



CITYAM - Regulations and integration of Urban Air Mobility in city planning

An overview of national and local regulations in Baltic Sea Region countries and policy analysis for the introduction of Urban Air Mobility in cities and regions.

Kista Science City

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Summary

EU cities and regions are actively exploring the potential of Urban Air Mobility (UAM) to modernize their transportation systems. Before fully embracing UAM, the CITYAM project is conducting a thorough examination of existing policy plans and regulations in specific Baltic Sea Region countries to ensure that drones and other parts of the UAM systems can be seamlessly and safely integrated. This report summarizes current and upcoming EU-regulation and compares local regulations and regional policies in the partner countries of the project (Finland, Estonia, Latvia, Poland, Germany, and Sweden). This includes looking at EU-wide regulations, which provide a broad framework.

By collaborating and sharing insights, municipalities within CITYAM can pinpoint best practices and address shared challenges, and this collaborative effort is also about ensuring they have the necessary knowledge about the necessary infrastructure, like drone landing sites, and understanding public sentiment towards UAM.

This comprehensive approach is designed to ensure that, when UAM is introduced, it is done in a manner that is efficient, safe, and aligned with both local and broader EU objectives.

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Glossary

Acronym	Meaning	Note
AGL	Above Ground Level	
ATC	Air Traffic Control	
BVLOS	Beyond Visual Line-of-Sight	
CTR	Control Zone (around airport)	
EASA	European Aviation Safety Agency	
HEMS	Helicopter Emergency Medical Service	
SAIL	Safety Assurance Integrity Level	
SORA	Specific Operation Risk Assessment	
UAM	Urban Air Mobility “New air transportation system for passengers and cargo in and around densely populated and built environments, made possible by vertical take-off, and landing electric aircraft (eVTOL) equipped with new technologies such as enhanced battery technologies and electric propulsion. These aircraft will have a pilot on board or be remotely piloted.” (Georgiev, Larroutou, & Stjernberg, 2021)	
VTOL	Vertical Take-off and Landing	

1 Introduction

1.1 Background

The CITYAM project aims to support and empower cities in facilitating a responsible and acceptable increase in urban air mobility via transnational Baltic Sea Region cooperation, to achieve a cleaner and more sustainable transportation system.

The project helps cities and citizens to adapt to future changes and to see the possibilities brought by Urban Air Mobility. CITYAM seeks solutions suitable for increasing UAM in a responsible way that is also acceptable to citizens. UAM has an increasingly important role in cities and the tools needed to manage it are at the core of the CITYAM project.

1.2 Purpose

This report forms a baseline overview of the relevant EU-level regulations, to prepare for the UAM solutions that will be tested in the leading cities of the project, Hamburg, Helsinki and Stockholm. It also outlines applicable national and regional policies as well as regional and local challenges / challenges on the local and regional level that the respective regulations bring along.

1.3 Goal

The goal is to form a basic frame of reference for supporting UAM solutions testing in the cities of the CITYAM project. The goal is also to support collection of national, regional, and local regulations in order to create interregional learning to promote a faster uptake of UAM innovations in the EU.

1.4 Method

The goal is to give an overview of the relevant EU level regulations and mapping of relevant existing and upcoming regulations with effect on cities: both on an EU as well on a national level in partner countries used the following methodology:

Literature study of current regulations: First and foremost, we conducted an extensive literature study. This included a thorough review of current research and reports in the field of flight safety. We also examined current regulations and guidelines for flight operations, with a special focus on drone operations.

Analysis of SORA and SORA 2.5: We analyzed SORA (Specific Operational Risk Assessment) and its latest version, SORA 2.5, to assess the risks of drone operations. SORA is a process used to assess risks in specific drone operations, and SORA 2.5 is an updated version of this method.

Analysis of certification and standards: We also reviewed relevant certifications and standards for drone operations. This included examining which certificates are required to carry out drone operations and which standards must be followed to ensure flight safety.

Semi-structured Interviews and stakeholder surveys: We conducted interviews of representatives of the partner regions of CITYAM to collect national, regional, and local regulations that affect UAM services. We also performed surveys in the different areas of interest for this topic, in which the partners and stakeholders provided information.

1.5 Outline

This report consists of five main sections.

1. Introduction

To give an introduction to the background and methodology for this report.

2. EU Regulation and introduction of UAM in city planning

Providing a current general overview of the regulatory environment for UAM in the European Union, explaining the functions for city involvement.

3. Financial outlook and timeline for introduction of UAM

Explains the EU perspective of the financial outlook and funding opportunities for introduction of UAM.

4. National and city regulation and policy collection

Presents the results from the surveys of regulations and policies that are specific for individual nations and cities. Gives detailed insight into how different aspects of UAM can be handled and provides a comparative summary.

5. General stakeholder survey - Key Takeaways

Summary of the general stakeholder survey, which was performed by the CITYAM project, conducted in May 2023.

2 EU Regulation and integration of UAM in city planning

While urban mobility is slowly but steadily expanding into the air space, societies in the Baltic Sea region are not yet ready for wider-scale deployment. There are challenges to overcome related to regulations, city planning, urban air space management, public officials' capabilities, public acceptance, and policy integration. In order to aid the implementation of new drone services and to support the testing of the UAM services in the main cities of CITYAM, this report gives a brief overview of the relevant EU-level regulations.

2.1 Overview of applicable EU-level regulations

2.1.1 The three types of drone operation categories; open, specific, and certified

The European Union Aviation Safety Agency (EASA) has established three categories for drone operations: Open, Specific, and Certified. Here's a brief overview of each category.

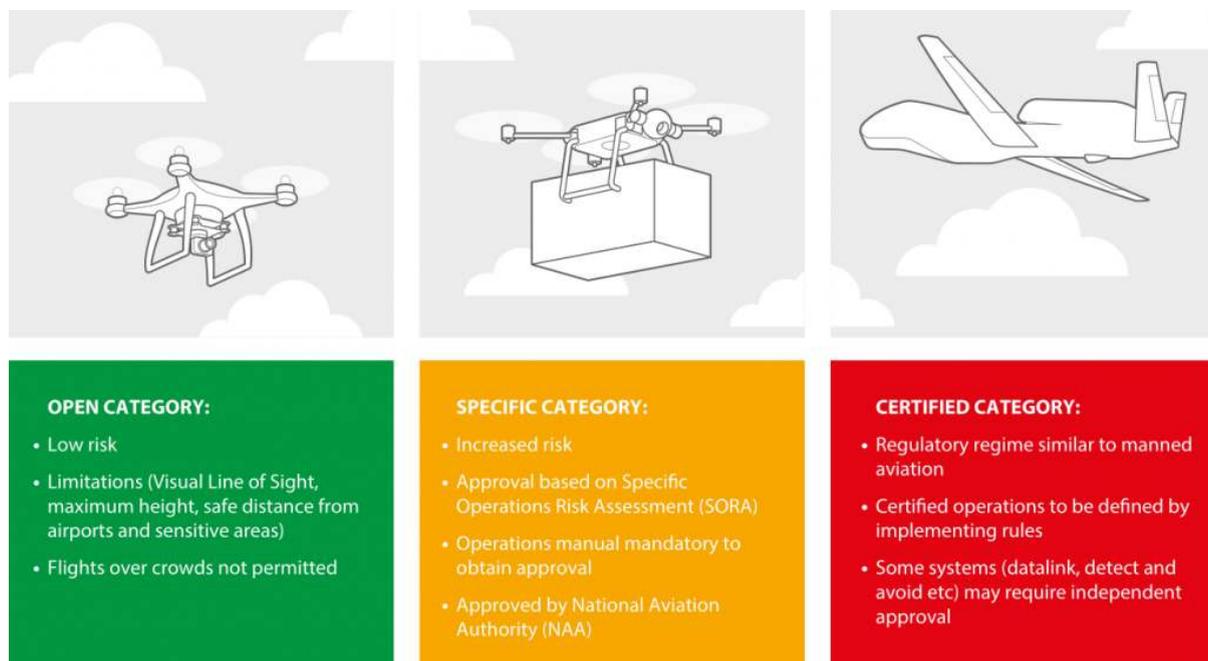


Figure 1 - Drone categories, source: EASA.

2.1.1.1 Open Category

Description: This category is for low-risk drone operations. No prior authorization is needed, but the operations are subject to certain limits (e.g., altitude, distance from people, maximum take-off weight).

Relation to UAM & City-planning: Open category drones are typically not used for UAM due to their lightweight and low-risk nature. However, they can be used for tasks like aerial photography, which can assist in city-planning and infrastructure inspection.

2.1.1.2 Specific Category

Description: This category caters to a higher risk level than the Open category. Drone operators need to conduct a risk assessment (called SORA; Specific Operations Risk

Assessment), and depending on the risk, may need to obtain an operational authorization from the national aviation authority.

Relation to UAM & City-planning: Drones in this category can be utilized for more specialized urban tasks, such as monitoring traffic patterns, infrastructure inspection, or small cargo deliveries. Their integration into city-planning can be pivotal for developing smart cities, ensuring efficient use of airspace, and determining drone corridors.

2.1.1.3 Certified Category:

Description: This category is for the highest risk operations, akin to manned aviation. It requires drones to be certified, pilots to have licenses, and operators to be approved by aviation authorities. It covers large drones or those used for operations with significant risks to third parties.

Relation to UAM & City-planning: UAM largely falls under the Certified category, especially when considering passenger transport or heavy cargo delivery. City-planning will need to incorporate infrastructure for IAM, such as vertiports, traffic management systems, and integration with ground transportation.

The Open and Specific categories will influence city-planning by establishing the appropriate airspace and will be the first real challenge regarding public acceptance. The Certified category, especially in the context of UAM, will have significant macro-level implications, requiring extensive planning and infrastructure development in a wider logistical plan.

