ACI EUROPE POSITION

Advanced Air Mobility

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Introduction

Advanced Air Mobility (AAM) is rapidly developing as an exciting new paradigm in aviation. New aircraft and air traffic management technologies offer the prospect of electric vertical take-off and landing (eVTOL) aircraft providing a range of advanced mobility solutions in Europe's cities and regions.

Naturally, due to its nature as a form of aviation, and its **potential for accessible, rapid and more on-demand connectivity**, Advanced Air Mobility is being considered for transporting passengers to and from airports.

As such, **AAM may benefit the future of European citizens and airports in multiple ways**, so as to respectively further improve the passenger experience and develop new sources of revenue. It also bears mentioning that eVTOL technology offers new opportunities for feeding traffic between airports and cities, as well as offering regional airports a new role as the regional hub for low-carbon public transport and local traffic.

Due to their electric powertrains, **eVTOLs constitute a first step towards electric, zero-emission aviation**. Their development therefore also presents the opportunity to not only innovate in the services offered to passengers at airports, but also to do so in a way which is in line with the drive for Net Zero and decarbonisation of aviation

Consequently, there are **numerous ways in which AAM services could be deployed in an airport environment.** For example, an airport may choose to operate the "vertiport" (an infrastructure for aircraft which land and take off vertically) while specialist operators provide AAM services and a U-Space provider offers air navigation services. Another business strategy could be for a third party to operate the vertiport, while airlines would propose AAM services to link in with their scheduled flight services, and the tower ANSP would provide U-Space services. Alternatively, the airport may wish to provide all services. In all these scenarios, as well as in the many other possible options, the airport operator would retain a stake and a role in the AAM deployment.

Indeed, in order to seize these opportunities, **it is essential that a clear regulatory framework enables the efficient, secure and competitive development of AAM**. The opportunities are extensive, yet there nonetheless remain concerns which must be addressed by the EU and national authorities. These include the need to integrate eVTOLs into the airport environment, taking into account their advanced performances and capabilities without negatively impacting safety, security, capacity and the environment. **The development of such a regulatory framework will serve as an enabler for AAM as an innovative mobility solution** which can deliver new passenger services to and from airports.

This paper sets out the views of ACI EUROPE on how these regulatory needs may be addressed in order to make AAM in the airport environment a reality.

1. Creating a dedicated regulatory framework

1.1 In order for airports to fully seize the opportunities presented by AAM, **an appropriate regulatory framework is required**. This framework shall provide rigorous safety and security standards, while remaining proportionate. The regulatory framework must furthermore enable fair competition and allow the market to evolve naturally.

1.2 Given the paradigm shift which AAM represents for the airport and aviation business model, and the pace at which this ecosystem has been developing, **airports must be agile, proactive and anticipate the potential disruption ahead** – based on assessment of AAM's potential for the airport**.** This entails that airports must develop the adequate infrastructure and concepts of operations in parallel to the finalisation of the AAM-specific regulatory framework, work which is currently in progress. This will necessitate a transparent approach from regulators to the airport sector as the framework develops so as to ensure alignment.

1.3 Indeed, the latter must be completed as promptly as possible so as to provide a clear framework while ensuring flexibility and proportionality. **Airports should be able to keep their options open in order to benefit from technology in the most appropriate manner and to offer services which match their business strategy.** The evolution of the regulations must go hand-in-hand with the evolution of this fast-changing technology and market situation and facilitate AAM integration into a complex environment such as an airport.

1.4 A regulatory framework is also essential to **provide a reference point which will enable local authorities and regional bodies to make AAM a reality in cities and airports**. This includes navigating complex planning requirements and local use provisions that must be addressed. This must be further supplemented by adequate and ambitious financial and organisational support at EU level, including through potential inclusion of AAM infrastructure in the revised TEN-T Guidelines. Such funding is necessary for airports and national civil aviation authorities that are willing to move forward with manufacturers and operators so as to achieve a national framework. Based on the use of sandboxes, research and demonstrations this will accelerate the process of acceptance and the economic development of first movers, beginning the integration of AAM into airport operations.

