facilitate the implementation of more complex UAS operations in all classes of airspace, while ensuring an orderly coexistence with manned aviation and Air Traffic Management (ATM)..