2.1.2 The EU drone regulations

Regulation no / Document	Name	Description
2019/945	Commission Delegated Regulation on unmanned aircraft systems and on third-country operators of unmanned aircraft systems	EU Regulation 2019/945 pertains to unmanned aircraft systems (UAS) and third-country operators of UAS. In essence, it sets out the requirements for the operation and certification of drones in the European Union. It covers aspects such as the technical and operational requirements for drones, registration requirements, and the responsibilities of operators and pilots. The aim is to ensure safe, secure, and sustainable drone operations in the EU airspace.
2019/947	Commission Implementing Regulation on the rules and procedures for the operation of unmanned aircraft	EU Regulation 2019/947 establishes the rules and procedures for the operation of unmanned aircraft within the European Union. It addresses areas like operational risk assessments, operational categories of drone flights (Open, Specific, and Certified), as well as the responsibilities and competencies of national aviation authorities. The goal is to create a harmonized framework across the EU for safe drone operations while accommodating the varying levels of risk associated with different drone activities.
2021/664	COMMISSION IMPLEMENTING REGULATION (EU) 2021/664 of	Rules and procedures for the safe operations of UAS in the U-space airspace, for the safe integration of UAS into the



	22 April 2021 on a regulatory framework for the U-space	aviation system and for the provision of U-space services. This Regulation applies within the zones designated as U-space airspace to operators of UAS; U-space service providers; and providers of common information services.
2021/665	COMMISSION IMPLEMENTING REGULATION as regards requirements for providers of air traffic management/air navigation services and other air traffic management network functions in the U-space airspace designated in controlled airspace	Rules for implementing a U-Space in controlled airspace.
2021/666	Commission Implementing Regulation as regards requirements for manned aviation operating in U-space airspace	Requirements for manned aircrafts operating in U-Space.

2.1.3 Central actors for UAM regulation

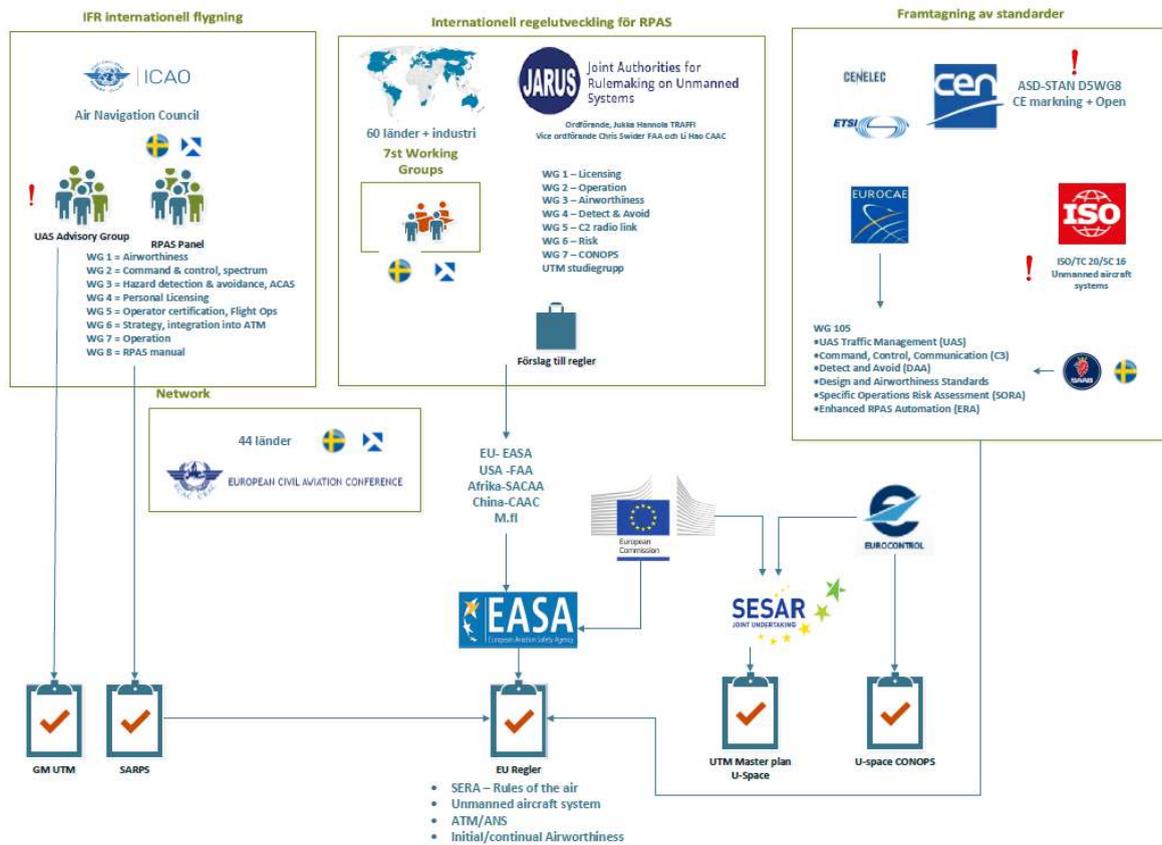


Figure 2 - Central actors for UAM regulation. Source: Transportstyrelsen.

2.2 Relevant upcoming regulations and policies

2.2.1 Single European Sky Background

In an effort to modernize European air traffic management, the EU rolled out several noteworthy initiatives within Urban Air Mobility (UAM). Among these, the SESAR (Single European Sky ATM Research) program stands out. Moreover, the European Aviation Safety Agency (EASA) set forth a roadmap detailing the seamless integration of unmanned aerial vehicles (UAVs) into the European flight ecosystem. The EU Commission further enriched this vision with a white paper that discusses urban air mobility's future trajectory.

2.2.2 Drone Strategy 2.0

November 2022 saw the unveiling of the EU Commission's ambitious Drone Strategy 2.0. It outlined 19 major actions targeted at shaping the drone sector in the EU by 2030. A significant part of this vision is the expectation that by 2030, drones will be widely accepted by EU residents and will play a crucial role in services like emergency response, inspections, and the delivery of goods.

The strategy is built on two main pillars:

- Developing the EU Drone Services Market: This emphasizes the creation of regulatory frameworks concerning airspace, vertiports, and traffic regulations.

- **Boosting Civil and Defense Industry Collaboration:** This focuses on enhancing the interplay between the civilian sector and the EU's security and defense industry. It encompasses aspects of research and innovation.

To supplement this strategy, the EU Commission has proposed a few regulatory amendments. They are also exploring the establishment of an EU-wide drone testing network for civil defense purposes. Plans are underway to draft a strategic roadmap dedicated to drone technologies.

2.2.3 SORA 2.5

What is a SORA?

SORA (Specific Operational Risk Assessment) is a process developed to identify and assess risks in specific drone operations. SORA includes a structured method for assessing the risk level associated with specific operations, developing appropriate risk mitigation measures, and supporting the authorities' decisions in the licensing process.

The SORA model is based on two main analysis steps. The first step is to assess the "Ground Risk", which assesses the risk to people on the ground based on the nature of the operation. The second step is "Air Risk", which assesses the risk to other aircraft.

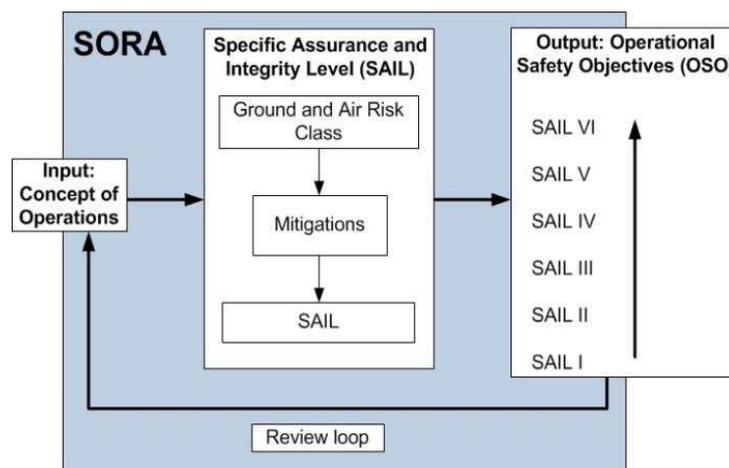


Figure 11: SORA Process, simplified. Source: Nikodem, Florian & Bierig, Andreas & Dittrich, Jörg. (2018). The New Specific Operations Risk Assessment Approach for UAS Regulation Compared to Common Civil Aviation Risk Assessment.

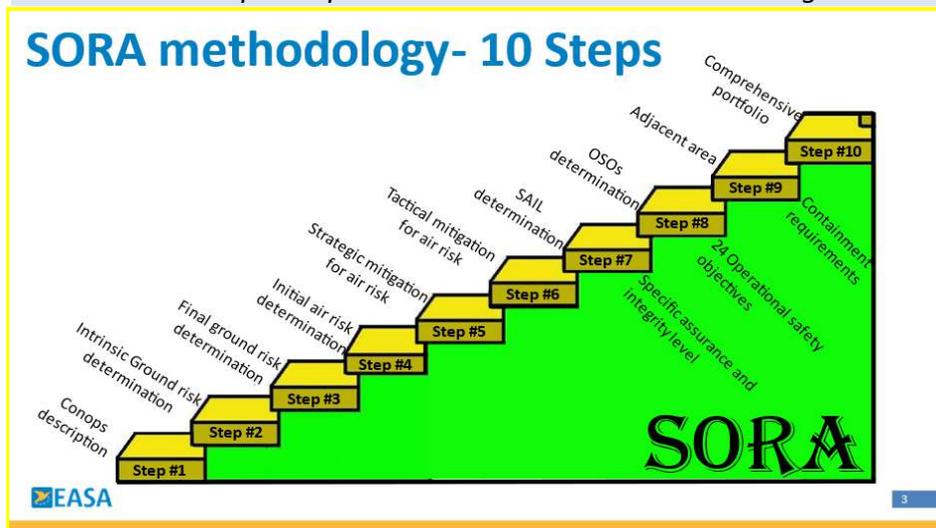
When it comes to quantitative and qualitative risk analysis within SORA and risk assessment for drone operations, the following applies:

Quantitative risk analysis: This means using numerical values to quantify risk. Quantitative risk analysis may use probability models and statistics to measure the risk of a certain event occurring and its potential consequences. Quantitative methods are often more precise but can be more time-consuming and require more data.