1.5 An **official European endorsement for companies or consortia working on demonstrators or test flights aiming to demonstrate the feasibility of AAM**, operational procedures and use cases could help secure the necessary support from competent local/national authorities. This may constitute an interim step towards supporting the development of necessary regulations and industry standards and best practices, basing it on real experience and data needed to satisfy better regulation requirements. Given the high speed of development both in business models, services and technology, endorsing actual trials brings visibility, experience, data and development for this emerging industry. It is also vital that European organisations outside of the EU are able to participate so as to ensure regulatory and operational alignment.

1.6 **It has been suggested that developing AAM for commercial cargo could be a first step** to initiate UAM integration without passengers onboard. eVTOLs do have potential for cargo transport, depending on their size and power as well as airports' business models and commercial strategies. Nonetheless, some elements are specific to cargo and may not be transferable to passenger transport (e.g. safety requirements, speed of supply chain, vertiport location and capacity, security requirements and secure supply chain), which should be borne in mind if following a phased approach.

1.7 Operators of Advanced Air Mobility services will require **authorisation and operator certification**. This is expected to be covered by the "Certified category" and may allow flexibility similar to the current exceptions based on MTOM[1] and numbers of passengers foreseen in the Air Services Regulation. For similar reasons, **the regulatory approach must address the form and technical requirements of the vertiport**. Technical work to standardise charging infrastructure and integration with national power grids are also a vital element of the policy strategy, so that airports are not restricted to serving only a single type of eVTOL or AAM provider, as well as to ensure efficiency and optimise the turnaround process.

1.8 **Regulators should avoid simply replicating helicopter rules, even though they may serve as a basis for initial work.** This is a new technology and it should be viewed with fresh eyes. Any new rules need to reflect differences in performance, energy, technology in particular digital capabilities and noise of eVTOLs compared to helicopters. It will nonetheless be important to identify the aircraft category to which eVTOLs belong. A financial charging method for AAM to access the airport will need to be devised, as well as insurance requirements for operating at an airport. As providing facilities and services for AAM is a new competitive business service, it does not require any price regulation.

[1] Maximum Take-Off Mass

1.9 AAM's successful integration into the airport operation must be founded on a strong and open **relationship with local communities.** Such success will only be achieved if the development, regulatory framework and implications on people and businesses in and around airports is understood from the outset by local communities. This requires a comprehensive engagement strategy between industry and Governments alike. AAM can help serve airports' emissions objectives, and potentially noise objectives as more is understood about the technology's impacts. Research into potential noise benefits or mitigations of any noise issues is a vital part of developing the AAM market. New technology such as AAM brings the opportunity for a new start in terms of electric power sources and operating practices, and therefore environmental and climate goals should be built into the development of the business model.

2. Optimising airport capacity

2.1 AAM flights at, or in the vicinity of, airports must be devised in a manner that **does not interfere with regular manned aviation operations or occupy airspace capacity allocated to regular commercial manned flights**. As such, approach and departure routes for eVTOLs might require segregated flight corridors to ensure independent AAM and commercial aviation operations. As above, local community engagement to deliver this remains key.

2.2 Thus, **assessments of the impact of AAM on an airport's capacity should include the effect on the airport's coordination parameters**. These are integral to the optimisation of airport capacity and the interface with airspace capacity and are carefully calculated for those purposes.

2.3 Indeed, **traffic coordination at the vertiport must ensure this**, and be integrated with the ANSP managing traditional traffic thus maintaining their capability to plan movements and deconflict. This also feeds into the fact that airspace use at and around an airport can have an influence on en-route capacity. This strengthens the need to bring non-EU states, organisations and aviation businesses within the development of airspace rules and processes.

2.4 In any case, before any structured AAM operations can take place, **an industry-accepted Concept of Operations is required**, outlining how AAM operations in the airport environment will work. This should include prerequisites, roles and responsibilities, and safety and capacity assessment methodology and procedures.

2.5 Finally, in order to safeguard both safety and capacity objectives, **thorough consideration needs to be given to the provisions**

needed in case of system failure(s) and/or human error, including training.