Qualitative risk analysis: This involves assessing risks based on subjective characteristics rather than exact numerical values. Qualitative risk analysis may involve ranking risks based on their potential impact and the likelihood of their occurrence, but without assigning specific numerical values. Qualitative methods are often simpler and quicker to implement and can provide a good way to quickly identify major risks.

The SORA process is qualitative in nature and is a so-called "Pen and paper" analysis, where there are certain predefined quantifications (size of the drone, impact energy, etc.) where you fall into a certain category of risk depending on the vehicle used. However, there is an opportunity to support the qualitative assumptions with quantitative data when describing their OSOs (Operational Safety Objectives) and in the Comprehensive Safety Portfolio. In EASA's publication "Acceptable Means of Compliance (AMC) and Guidance Material (GM) to Commission Implementing Regulation (EU) 2019/947", chapter "C.3.1 SORA qualitative vs quantitative approach" it clarifies as follows.

"This air risk assessment is qualitative in nature. Where possible, this assessment will use quantitative data to back up and support the qualitative assumptions. The SORA approach in general provides a balance between qualitative and quantitative approaches, as well as between known prescriptive and non-traditional methodologies."



2.3 Regulatory topics of special consideration for city planning

2.3.1 U-Space

U-space is a framework proposed by the European Union to ensure safe and efficient access to airspace for large numbers of drones. Essentially, it is a system to manage drone traffic, focusing on low-altitude operations. The EU regulations for these are 2021/664, 2021/665, and 2021/666.

The objective of U-space is to enable complex drone services, with high density, in all types of operational environments, including urban areas and cities. U-space is planned to be digital, automated, and seamless to ensure safe drone operations and collaboration with manned aircraft.

Some of the services and features that U-space includes are:

- E-identification and geo-awareness: This means that drones can automatically identify themselves and know their position relative to other objects and zones.

- Traffic information and conflict management: These functions might mean that drones can receive real-time information about other traffic and potential conflicts and manage these conflicts efficiently.
- Flight planning and approval: This could mean that drone operators can plan and get approval for their flights in real-time.
- Command and control: This means that drone operators can have effective control over their drones throughout the operation.

U-space aims to help drone services scale up safely and efficiently and facilitate a range of new commercial opportunities within the drone sector. U-space is under implementation across the EU and will be phased in over the next decade. The European Commission has tasked Eurocae with standardizing and harmonizing the system, and ASTM, ISO, and IEEE are also working on standardizing U-space/UTM.

2.3.2 City involvement and U-Space Coordination mechanism

EASA has released a document called “Acceptable means of compliance (AMC) and guidance material (GM) to the U-space regulatory package” in which it highlights the role of the cities and regional actors in the establishment of the U-Space airspace. This means that all relevant actors that are affected by the introduction of U-Space will have a say on how it is managed with requirements and constraints.

“The U-space coordinator should identify, involve, and consult with all these relevant ‘other authorities and entities, including at local level’. These authorities or entities may be affected by, or interested in, the deployment of a U-space airspace in some way and therefore should be considered accordingly. The term ‘local’ refers to public and administrative authorities, and to entities of various types at local and regional level, such as municipalities, metropolises, prefectures, regions, airports, and ports in accordance with the multilevel governance models of a given Member State. In addition, relevant local civil society organizations, associations, and private entities should be involved and consulted.”

Acceptable Means of Compliance and Guidance Material to Regulation (EU) 2021/664 on a regulatory framework for the U-space. Cologne: European Union Aviation Safety Agency, GM1 Article 18(f), EASA 2022

2.3.3 Important regulatory topics for coordination in the context of city planning

2.3.3.1 Noise

One of the significant challenges in the integration of UAM into urban environments is noise pollution. Noise generated from eVTOLs (electric Vertical Takeoff and Landing vehicles) and other UAM vehicles may contribute to increasing the ambient noise levels in cities, potentially affecting the quality of life for residents. Regulations must establish noise emission standards for UAM vehicles that are acceptable and minimally disruptive to urban communities. These standards should consider various factors, including the time of operation, flight altitudes, and densely populated areas where noise sensitivity is higher. Developers and operators should also actively seek technologies and operational procedures that minimize noise production, such as quieter propulsion systems and flight paths that avoid residential areas.

2.3.3.2 Privacy

With UAM vehicles potentially flying over densely populated areas, privacy concerns become prominent. The public may express discomfort or opposition to UAM if there are fears of being constantly observed or recorded from above. Hence, regulations must explicitly address privacy concerns by establishing clear guidelines on data collection and use by UAM operators. These regulations should define the permissible types of data that can be collected, how the data should be stored and secured, and the duration of data retention. Operators must also implement technologies and practices that protect individual privacy, possibly through the use of anonymization or aggregation of data collected during flights.

2.3.3.3 Environmental considerations

Environmental sustainability is crucial for the acceptance and successful integration of UAM into urban settings. UAM vehicles should adhere to strict emissions standards to minimize their environmental footprint. Regulatory bodies need to define these emissions standards, considering not only the emissions during flight but also the emissions resulting from the production and disposal of UAM vehicles and infrastructure. Life-cycle analysis of UAM vehicles and their components should be conducted to understand and mitigate their overall environmental impact. Furthermore, the use of renewable energy sources for powering UAM vehicles and infrastructure should be promoted and incentivized by regulatory policies.

2.3.3.4 Infrastructure

Infrastructure development for UAM poses unique challenges, as it requires significant investment and careful planning to ensure safety and efficiency. Regulations should establish safety standards for the construction and operation of vertiports, including their location, design, and the technologies implemented for traffic management and communication with UAM vehicles. Coordination with existing urban infrastructure and transportation networks is crucial to maximize the efficiency and accessibility of UAM services. Regulatory frameworks should also facilitate the collaborative planning and development of UAM infrastructure among various stakeholders, including local governments, UAM operators, and the community.

3 Financial outlook and timeline for introduction of UAM

3.1 Background

The coming five years are difficult to forecast for UAM due to new regulations, technology, standards, and a new market where there naturally are uncertainties regarding customer needs and willingness to pay. The European Commission, as previously mentioned in this report, has released a strategy for drones, Drone Strategy 2.0. This strategy outlines a path forward and the removal of obstacles to enable the new market. A significant vision articulated in this strategy is that "By 2030 drones and their required ecosystem will have become an accepted part of the life of EU citizens."

By 2030 drones and their required eco-system will have become an accepted part of the life of EU citizens.

From 2003 onwards, the Union invested a total budget of almost € 980 million in the development or use of drones for innovative applications. It funded 320 projects relating to the drone sector under the R&I. The Commission intends to continue to provide funding for R&I on drones and their integration into the airspace under the Horizon Europe programme and the European Defence Fund. The Commission also intends to set up a coordinated series of calls under the existing EU instruments and EIB loans to support a new flagship project on drone technologies.

The EU Commission expects that a large-scale drone market will have the potential to generate 14.5 billion euros and contribute to 145,000 jobs in Europe by the year 2030 (EU Commission, 2022a). Additionally, there's a proposal to fund an online platform aimed at supporting various stakeholders, from authorities to industries, in realizing sustainable innovative air mobility projects. This initiative is part of the "Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe", which was adopted by the European Commission in November 2022. Flagship action number 7 of this Strategy says that "the Commission will fund the creation of an online platform to support a sustainable IAM implementation by authorities, communities, municipalities, industry and stakeholders." A first version of this online platform, the so-called IAM Hub, has been developed in cooperation with industry partners, national regulatory bodies and representatives of local authorities and will go live by the end of 2023. It aims to better define and communicate on Innovative Air Mobility opportunities and to ensure broader acceptance, as well as comprehensive and transparent information about the technology and the type of operations involved.

A reasonable forecast is that by 2030, the first eVTOL vehicles will perform regional flights with pilots at multiple locations in Europe (McKinsey estimates that 60,000 new pilots for eVTOL may be needed by 2028), and this will place significant demands on airspace safety. The coordination with the introduction of U-Space is crucial here for the market potential in innovative air mobility (including both drone deliveries of goods and passenger transports with e-VTOL) to be realized.

***With the right framework in place, the drone services market in Europe could by 2030 reach a value of €14.5 billion, with a compound annual growth rate of 12.3%, and create 145,000 jobs in the EU”
(From: Drone Strategy 2.0 for a Smart and Sustainable Unmanned Aircraft Eco-System in Europe COM (2022) 652 final, Brussels 29.11.2022).***

3.2 Financing Survey Summary - Key Takeaways on UAM Financing in EU Regions and Cities

In this chapter you will find the summary of the financing survey which was performed by the CITYAM project and responded by UAM stakeholders. The questions placed in order to get information for this survey can be seen in Appendix C to this report. All countries in the CITYAM project responded, however the number of respondents was low, so the responses can not be seen as all-encompassing to the UAM area. The survey was conducted in May-June 2023.

3.2.1.1 Candidate Selection Process in UAM Tenders/Procurements:

The responses emphasized the need for transparency and adherence to best management practices during the selection process. However, details about specific mechanisms or regulations for the selection process were not provided.

3.2.1.2 UAM Activities Subsidizing/Financing Mechanisms:

Suggestions for financing mechanisms included dividing fees among users, municipalities, and the state. Other recommendations encompass collecting user fees by UAM operators and providing grants for infrastructure development and specific UAM activities.

3.2.1.3 Responsibility Distribution for Subsidizing/Financing:

- **Operation Approval:** The responsibility falls on both the municipality and UAM operators (including UAS and vertiports).
- **Operation Risk Assessment:** The responsible entity was not specified.
- **Flight Authorization:** Fees for flight authorization are to be paid by final users to UAM operators.
- **UAM Traffic Control:** The responsible entity was not specified.
- **Designation of No-Flight Zones:** Both the municipality and state should finance this aspect, providing input to the dataset-distributing entity.

3.2.1.4 Input Provision to Responsible Organizations:

- **For Areas Such as Operation Approval, Risk Assessment, Flight Authorization, and Traffic Control:** Organizations in charge need to ensure quality, transparency, and safe operations, preferably through a cost-free tool.

- **Vertiport-Related Responsibilities:** These are to be handled by vertiport operators in collaboration with municipalities and/or the state.
- **Estimation of Environmental Impact:** The survey did not specify a responsible organization.
- **Other Areas (Public Transport, Weather Forecasting, Digital Infrastructure, Data Management):** Responsibility is shared among businesses, the free market, local municipalities, national authorities, and service providers. No specific organizations were identified for network connectivity, counter-UAS measures, UAM research, or the installation of receivers.

3.2.1.5 Note

The survey responses lacked information on certain responsibilities, financing arrangements, and regulations. For a comprehensive understanding and framework, further clarification and coordination with regulatory bodies are necessary. This will help in establishing clear guidelines for candidate selection, financing mechanisms, and assigning responsibilities in UAM operations from city, municipality and regional perspective.

U-Space and drone regulation from a EU Commission perspective is a free and open market

3.3 Methods of funding

3.3.1 General EU R&D Funding:

- **Horizon Europe:** The flagship program with €95.5 billion, focused on various scientific and innovation projects.
- **European Structural and Investment Funds (ESIF):** Includes ERDF and ESF, supporting regional development, innovation, SMEs, and employment.
- **EIB & EIF:** They offer financial support and expertise for various sustainable investment projects and SMEs.
- **Public-Private Partnerships (PPPs):** Facilitate collaboration and investment between public and private sectors.
- **EUREKA, COSME, EIT, and ERASMUS+:** These provide funding and support for cross-border cooperation in R&D, SMEs, innovation, and education.
- **National Funding Schemes:** Individual member states offer various funding options for R&D within their jurisdictions.
- **Private Investment:** Corporations, venture capitalists, and angel investors significantly contribute to R&D funding.
- **Non-Profit Funding:** Foundations and NGOs grant funds for specific research initiatives.

3.3.2 UAM-Related R&D Funding:

- **SESAR:** Focuses on ATM system overhaul, funding UAM projects that align with air traffic management improvement goals.
- **Interreg:** Supports projects promoting regional integration and technological innovation in different EU regions.



- **EASA:** Provides funds for projects promoting aviation safety, crucial for UAM technology certifications and compliance.
- **Horizon Europe:** As the prominent funding program, it supports UAM projects driving technology advancement and environmental sustainability.
- **National Funding:** Various programs by EU member states support UAM R&D tailored to each country's specific needs and priorities.
- **Other Initiatives:** Funding may also come from industry groups, academic institutions, or non-profits advancing aviation and transportation technologies.

3.4 Conclusion

The UAM sector is entering a crucial phase in the next five years, with significant uncertainties due to new regulations, technologies, and standards. The market is also newly emerging, creating uncertainties regarding customer needs and payment willingness.

The EU Commission has a positive outlook on the drone market, expecting it to generate substantial revenue and job opportunities by 2030.

Initiatives are underway to support stakeholders in realizing sustainable innovative air mobility projects, reflecting the EU's commitment to fostering this sector.

The first eVTOL vehicles are expected to be operational by 2030, necessitating a considerable number of new pilots and rigorous airspace safety measures.

Coordination with the U-Space introduction is vital for unlocking the market potential of innovative air mobility, encompassing both goods and passenger transport using drones and e-VTOL vehicles.

4 National and city regulation and policy collection

The ascent of Urban Air Mobility (UAM) presents cities with a transformative mode of transport that has the potential to redefine urban landscapes. As emerging services and market potentials come to the fore, a tapestry of national and regional regulatory perspectives emerges. Throughout several CITYAM partner regions, studies have spotlighted the opportunities presented by this new frontier of urban transportation.

Yet, the integration of UAM isn't without its complexities. Acquiring landowner permissions (in some nations), ensuring environmental compliances, and navigating the city mandates underscore the myriad challenges cities face. A sentiment echoed by the Economic Development Department of Helsinki which underscores that while cities may have limited legal avenues to govern urban aviation directly, they aren't entirely without influence. Instead, softer policies—like clear vision statements, collaborative strategies, and proactive participation in UAM development—can play a pivotal role in not only facilitating economic growth but also in alleviating potential UAM-related concerns like noise pollution.

"As there are few legal possibilities for the city to manage urban aviation, soft policies, such as guidance, instructions, clear vision, cooperation, and early participation in the UAM development can be leveraged to impact the economic development and to mitigate potential drawbacks from urban aviation such as noise."

Study on the Future of Helsinki's Urban Air Mobility, City of Helsinki
Economic Development Department, 2023

Further compounding the regulatory environment is the growing mandate and responsibility cities bear in both administering UAM and advocating for its public acceptance. As UAM becomes an integral part of the urban narrative, cities are finding themselves at the nexus of its evolution. This mandates a holistic understanding of the myriad national and regional regulations that intersect with UAM's introduction.

However, the journey towards a harmonized UAM landscape is rife with ambiguities. The absence of a unified strategy for UAM's integration signifies that the onus falls upon individual member states to chart their paths, each grappling with its unique set of challenges and roadblocks.

"... At the same time, there is a lack of a common strategy for how UAM should be implemented, and it is up to each member state to find its way through the national, regional, and local obstacles and challenges that exist."

Innovativ luftmobilitet - Förutsättningarna för att etablera IAM i Sverige
<https://www.transportstyrelsen.se/globalassets/global/publikationer-och-rapporter/rapporter/luftfart/ny-iam-rapport-ak2.pdf>



A comprehensive collection and comparison of national and regional regulations that affect the introduction of UAM is needed in order to promote interregional learning and sharing of best practices.

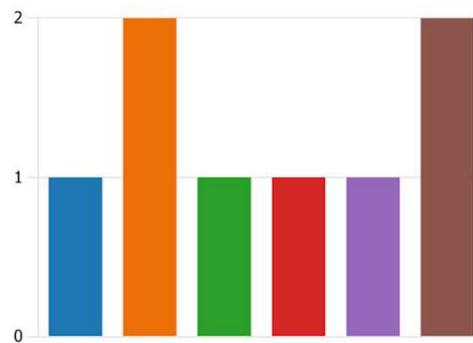
For this purpose, a template is shown in Appendix 1 for the continued collection of national, regional and local regulations that affects the introduction of UAM in the partner countries of CITYAM.

4.1 CITYAM National and city regulations collection

Respondents

2. Which country are you responding for?

[More Details](#)



4.1.1 Noise

All countries have noise regulations or policy that may affect urban air mobility.

Do you have any noise regulation or policy that may affect or regulate UAM in the city or municipality you respond for?

Country	Response	Note
Finland	YES	https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations#noise--vibration-and-dust-control
Germany	YES	The following law could apply for vertiports: https://www.gesetze-im-internet.de/flul_rmg/BJNR002820971.html Since drones are currently allowed to take off anywhere in Germany, there is no ground-based facility that emits noise (like an airport). However, noise protection at



		airports is specifically regulated in Germany as referenced in the link above.
Estonia	YES	General national noise level regulations https://www.riigiteataja.ee/akt/163756
Sweden	YES	https://tillstand.stockholm/tillstand-regler-och-tillsyn/miljoregler/buller-fran-verksamheter/ https://www.naturvardsverket.se/vagledning-och-stod/buller/buller-fran-industrier/
Poland	YES	https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/dopuszczalne-poziomy-halasu-w-srodowisku-17361247
Latvia	YES	https://likumi.lv/ta/id/263882-troksna-novertesanas-un-parvaldibas-kartiba and for Riga and https://mvd.riga.lv/uploads/troksna_kartes/Kluso%20rajonu%20karte/Lidosta/#12/56.9680/24.1292 and for ROAD https://lvceli.lv/celu-tikls/celu-kartes/troksnu-kartes/ and for AIRPORT https://www.riga-airport.com/en/node/277

4.1.2 Privacy

All countries have regulations or policy that affects urban air mobility regarding privacy.

Do you have any regulation or policy that affects or regulates UAM regarding Privacy?		
Country	Response	Note
Finland	YES	Apart from Europe’s General Data Protection Regulation (GDPR), there are no other regulations at the moment that explicitly cover UAM related privacy or security. https://gdpr-info.eu/
Germany	YES	In addition to Apart from Europe’s General Data Protection Regulation (GDPR), § 21h (3) No. 7 LuftVO, https://www.gesetze-im-internet.de/luftvo_2015/___21h.html (Ban on flying over property).
Estonia	YES	We strictly follow Europe's General Data Protection Regulation (GDPR) but apart from that, there are no other, regional or national regulations at the moment that explicitly cover UAM related privacy or security. https://gdpr-info.eu/ .
Sweden	YES	https://start.stockholm/om-stockholms-stad/sa-arbetar-staden/kamerabevakning/
Poland	YES	

Latvia	YES	https://likumi.lv/ta/id/57659-par-aviaciju and https://likumi.lv/ta/id/324351-bezpilota-gaisa-kugu-lidojumu-noteikumi and https://likumi.lv/ta/en/en/id/300099
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4.1.3 Environmental considerations

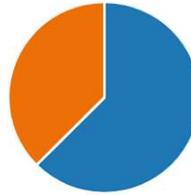
Majority (6) of cities have regulation or policy that affects environmental issues.