3. Technical and safety requirements for vertiports and eVTOL infrastructure at airports

3.1 Clear technical requirements and industry standards must be set for UAM to be integrated into the airport environment. **The guiding principle in doing so must be neutrality vis-à-vis particular eVTOL and vertiport manufacturers or service providers**, thus offering airports the maximum opportunity to benefit from AAM and solidifying the business case.

3.2 In determining the technical requirements, a number of operational questions require resolution, which are relevant for vertiports in all locations and not just at airports. **The AAM service will only be functional if both the airport and the urban/suburban/regional parts of the service chain successfully address the safety and operational requirements**. This includes local community engagement, and can be facilitated through development of technical standards.

3.3 **Infrastructure at vertiports should be designed to cater to all common types of eVTOLs**. Requirements for charging infrastructure, power supply, ground handling and turnaround processes should be harmonised across various aircraft models and based on standards. A standard reference procedure may benefit all, and address questions raised by differing technical specifications of eVTOLs. These may include how eVTOLs manoeuvre on the ground, the number and volume of flights, charging time and procedures, etc. These factors can determine how much ground space is needed for turnaround, parking and recharging.

3.4 The weather and visibility conditions in which eVTOLs can operate requires clarification, as the business case will be undermined if they can only operate in fair conditions. It will need to be ensured that collision with obstacles can be prevented, as well as clarification on the level and type of Rescue and Firefighting Services response that will be needed, for instance through application of ICAO Annex 14 Volume II. **It must be borne in mind in this context that the vertiport may be on top of a structure such as the terminal or a multi-storey car park**. The need for any additional procedures in airport emergency plans also requires clarification, as well as ensuring the safe operation of eVTOLs in busy urban, populated areas. The development of safety rules and procedures for AAM must also take into account wildlife and bird strike risks.

3.5 **It should be clarified whether vertiports located on the landside of an airport, or off-airport, will be considered separate entities** or as integral parts of the aerodrome. This will have implications for regulatory compliance for the aerodrome operator. At the other end of the route, vertiports in city locations will require adequate space in order for the system to be viable. **Cooperation with local councils is therefore essential to enable development of AAM**. At a city level, planning authorities are the best placed to quantify the potential impact of urban air mobility and study how the vertiport network could integrate within a broader mobility strategy to achieve strategic objectives such as reducing commuting times, reducing air pollution and enhancing connectivity. It must furthermore be determined which authority (National civil aviation authority, local authority…) will give approval for low-level routes through the city, and how the development of urban vertiports may interact with building safety regulations. In addition, it must be considered how the development of new AAM routes aligns with wider airspace change processes and requirements from airports – especially the question of who is ultimately responsible for their submission.

4. Developing security requirements

4.1 While AAM will be operated and deployed differently from traditional commercial aviation, the **security requirements that are applied to them may be very similar.**

4.2 AAM's business case requires **smooth and speedy security procedures providing an adequate level of protectio**n. However, for certain types of traffic (e.g. aircraft under 15T MTOM, helicopters, aerial work…) it is already allowed to set alternative security procedures on the basis of a local risk assessment. This existing regulatory framework[2] should be sufficient to deploy several use cases foreseen for AAM.

4.3 Where AAM passengers are continuing their journey on traditional commercial aircraft through a connection at the airport, the security regime applied to them should be the same as the one applicable to all passengers transferring at the airport. This will require passengers, cabin baggage and hold baggage to be screened to meet the regime's requirements.

4.4 From a regulatory perspective, **it is possible to enforce the screening requirements at the vertiport. This means meeting**

[2] COMMISSION REGULATION (EU) No 1254/2009 of 18 December 2009 setting criteria to allow Member States to derogate from the common basic standards on civil aviation security and to adopt alternative security measures

stringent requirements, but it could be operationally beneficial depending on the specific business case of a deployment model.

4.5 Where passengers and hold baggage are arriving unscreened at the airport, they will have to be screened either through the normal passenger/baggage flow or through specific transfer checkpoints or hold baggage injection point.

4.6 **Hybrid scenarios can also be envisioned**. Hold baggage could be screened at the vertiport of departure, while passengers are not, for instance. Alternatively, hold baggage could be screened in the eVTOL's "hold" itself through technology such as Explosive Vapour Detection (lightweight screening solutions which are currently in development for AVSEC use). Such a scenario would require amendment to the Aviation Security Regulation.