Do you have any city regulation or policy that affects or regulates UAM regarding environmental issues (nature reserves, pollution,)		
Country	Response	Note
Finland	YES	<p>Finnish Aviation Law: https://www.finlex.fi/en/laki/kaannokset/2014/en20140864.pdf (translation in English)</p> <p>Law on Environment Protection: https://www.finlex.fi/fi/laki/ajantasa/2014/20140527 (in Finnish)</p> <p>Law on particular neighbourhood relations: https://www.finlex.fi/fi/laki/ajantasa/1920/19200026# (in Finnish)</p> <p>Environmental Protection Regulation: https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations#noise--vibration-and-dust-control (in English)</p>
Germany	YES	<p>§ 21h (3) No. 6 LuftVO, https://www.gesetze-im-internet.de/luftvo_2015/_21h.html (ban on flying over nature reserves)</p>
Estonia	YES	<p>Estonian aviation law (special agreements needed to fly over nature reserves) https://www.riigiteataja.ee/akt/LennS</p> <p>Also the Flight restrictions for aircraft and geographic areas to restrict the flight of unmanned aircraft https://www.riigiteataja.ee/akt/326082022001</p>
Sweden	NO	
Poland	NO	
Latvia	YES	https://likumi.lv/ta/id/57659-par-aviaciju and https://likumi.lv/ta/id/324351-bezpilota-gaisa-kugu-lidojumu-noteikumi

4.1.4 Infrastructure and city planning

9. Infrastructure and city planning

[More Details](#)



Do you have any city regulations or policy that affects or regulates UAM regarding infrastructure, zoning rules or city planning policies? Also consider the introduction of landing sites for UAM.

Country	Response	Note
Finland	YES	The City of Helsinki has designated 'quiet areas' (less than 50 dB areas (sum, day)), even though there is no particular regulation addressing this.
Germany	YES	The response of no reflects the fact that it is not clear yet if the rules apply. If they do apply, it would only be for UAM as air taxis, not for small drones. For Vertiports, the following regulations may apply for city planning: https://www.gesetze-im-internet.de/baunvo/ (areas in German cities are separated according to the type of use (living, working,..) https://www.juraforum.de/gesetze/luftvo/
Estonia	YES	The city of Tartu has established "quiet areas" and "potential quiet areas" that should be taken into consideration when planning the landing sites and other UAS infrastructure. https://geohub.tartulv.ee/datasets/Tartu::potentsiaalne-vaikne-ala/explore?location=58.366529%2C26.694800%2C12.23 Also the flight restrictions for aircraft and geographic areas to restrict the flight of unmanned aircraft https://www.riigiteataja.ee/akt/326082022001
Sweden	NO	
Poland	NO	
Latvia	YES	Riga City land use master plan will have a direct impact on zoning, take-off/landing site locations and other enabling or restricting elements. Most of it can potentially be accounted for through the GIS tool. https://www.rdpad.lv/rtp/speka-esosais/ and



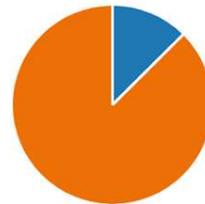
https://www.rdpad.lv/wp-content/uploads/2023/03/TIAN_20230316_1625.pdf
<https://likumi.lv/ta/id/324351-bezpilota-gaisa-kugu-lidojumu-noteikumi>

4.1.5 Operating hours

11. Operating hours

[More Details](#)

● Yes 1
 ● No 7



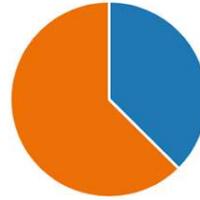
Do you have any city regulation or policy that affects or regulates UAM regarding working and operating hours (drone flights at night, Sundays, public holidays)?

Country	Response	Note
Finland	YES	Environmental Protection Regulation: https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations#noise--vibration-and-dust-control (in English)
Germany	NO	No, however the following regulation could apply to flying during the night: https://www.gesetze-im-internet.de/flul_rmg/BJNR002820971.html (the law originally applies to aircraft, but it remains to be seen whether it also applies to UAMs)
Estonia	NO	
Sweden	NO	
Poland	NO	
Latvia	NO	

4.1.6 National regulations

13. Do you have any National regulations that affects UAM that deviates from the EU-wide regulations?

[More Details](#)



Do you have any national regulations that affect UAM that deviate from the EU-wide regulations?

Country	Response	Note
Finland	YES	It is not mentioned as such in this document
Germany	YES	§ 21 h (3) LuftVO
Estonia	NO	<p>According to the Estonian Aviation Act § 4¹ Section 1, the Government has the authority to limit the use of airspace in Estonia. Such a decision does exist for unmanned vehicles (unfortunately, only in EST): https://www.riigiteataja.ee/akt/326082022001</p> <p>As the basis of all the UAS regulations in Estonia are still the EU regulations, where actually these type of national safety (cross boarder) aspects are covered as exeptions, then I wouldn't say that it deviates from the EU- wide regulations at this point.</p>
Sweden	YES	https://www.transportstyrelsen.se/globalassets/global/regler/remisser/luftfart/tsf-2023-40-uas/tsf-2023-40-transportstyrelsens-foreskrifter-om-obemannade-luftfartyg-uas-infor-remiss.pdf
Poland	NO	
Latvia	NO	

4.2 Comments and explanations to national and city regulation

In this section, the national- and city regulations and policies are further explained in detail.

4.2.1 Finland

- **National regulations regarding Urban Air Mobility**

A regulation that affects the installation of landing sites for drones on a national level is the land use and construction law issued by the Ministry of Environment. According to Section

57 §, there should be protection regulations in the site plan if an area or building site needs to be protected due to the landscape, natural values, built environment, cultural-historical values or other special environmental values. The respective law also imposes building restrictions and even building prohibitions in some cases. (See Land use and construction law: <https://www.finlex.fi/fi/laki/alkup/2023/20230752>)

Finland also follows the EU Habitats and Birds Directives (later formulated as Environmental Responsibility Directive). Based on these directives issued by the EU, the national Nature Conservation Act (Luonnonsuojelulaki 9/2023) also affects UAM. The Act in question defines national / natural parks, private and other nature reserve areas indicated by the Finnish state as nature reserve areas. In addition to this and concerning protected animal species (including birds), it is prohibited to deliberately disturb those animals particularly during their breeding season as well as their resting areas important for migration and life cycle. Areas included in Natura 2000 should also be taken into account (See Nature Conservation Act: <https://www.finlex.fi/fi/laki/alkup/2023/20230009>).

In contrast to the most EU countries, the utilisation of mobile networks in the air requires a special permission from both the network operator and the Finnish Civil Aviation Agency (Traficom) unless it is being used by authorities or certain authorised tasks (see <https://www.traficom.fi/sites/default/files/media/regulation/M%C3%A4%C3%A4r%C3%A4ys%2015AT.pdf>).

- **National strategy for Urban Air Mobility**

The Action Plan on transport automation issued by the Ministry of Transport and Communications (2021) identifies the lack of regulation for UAM landing sites and also, the need for national regulation. However, there is no indicated timeline for the development of such regulations or guidelines. Despite the lack of regulation, the Action Plan recommends cities to take UAM infrastructure requirements into consideration in land use planning. According to the Plan, the current information of flight obstacles is limited and Finnish cities should generate real-time data of such obstacles. Cities are viewed whatsoever as minor stakeholders in the development of regulation and also, in the study of mobile network coverage for unmanned aviation (See Action Plan: https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/163629/LVM_2021_28.pdf)

According to the Logistics Digitalisation Strategy issued by the Ministry of Transport and Communications (2020), the logistics data environment needs to be developed further so, situational picture data is improved and become accessible to various actors (data providers, utilisers, users). Additionally, urban logistics should be improved with optimised fleet, capacity, and multimodality. There should be greater flexibility and to this end, smaller delivery vehicles can be used for the last-mile deliveries. Noise from loading and unloading is seen as a major obstacle for flexible use of fleet, which is an essential consideration for drone use in logistics. UAM or drones are not explicitly stated in the strategy. Nonetheless, the strategy includes themes closely related to the integration of UAM into other modes of transport. (See the Logistics Digitalisation Strategy in Finnish: https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162463/a_LVM_2020_13.pdf?sequence=7&isAllowed=y and key takeaways of the Logistics Digitalisation Strategy in English: https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/162463/c_Appendix_in_English.pdf?sequence=9&isAllowed=y)

- **City regulations and policies regarding noise**

The City of Helsinki does not have any own thresholds or limits for environmental noise. Nevertheless, the City has adopted a Noise Abatement Action Plan. The latest Noise Abatement Action Plan that covers the upcoming period 2023-2028 has not been published yet officially by the City. Additionally, Helsinki is the only Finnish city that has adopted an Environmental Noise Directive (Ympäristömeludirektiivi). The current one has been in place since 2012. It does include air traffic but not unmanned aerial vehicles (UAVs). On the basis of the Environmental Protection Act though, the City of Helsinki has environmental protection regulations in place that address particularly noise and vibration (See Environmental Protection Regulation:

<https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations#noise--vibration-and-dust-control>).

- **City regulations and policies regarding privacy**

There is no regulation at the moment at the City of Helsinki that explicitly covers UAM related privacy or security. There are normal privacy regulations in place, such as Europe's General Data Protection Regulation (GDPR). The approval process of flights does not cover privacy in UAM operations. In general, GDPR restricts entities to use the data they collect within the EU territory and target EU citizens and residents (See GDPR: <https://gdpr-info.eu/>).

- **Environmental considerations in city regulations and policies**

On the basis of the Environmental Protection Act, the City of Helsinki has imposed environmental protection regulations aiming at preventing environmental pollution. These regulations might apply to drone operations as well even if not explicitly mentioned.

(See Environmental Protection Regulations:

<https://www.hel.fi/en/urban-environment-and-traffic/protection-of-the-environment-and-nature/prevention-of-environmental-hazards/environmental-protection-regulations#noise--vibration-and-dust-control>)

Additionally, the law on particular neighbourhood relations 26/192016 (paragraph 17) states that regular, commercial or industrial activities cannot significantly encumber neighbours due to among others reasons of noise or vibration. Therefore, an environmental permit may be requested from the City's Environmental Unit if a vertiport or droneport affects the environment essentially (See Law on particular neighbourhood relations:

<https://www.finlex.fi/fi/laki/ajantasa/1920/19200026#>).

- **City regulations and policies regarding infrastructure and planning**

The City of Helsinki has designated "quiet areas" (less than 50 dB areas (sum, day)), even though there is no particular regulation addressing this. Apart from noise reduction, land use planning in Helsinki aims for the retention of these "quiet areas". Helsinki's designated

“quiet areas” are based on surveys portraying its residents' perceptions and have been determined on this basis. (See Helsinki’s map that identifies the ‘quiet areas’ highlighted by blue:<https://www.hel.fi/static/ymk/hiljaiset-alueet/Helsingin-hiljaiseksi-koetut-alueet-2007-2008-kartta.pdf>).

Additionally, Section 17 of the environmental protection regulations might apply to the case of installing a drone landing site somewhere with much coming and going drones (See link to the Environmental Protection Regulations above).

It is worth mentioning at this point that the Finnish Civil Aviation Agency Traficom together with the Helsinki Regional Transport Authority has outlined a Roadmap for Transport Automation in Helsinki regions (2021). The roadmap recommends cities and regional planning authorities to include take-off, landing and loading sites in land use planning and zoning. Additionally, Finnish cities and regional authorities should ensure accessibility of related automated transport systems and infrastructure and also, improve their transport automation related capabilities through tests (See Roadmap for Transport Automation in Helsinki:https://www.traficom.fi/sites/default/files/media/file/Liikenteen_automaaation_tiekartta.pdf)

- **City regulations and policies regarding operating hours**

According to the environmental protection regulations set by the City of Helsinki, "making noise near residential buildings, accommodations and care and nursing facilities at night between 22.00 and 7.00 is prohibited." (see related link above).

4.2.2 Germany

In May 2020, the Federal Ministry for Digital and Transport presented the federal government's action plan for unmanned aviation systems and innovative aviation concepts to the federal cabinet. The action plan is intended to enable the use of drones while promoting research and development, supporting the transition to practical drone application, and strengthening public safety. The action plan also includes measures to implement the EU regulations on unmanned aircraft in Germany including: a new framework for drone operations, detection and defense measures, innovation, increasing social acceptance, and possible future air taxis for transport and as a possible emergency doctor transport in air rescue.

In June 2021, the Commission's delegated regulation (EU) 2019/945 and the Commission's implementing regulation (EU) 2019/947 were adopted in Germany’s regulations. The Commission’s implementing regulation (EU) 2021/664 (U-space regulation) has not been adopted yet.

§ Section 21 (3) LuftVO is the implementation of Art. 15 DVO (EU) 2019/947. Hereby, the German legislator exercises its discretionary power granted by the EU and enacts special rules for certain areas in which special rules must be complied with (control zones, nature conservation areas, residential areas, open-air swimming pools, etc.).

The Federal Ministry for Digital and Transport also developed a concept paper in December 2022, titled “Establishment of U-Spaces in Germany”. The concept is intended to provide the

basis for the establishment of U-Spaces in Germany and was developed together with the Unmanned Aviation Project Group (PG Unb LF). This group includes experts with the participation of various federal ministries, federal states, authorities, federal companies and the Drone Advisory Board. It serves to define the responsibilities, necessary structures and the procedure for the designation of U-Spaces in accordance with the Implementing Regulation (DVO) (EU) 2021/664.

More information on the concept paper can be found here:

<https://www.dipul.de/homepage/de/aktuelle-meldungen/u-spacekonzept-deutschland/konzept-einrichtung-von-u-spaces-in-deutschland.pdf?cid=18w>. According to the paper, Germany plans to distribute all information through the SCISP, meaning: not only the “CI” but also that of the USSPs (flight permits) or government agencies (info on state air traffic and orders whether airspaces are temporarily closed to drones).

4.2.3 Estonia

In Europe, the unmanned aviation is regulated by the European Commission under the following regulations:

- Regulations (EU) 2019/947 and 2019/945 for Unmanned Aircraft Systems (combined in Easy Access Rules)
- 2021/664 of 22 April 2021 on a regulatory framework for the U-space (Text with EEA relevance)

There are 3 UAS categories:

- Open category (A1/A3 and A2)
 - No authorisation required to fly
 - Must remain in line of sight (VLOS)
 - 120 m (393 ft) altitude
 - Avoid restricted airspace
 - Remote pilot must obtain open category remote pilot training and licenses (possibility to obtain licenses in Estonian CAA)
 - A1/A3 online exam
 - A2 on-site exam
- Specific category
 - Operational authorisation from CAA is required. There are 4 different ways to obtain operational authorisation:
 - Operational declaration – STS (Standard Scenarios) (applicable from 01.01.2024);
 - Operational authorisation – PDRA (Pre-Defined Risk Assessment);
 - Operational authorisation – SORA (Specific Operations Risk Assessment);
 - Light UAS Operator Certificate – LUC.
 - Remote pilot must obtain specific category training and licenses (possibility to obtain licenses in Estonian CAA)

- STS license - currently unavailable in Estonia.
- PDRA and SORA training - possible to obtain in Estonia
- LUC - possible to obtain in Estonia
- Certified category
 - Authorization from CAA is required but as the certified category is still being developed at the EU level, it is currently not possible to apply for permits for this category.

Under the Estonian Aviation Act the restrictions of use of Estonian airspace have been regulated as geographical areas in Estonia. For the overview of active airspace status an application was published by the Estonian Air Navigation Services in 2023. This app helps remote pilots with all the relevant flight planning information (height limits, restrictions and requirements, NOTAM notices).

Sandbox for testing products and services for the purpose of legal and certification process Currently, a project called Competent Authority Coordinating Testing in U-space Sandbox (CACTUS) is called to action by the Estonian Transportation Administration. The main aim of establishing the sandbox is to operate it as a regulatory sandbox and to ensure economic development. It would be used for validation purposes for regulatory aspects such as testing CISP, USSP capabilities and attracting public and private, local and foreign companies who would like to perform testing.

Status and internal legal acts (Overview by the Estonian Transportation Administration, Priit Rifik, 30.06.2023):

- Internal Rules of the Air: <https://www.riigiteataja.ee/akt/129102019006> old and basic legislation for UA operations
- Government regulation nr 82: <https://www.riigiteataja.ee/akt/130082022005> notification procedure for establishing GZ
- Government regulation nr 81: <https://www.riigiteataja.ee/akt/130082022004> the procedure for applying for and granting a permit and determining the permit grantor (state aviation)
- Government Order nr 229: <https://www.riigiteataja.ee/akt/326082022001> creation of GZ for environmental, police, military etc purposes. Three appendices that contain GZ coordinates (state aviation)
- Government regulation nr 240: <https://www.riigiteataja.ee/akt/102072022003> regulates use of Estonian Airspace and Tallinn FIR
- TA general precept: <https://www.transpordiamet.ee/droonid> Tool for TA to establish add hoc requirements for UA and establish GZ for aviation safety reasons

Internal process is ongoing where the Transportation Administration plans to amend all the listed internal regulations. It means that TA will add necessary regulation to Estonian

Aviation Act in order to apply the U-space regulations. The TA's aim is to enforce the amendments in the second half of 2024.

4.2.4 Sweden

In Sweden, operations with unmanned aircraft systems, UAS, have been regulated by, among other things, national regulations, the Transport Agency's regulations, and general advice (TSFS 2017:110) on unmanned aircraft. On July 1, 2019, two EU common regulations came into force that regulate the use of unmanned aircraft systems (UAS); the Commission's delegated regulation (EU) 2019/945 of March 12, 2019, on unmanned aircraft systems and third-country operators of unmanned aircraft systems referred to as the delegated regulation and the Commission's implementing regulation (EU) 2019/947 of May 24, 2019, on rules and procedures for the operation of unmanned aircraft referred to as the implementing regulation. The new EU regulations for UAS require adjustments to the existing national regulations. Parts of TSFS 2017:110 are no longer relevant since the requirements are now found in the EU regulations. Other parts of TSFS 2017:110 are still relevant as they cover areas that are still regulated nationally. The provisions in these parts need updating. There is also a need for complementary national provisions to the Commission's implementing regulation (EU) 2019/947.

The proposed regulations are divided into three main areas:

1. The first part applies to all UAS operations, regardless of whether the operations are covered by the EU regulations or national provisions.
2. The second part contains only rules for operations that are exempt from the EU regulations according to Article 2.3 of Regulation (EU) 2018/1139 and are regulated nationally.
3. The third part includes supplementary provisions for UAS operations that are regulated through the EU's regulations and exemption provisions

The suggested regulation is under review, and all associated information can be found here; <http://www.transportstyrelsen.se/sv/Regler/Remisser/>

4.2.5 Poland

Poland complies with the European Union's regulations setting out the requirements for unmanned aircraft systems.

First and foremost, this is the REGULATION (EU) 2018/1139 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and the regulations amending and repealing them. The Polish Civil Aviation Authority makes them available consolidated in the Polish language version.

As of 31 December 2020, COMMISSION IMPLEMENTING REGULATION (EU) 2019/947 of 24 May 2019 on rules and procedures for the operation of unmanned aircraft shall apply.

Further pan-European legislation to which Poland adheres is:

- COMMISSION DELEGATED REGULATION (EU) 2019/945 of 12 March 2019 on unmanned aerial systems and operators of unmanned aerial systems from third countries;

- Acceptable Means of Compliance (AMC) and Guidance Material (GM) to the provisions of Regulation 2019/947 introduced by Decision 2019/021/R of 09 October 2019 of the Executive Director of the European Union Aviation Safety Agency (EASA), as amended by Decisions 2020/022/R of 15 December 2020 and 2022/002/R of 7 February 2022;
- Easy Access Rules for Unmanned Aircraft Systems a
- Noise Measurement Guidelines for Unmanned Aircraft Systems lighter than 600 kg operating in the special category.