4.7 **All these scenarios will have an effect on the infrastructure required** at the vertiport of departure and at the airport.

4.8 Given the innovative and digital nature of AAM, **the cybersecurity requirements applicable to vertiports and AAM activities must be clarified**. As the EASA regulatory scope does not currently explicitly cover vertiports, it must be clarified whether the EASA Regulation on "Management of Information Security Risks (RMT.0720/Opinion 03/2021)" will apply to them. This also holds true for existing aviation cybersecurity regulations and the NIS Directive.

4.9 Funding support is important also for airports which seek to **develop Counter-UAS (Unmanned Aircraft Systems) systems to protect airports and AAM from non-cooperative drones**. More dual-use support could come from military institutions to ensure monitoring and countering solutions. Devices for C-UAS and cybersecurity should be available in the market to ensure greater physical protection, and to give private investors in airports, vertiports and AAM greater certainty and security over their investments. These systems should take into account the integration between Unmanned Traffic Management systems and U-Space service provision.

5. Ensuring U-Space and ATM integration

5.1 Since AAM operators are a new type of airspace user with very different characteristics compared to legacy manned aircraft, **provisions have to be made to ensure that the U-space system can handle multiple operators and operator types**. Management and control of both legacy manned aircraft and AAM in the aerodrome environment must be assured and straightforward.

5.2 This includes how the controlling body (U-Space service provider, ANSP, …) would **plan, control or deconflict** multiple vehicles in close proximity; how aircraft and vehicles would be aware of each other's movement, receive conflict alerts and be able to avoid each other (in the air and on the ground, including ground vehicles), in both good and adverse weather conditions; and how this would work in areas where ATC has limited or poor visibility over movements (e.g. in cargo handling areas, behind buildings/hangars) or in instances where the aerodrome is uncontrolled. **The innovative potential of AAM for the development of standardised and automated conflict detection and avoidance should be encouraged**.

5.3 With regard to integration of UAM with (or segregation from) traditional aviation, a **fully separate and segregated AAM system could serve as an option for testbeds for new concepts.** However, any such segregation must consider the impact on both competition (as airports with congested airspace who may benefit the most from eVTOL operations may not be able to enter the market) and development of the market (as an approach that starts with only segregated airspace could take decades to evolve towards integration once operations are established) Procedures must be developed for situations where an eVTOL cannot land and needs to divert to an alternate, including planning and communication.

5.4 **The role of the aerodrome operator in these processes must be clarified**. For instance, if the U-Space service provider would like to grant access for an AAM movement when there is a conflict of interest with the aerodrome operator (e.g. works, other activities that have higher priority, lack of parking space, security, safety, noise abatement, …).

5.5 Finally, clarification is also needed as to **eventual requirements in terms of technology, standardisation, procedures, communication and training**, linked to the time horizon for demonstration and deployment of eVTOL services.

Conclusion

In conclusion, the development of Advanced Air Mobility offers many opportunities for airports. Their realisation requires rigorous and proportionate safety and security standards, enabling fair competition and natural evolution of the market. This framework and its principles should include:

- **Taking a fresh approach to regulation**, given the nature of AAM and eVTOLs as a new form of aviation, rather than a simple extension of existing concepts;

- **Providing endorsement from local/ national authorities** for airport operators that are working with stakeholders on demonstrations or test flights aiming to validate the appropriate regulatory framework and integrate AAM into airport operations.

- Ensuring that U-Space and airspace design **integrate with the existing airport and ATM system** without compromising safety and airport capacity;

- **Addressing the form and technical requirements of the vertiport**, and standardising electrical charging infrastructure;

- **Integrating AAM into the airport environment,** underscoring the relationship with local communities through the role of AAM as a new form of connectivity and sustainable development;

- **Clarifying the security requirements for AAM services**, noting that this may vary depending on the business model being followed, and that flexibility is possible under the Aviation Security Regulation.

ACI EUROPE and its members stand ready to assist in this work, through provision of expertise and further input to the regulatory process. Airports look forward to seizing the historic opportunity which is presented by AAM and which will be enabled by a forward-thinking regulatory environment.