Regulatory documents at national level are the Guidelines of the President of the Civil Aviation Authority. 11 such guidelines are currently available as binding.

The guidelines include:

Modalities of operations using unmanned aircraft systems in view of the entry into force of the provisions of Commission Implementing Regulation (EU) No 2019/947 of 24 May 2019 on rules and procedures for the operation of unmanned aircraft.

The designation of geographical zones for unmanned aircraft systems.

How to verify the identity of candidates for the unmanned aircraft pilot competency for the A2 subcategory of the 'open' category during the online theoretical examination.

National Standard Scenario NSTS-01 for visual line of sight (VLOS) or first person view (FPV) operations using an unmanned aircraft with a take-off mass of less than 4 kg.

National Standard Scenario NSTS-02 for visual line-of-sight (VLOS) operations using a multi-rotor (MR) category unmanned aircraft with a take-off mass of less than 25 kg.

National Standard Scenario NSTS-03 for visual line of sight (VLOS) operations using an unmanned aircraft of fixed wing category (A) with a take-off mass of less than 25 kg.

National Standard Scenario NSTS-04 for visual line of sight (VLOS) operations using a helicopter category unmanned aircraft (H) with a take-off mass of less than 25 kg.

National Standard Scenario NSTS-05 for beyond visual line of sight (BVLOS) operations using an unmanned aircraft with a take-off mass of less than 4 kg, within 2 km of the pilot of the unmanned aircraft.

National Standard Scenario NSTS-06 for Beyond Visual Line of Sight (BVLOS) operations using a multi-rotor (MR) category unmanned aircraft with a take-off mass of less than 25 kg, within 2 km of the pilot of the unmanned aircraft.

National Standard Scenario NSTS-07 for Beyond Visual Line of Sight (BVLOS) operations using an unmanned aircraft of the fixed-wing category (A) with a take-off mass of less than 25 kg, within 2 km of the pilot of the unmanned aircraft.

National Standard Scenario NSTS-08 for Beyond Visual Line of Sight (BVLOS) operations using an unmanned helicopter category aircraft (H) with a take-off mass of less than 25 kg, within 2 km of the pilot of the unmanned aircraft.

So far, no local regulations have been introduced in Gdansk regarding the operation of drones in urban space. There are also no strategic documents in this regard.

4.2.6 Latvia

Currently, the procedures for conducting unmanned aircraft flights in Latvia are regulated by Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (hereinafter - Regulation No2019/947), Sections 47 and 117.6 of the Latvian Law on Aviation, as well as Regulation No. 429 of the Cabinet of Ministers (Prot. 50, § 18) “Regulations regarding flight of Unmanned aircraft” (hereinafter - Regulations of UAM).

The purpose of Regulations of UAM is to determine the procedures by which unmanned aircraft flights are performed in the airspace of the Republic of Latvia; criteria and procedures for facilitating, restricting, and prohibiting unmanned aircraft flights; the procedures for circulation of information necessary for flights of unmanned aircraft, as well as the procedures for financing the provision thereof.

The maximum permitted flight height within the open category for unmanned aircraft is restricted to 120m as measured from the ground or water surface (not the take-off point) with additional restrictions in the air traffic control area (CTR) around the airfield “Riga” and in the traffic information area (TIZ) around the airfield “Liepaja”, where it is permitted to operate flights at an altitude of no more than 50 m.

Despite the conditions set out in the general requirements, bans, restrictions, or facilitations related to safety, security, privacy or environmental aspects may be imposed on unmanned aircraft flights in certain locations. In some cases, flights may have to be pre-agreed or subject to additional conditions (e.g., flights only with a certain class of unmanned aircraft) and in other flights may be completely banned. Similarly, individual locations may not be allowed to comply with any of the conditions for the open category.

Some examples in Latvia include:

- Restrictions near aerodromes (direct proximity of aerodromes, air traffic control areas (CTR), traffic information areas (TIZ), aerodrome air traffic areas (ATZ)),
- Areas created in connection with aviation activities (Temporary reserved areas (TRA), temporary restricted areas (TSA), danger areas (D), partially restricted areas (R) and restricted areas (P)),
- zones established around military objects, the Bank of Latvia, places of imprisonment, as well as infrastructure objects related to ensuring public order and security, State border security and civil protection,
- Restrictions around industrial accident risk objects,
- Restrictions near streets, public highways, bridges, railway infrastructure, electric network overhead lines and cemeteries.

The following documents are relevant for the assessment of potential noise from unmanned aircraft. Cabinet of Ministers Regulation No. 16 “Procedures for the evaluation and management of noise”, which determines noise indicators, procedures for the application thereof, requirements for mapping and assessment methods. Based on the Regulation, the development of Strategic noise maps has been carried out by Riga City Department of

Housing and Environment, Statestock company “RIGA International AIRPORT” and State limited liability company “Latvian State roads”.

Although there are currently no specific restrictions or regulations that apply to the impact of UAM on the privacy of citizens or companies, the Law on Aviation and Regulations of UAM implicitly determine the national policy applicable to all aircraft, including UAM. With regards to environmental issues (nature reserves, pollution, etc.), Regulations of UAM include the possibility for state and local government authorities to impose certain restrictions, while the Law on Aviation may also impose certain restrictions.

Regarding urban planning, regulations and city infrastructure, the following should be noted: The Riga Master plan (hereinafter - RTP), as the long-term spatial development planning document of Riga City, it directly affects and determines the permitted use, functions and development directions of the city’s territories. When working on the landing site planning tool, the RTP plays an integral part of the planning of these sites and should form the basis for this process, as the level of detail makes it easy to be used. As the case in other subjects, the Regulations of UAM should be used as guidelines when working on urban planning and land use issues.

4.3 Comparative summary of national regulations

The Figure below shows comparatively national and local regulations that specifically address UAM in the CITYAM partner cities. If no specific regulation addresses UAM, or no regulation deviates from EU-regulation, it is denoted as “N”, meaning that the EU-regulations and policy apply.

Country	Noise regulation	Privacy	Environ-ment	Infra-structure	Operating hours	National regulations
Finland	Y	Y	Y	Y	Y	Y
Germany ¹	N	Y	Y	N	N	Y
Estonia	Y	Y	Y	Y	N	N
Sweden	Y	Y	N	N	N	Y
Poland	Y	N	N	N	N	N
Latvia	Y	Y	Y	Y	N	N

¹ In Germany, for the categories of regulations on “Noise” and “Infrastructure” it still remains if the regulations mentioned apply to UAM (UAM in the sense of air taxis which need vertiports. For small drones, no noise or infrastructure rules apply).

5 General stakeholder survey - Key Takeaways

In this chapter you will find the summary of the general stakeholder survey which was performed by the CITYAM project and responded by UAM stakeholders. The questions placed in order to get information for this survey can be seen in Appendix D to this report. All countries in the CITYAM project responded, however the number of respondents was low, so the responses cannot be seen as all-encompassing to the UAM area, the survey was conducted in May 2023.

5.1 Familiarity with physical UAM

There is a range of familiarity among stakeholders with physical and digital Urban Air Mobility (UAM) infrastructure. Some stakeholders have limited or basic knowledge of UAM infrastructure, while others are more familiar or even experts in specific areas. Familiarity with physical UAM infrastructure varies, with some stakeholders having a basic understanding or learning about it through materials, masterclasses, or conferences. Familiarity with digital UAM infrastructure is less widespread, with some stakeholders having no knowledge or experience in this area. Awareness of infrastructure components such as vertiports, charging stations, air traffic control systems, and communication/navigation infrastructure is present among some stakeholders.

The expertise of stakeholders ranges from awareness and early stages to more advanced levels, with some stakeholders lacking specific plans for physical and digital UAM infrastructure. Stakeholders have obtained knowledge about UAM infrastructure through various sources, including conferences, newsletters, and legal documentation from organizations like EASA. These key takeaways highlight the varying levels of familiarity and expertise among stakeholders regarding physical and digital UAM infrastructure.

5.2 View on the situation of UAM in Nordic countries

- The level of agreement with the description of the situation in Nordic countries regarding Urban Traffic Management (UTM) varies among stakeholders.
- Some stakeholders from specific countries are aware of national developments related to UTM, such as Sweden identifying a CIS provider or Estonia establishing a drone testbed near Tartu.
- Stakeholders from Poland mention specific requirements and procedures for drone flights, such as online training courses, online tests, and informing the Polish Air Navigation Services Agency (PANSNA) via the DroneRadar application.
- There are stakeholders who indicate a lack of information or knowledge on the topic of UTM in their respective countries.

- In Poland, PANSA is mentioned as the producer and operator of the first operational, integrated national UTM system.
- Some stakeholders express uncertainty about the current status of UTM implementation in their countries or mention ongoing development with limited involvement of end-users.
- Stakeholders from Latvia mention a lack of designated actors responsible for UTM and a lack of concrete steps or funding allocated on the national level.
- These key takeaways highlight the diverse range of perspectives on the situation in different countries regarding UTM, with varying levels of information, development, and funding allocated to UTM-related initiatives.

5.3 Other key takeaways

The responses provided reflect a range of perspectives and awareness regarding NASA's Urban Air Mobility Maturity Levels (UML) and the interest in Advanced Air Mobility (AAM), specifically in the context of Urban Air Mobility (UAM) and Regional Air Mobility (RAM). Some participants are aware of UML and indicate that their region falls between UML-1 and UML-2. While UAM is the primary focus for many organizations, there is also some interest in RAM. The availability of small airports to support these initiatives varies across regions. When it comes to funding UAM-related activities, there is a consensus that those actively developing and implementing solutions should receive funding, while avoiding consultants and sales groups. Funding sources mentioned include the European Union (EU), national governments, and city budgets.

Opinions on subsidies for UAM differ, with some suggesting initial subsidies to establish a competitive market and ensure accessibility and low costs, while others believe subsidies should be limited or avoided altogether. The cost of U-space services and who should bear the expenses are topics of uncertainty, with suggestions ranging from minimal fees to stakeholder contributions.

The use of conventional-aviation overflight fees to finance U-space is debated, with some expressing uncertainty about its suitability and suggesting that the Air Traffic Management (ATM) industry should invest. Overall, there is a need for further research and understanding of U-space services, their costs, and funding mechanisms.

It's worth noting that some respondents have limited knowledge or are not directly involved in UAM-related activities, and their answers reflect this lack of awareness or involvement.

5.4 Regulations survey - Key Takeaways

The responses regarding rules and regulations related to Urban Air Mobility (UAM) compliance are varied. Some organizations state that they have no specific rules of their own, while others mention compliance with various EU regulations such as 2019/945, 2019/947, 923/2012, 2018/1139, 2150/2005, 2017/373, 139/2014, and 96. The Finnish Aviation Act and other Finnish Acts are also mentioned, along with regulations on radio frequency and GDPR considerations.

One respondent, an unmanned aviation safety consultant, emphasizes their role in helping clients comply with regulations. Compliance is typically dependent on approval from Civil Aviation Authorities (CAA) and city authorities, particularly in relation to environmental permits for drone/vertiport operations. The establishment of droneports and vertiports may require environmental permits, and cities are expected to have a say in U-space airspace matters.

Regarding U-space observatories, there is uncertainty and lack of knowledge among the respondents, with some expressing interest in being a part of it. The number of UAS zones, U-spaces, and USSPs (U-space Service Providers) currently and in the future varies across countries and regions, with estimates ranging from less than 100 to a few hundred, but not exceeding 1000 on a national level. The alignment of local regulations with EU regulations varies and is subject to individual countries' circumstances.

5.5 Infrastructure survey - Key Takeaways

Based on the provided responses, here are the key takeaways regarding the infrastructure readiness for future large-scale Urban Air Mobility (UAM) traffic:

- **Physical Infrastructure:** Many organizations do not currently have physical infrastructure to support UAM traffic. Some organizations are in the development phase, but their readiness levels vary. There is a need to create or adapt existing infrastructure, such as vertiports and landing platforms, to accommodate UAM operations. However, the cost and specific requirements for infrastructure development are often unknown.
- **Digital Infrastructure:** The readiness level for digital infrastructure supporting UAM traffic also varies among organizations. Some have digital infrastructure in place, such as 3D maps and geospatial data, while others are still in the development phase. The availability of data sources and the integration of digital tools and platforms for UAM operations are areas of interest and further exploration.
- **Data Access and Usage:** There is a mixed level of access to relevant data sources for supporting UAM operations. Some organizations have access to required data, such

as geospatial and cadastral maps, while others lack certain data or face challenges in obtaining it. The utilization of open data sources and the need for English interfaces in cadastral maps are areas of consideration.

- **Regulatory and Approval Processes:** Organizations express the need for clearer regulations, guidelines, and approval processes for UAM operations. Collaboration with regulatory bodies and the establishment of procedures for flight authorization, risk assessment, and operations approval are areas of interest and requirement.
- **Interconnection and Collaboration:** Organizations highlight the importance of interconnection with relevant services, such as U-space and network identification for traffic monitoring. Collaboration between different stakeholders, including municipalities, operators, and the general public, is seen as crucial for successful UAM implementation.
- **Infrastructure Planning:** The identification and utilization of suitable physical infrastructure, such as flat roofs and urban areas, for UAM operations is of interest. Tools and resources that provide information on available space, rooftop surfaces, and suitable locations for operations are desired by organizations.
- **Cost and Scalability:** The cost of infrastructure development, including physical and digital aspects, is often unknown or subject to further analysis. Scalability and readiness for large-scale UAM traffic vary among organizations, with some organizations having plans for future infrastructure provision and others lacking such plans.
- **Overall,** the responses indicate a mix of readiness and preparedness for UAM infrastructure. Many organizations are still in the development phase, facing challenges related to regulations, data access, and infrastructure creation. Collaboration, regulatory clarity, and further exploration of digital tools and data sources are crucial for achieving a comprehensive infrastructure setup for future large-scale UAM traffic.

Appendix: Survey questions

o National regulation collection survey questionnaire

- Which CITYAM partner / associated partner are you representing
- Which country are you responding for?
- Do you have any national regulation for?
 - Noise
 - Privacy
 - Environmental considerations
 - Infrastructure and city planning
 - Operating hours
- Do you have any National regulations that affect UAM that deviate from the EU-wide regulations? If possible, please explain the key implications of your national regulation.
- Are there any other Special considerations or regulations and/or policies that differ from the EU-wide that are applicable to UAM in your Local/Regional/National area?

o Infrastructure survey questionnaire

- Does your organization have physical infrastructure supporting the future large-scale UAM traffic?
- If currently in development, please estimate the readiness level and plans.
- If the physical infrastructure currently cannot support UAM traffic, what is needed to create new or adapt existing infrastructure to support the future large-scale UAM traffic? At what cost?
- Does your organization have digital infrastructure supporting the future large-scale UAM traffic?
- If currently in development, please estimate the readiness level and plans.
- If the physical infrastructure currently cannot support UAM traffic, what is needed to create new or adapt existing infrastructure to support the future large-scale UAM traffic? At what cost?
- Does your organization have access to all data sources (such as, e.g., geospatial data, etc.) that you need in order to support future UAM operations? If not, what are you missing?
- Is there anything not mentioned above that your organization misses and that prevents your organization from playing its desired role in UAM operations? If you are waiting for any external develop
- Do you use <https://dronechart.lfv.se/> (or a similar resource with permanent info from AIPs in your country)? If yes, what for?
- What UAM-related digital infrastructure will be used by municipalities, operators, the general public, etc.?
- What infrastructure does your organization provide?
- What infrastructure will your organization provide in the future? If dependent on any externals, what are they?

- What UAM-related physical infrastructure will be used by municipalities, operators, the general public, etc.? Feel free to specify functions and/or devices and/or services (e.g., connectivity and/...
- Are you interested in knowing where in your city you have space for a TOLA of 20m radius on the ground? Do you have tools that support such queries? Are you interested in such tools? Do you have ...
- Are you interested in knowing where the flat roofs are in your city? Do you know where they are? Do you have tools that support such queries? Are you interested in such tools?
- Are you interested in knowing where in your city you have flat roofs that have space for a TOLA of 20m radius? Do you have tools that support such queries? Are you interested in such tools?
- Are your cadastral maps open? Do they have an English interface? Do you know how they compare to the maps in other regions/countries?
- Do you know how to determine where to place the receivers to support Network identification for traffic monitoring service? If not, do you know whom to ask?
- Since "Urban" is in the very acronym "UAM", understanding what is a city, which areas are urban, which are rural, what is a commuting zone for a city, etc. is important for UAM?
- How many typologies of the functional urban areas (encompassing the economic and functional extent based on daily population movement patterns) do you have?
- Which categories of real estate (warehouse, trade, cultural, hospitality, industrial, sports, no-use, offices, historical, religious, shows, residential, health, etc) do you use?
- Do you want to be involved in operations approval and/or risk assessment and/or flight authorization?
- To which USSP services should you be connected? How? Input? Output?
- Who will give input to the Geoawareness service (kindergartens, parks, jails, etc) and how, who and via whom will check/approve the info, watch its expiration, etc?

○ Regulation survey questionnaire

- What rules/regulations, related to UAM, does your organization need to comply? Here are some example EU regulations: 2019/945, 2019/947, 923/2012, 2018/1139, 2150/2005, 2017/373, 139/2014 etc
- With what rules/regulations, related to UAM, does your organization comply right now?
- If there are rules/regulations with which your organization does not comply, what is missing?
- On what externals is your organization's compliance dependent?
- What existing/upcoming UAM regulations impact cities? How do they impact? For every regulation, please mention what effects it may have and rate the significance of the effect on the scale 1-10
- Is U-space observatory established on a national, regional, or local level? If yes, are you a part of the observatory? If no, do you want to be a part?
- How many UAS zones / U-spaces / USSPs are there in your country/region now and will be in the future?



- Last question only for national aviation/transport agencies: Are your local regulations aligned with EU's?

○ Financing survey questionnaire

Section 1: Candidate Selection in UAM Tenders/Procurements

- How do you plan to manage the candidate selection process for UAM tenders and procurements?
- Are there any specific regulations or rules that will be relevant to the candidate selection process?

Section 2: UAM Subsidizing/Financing Mechanisms

- What mechanisms for subsidizing/financing UAM activities are currently offered, or are planned to be offered in the future?

Section 3: Responsibility Assignment

- Could you specify which organization should be responsible for subsidizing/financing each of the following activities? Please provide the name of the organization where possible.
- Operation approval
- Operation risk assessment
- Flight authorization
- UAM traffic control
- Designation of no-flight zones (e.g., around schools, parks, kindergartens)

Section 4: Input Provision

- Who will provide input to the organization responsible for designating no-flight zones, and how will this input be delivered?

Section 5: Infrastructure and Operations

- Which organizations should handle the following activities, and how?
- Providing digital infrastructure supporting UAM operations
- Designing vertiports
- Planning vertiport placement
- Supplying energy to vertiports
- Building vertiports
- Maintaining vertiports
- Certifying vertiports

Section 6: Environmental and Operational Considerations

- Who should estimate the environmental impact from UAM operations near vertiports?
- Who should manage public transportation to and from vertiports?
- Which organization should be responsible for weather forecasting for UAM operations?

Section 7: Digital Infrastructure



- Which entities should provide digital infrastructure for municipalities related to UAM?
- Which entities should provide digital infrastructure for the broader society related to UAM?

Section 8: Data Management

- Who should handle the recording and storing of flight data?
- Who should process flight data for operations evaluation?

Section 9: Connectivity, Security, and Research

- Which organization should ensure network connectivity for UAM aircraft?
- Who should be responsible for counter-UAS measures?
- Which entities should conduct UAM research?
- Who should handle the installation of receivers supporting network identification for traffic monitoring services?