AiRMOUR

Public and stakeholder acceptance – Interim report

Deliverable 4.1

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Content

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Preface

City authorities are becoming increasingly aware that Urban Air Mobility (UAM) could present solutions for tackling issues such as congestion, pollution and emergency response times. However, if UAM is to become a viable reality in our future cities, it is imperative that citizens and stakeholders are adequately engaged in the development of UAM as early as possible. Inadequate engagement is likely to have severe negative consequences for progressing UAM operations. This is because commercial business models are dependent on user demand, and if the public do not trust the technology the business models will fail. It is important not to underestimate the power of the consumer who could provide valuable insights to benefit development of the technology. In addition to this economic incentive for engagement, there is a social responsibility for UAM stakeholders to consult the public who will be impacted by their operations.

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Executive summary

This report is a deliverable within the AiRMOUR project and is part of the work package 'Acceptance, public interest and socio-economic impacts toward the integration in Sustainable Urban Mobility Plans (SUMPs) and other local policies'. This is the interim report detailing the first round of public and stakeholder engagement activities and is part one of two deliverables, with the second due next year after the AiRMOUR demonstrations and simulations have taken place. The main objective of these two deliverables is to assess evolving public attitudes following the introduction of emergency medical Urban Air Mobility (UAM) services toward a wider understanding of public acceptance for an EU implementation of UAM.

The report outlines relevant literature on the topic of public acceptance of drones[1] and 'air taxis', also referred to as passenger eVTOLs. The review identifies common findings in the literature to date, such as, a generally positive attitude amongst the public toward UAM, a general lack of knowledge on the topic, higher acceptance for emergency use cases and similar concerns, including safety and noise.

Chapter 4 presents the methodology for the engagement activities undertaken to date. It also introduces the factors to be considered when discussing public acceptability which are social values, personal values, prior knowledge and prior experience. The public engagement activity involved circulating a questionnaire to a sample of 1,000 citizens in the locations of the AiRMOUR project's demonstrations and simulations. Over 1000 responses were gathered from the six countries of our consortium. The information was largely quantitative but there were a few open-ended questions to gather qualitative results also. The results from the questions used to identify patterns in responses are presented. This includes; 50/50 male/female split in respondents, balanced representation across the age groups, balanced representation for each country, 50/25/25 representation from urban/suburban/rural localities, and presents the level of knowledge on UAM and exposure to drones. It was apparent that the majority of citizens were either 'not knowledgeable at all' about UAM or were 'slightly knowledgeable'. Stakeholder engagement activities involved interviewing 15 experts from the EMS UAM area, circulation of a stakeholder questionnaire and a workshop with stakeholders. Participants were asked about acceptance of UAM activities with focused questions on the emergency medical use case.

Chapter 5 presents the results of the citizen questionnaire including general levels of acceptability and trust in the technology, attitudes towards delivery drones and passenger eVTOLs and assesses public views on different medical use cases. It identifies patterns in responses based on demographics, location of residence, prior knowledge, prior exposure and whether participants worked in the healthcare sector or not. Chapter 6 details findings from the three stakeholder engagement activities undertaken. Qualitative results are presented for each of the work package 4 (WP4) themes which are; public and stakeholder acceptance of UAM (in particular for EMS), safety and risk, environment, privacy, policy and legislation and socio-economics, all in the context of UAM.

Chapter 7 provides a discussion on the key findings from the public and stakeholder engagement activity so far. Key findings include: gender disparity in knowledge and subsequent acceptance of drones and eVTOLs with males being more knowledgeable on UAM and accepting of drones compared to females; as seen in previous studies, such as EASA, safety, privacy and noise pollution are the top public concerns; stakeholders feel that

[1] Note this study refers only to aerial drones, rather than ground or underwater drones.

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regulations are currently the most limiting factor in the advancement of UAM; and, the EMS use case is more accepting to the public than non-urgent medical use cases.

The next steps are for a second round of public and stakeholder engagement to coincide with the AiRMOUR demonstrations and simulations to see whether attitudes towards UAM and associated aircraft change after exposure and increased knowledge on the topic. This will greatly assist the UAM industry and associated stakeholders, including cities, in identifying successful strategies for future engagement and advance development of UAM services that are acceptable to all.

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1 Glossary

Abbreviation	Full term	Definition
AED	Automated external defibrillator	A medical device which is used for patients with a cardiac arrest.
ATM	Air Traffic Management	An umbrella term describing the necessary toolkit of airborne and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe, secure and efficient movement of aircraft during all phases of operation.
BVLOS	Beyond Visual Line of Sight	Sometimes also called BLOS, it describes BVLOS operations, where the flying of a drone is without a pilot maintaining visual line of sight to the aircraft at all times.
ConOps (UAM)	Concept of Operations (in Urban Air Mobility)	A definition of operations, operational environments and applicable legislative and/or regulative framework documents, in the context of Urban Air Mobility operations.
	Drone	Aircraft (Unmanned Aircraft - UA) or vehicle (e.g., underwater drones) designed to operate in fully autonomously (pre-programmed route and behaviour, without a human in control), automated (pre-programmed route and possible to take control at any time by Remote Pilot) or piloted remotely (Remote Pilot controls the drone on the ground). Also called Unmanned Aerial Vehicle (UA) or Unmanned Aircraft (UA) when referring to drone aircraft.
EASA	European Aviation Safety Agency	Agency of the European Union responsible for designing the civil aviation safety framework. EASA's mission is to promote the highest common standards of safety and environmental protection in civil aviation. The Agency develops common safety and environmental rules at the European level.
EMS	Emergency Medical Services	These are emergency or urgent services providing sufficient pre-hospital treatment or even replacing it with on-site qualified medical care in case of challenges for the patient transportation. See
eVTOL	Electric Vertical Take-Off and Landing aircraft	Helicopters or novel aircraft, that uses electrical propulsion to take-off, hover, and land vertically.
HEMS flight	Helicopter Emergency Medical Services flight	According to the definition of EASA: A flight by a helicopter operating under a HEMS approval, the purpose of which is to facilitate emergency medical assistance, where immediate and rapid transportation is essential, by carrying: (a) medical personnel; (b) medical supplies (equipment, blood, organs, drugs); or (c) ill or injured persons and other persons directly involved;
	HEMS helicopter	A conventional helicopter used for HEMS flight
SORA	Specific Operational Risk Assessment	SORA is a multi-stage process of risk assessment aiming at risk analysis of certain unmanned aircraft operations, as well as defining necessary mitigations and robustness levels.
sUA	Small unmanned aircraft	UA which is designed to transport low to medium weight payloads (<25kg)

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SUMP	Sustainable Urban Mobility Plan	A planning concept applied by local and regional authorities for strategic mobility planning. It encourages a shift towards more sustainable transport modes and supports the integration and balanced development of all modes.
UAM	Urban Air Mobility	UAM is used for on-demand, automated and passenger or cargo-carrying air transportation services system at lower-level airspace (<150m) altitude within metropolitan areas using VTOL aircraft.
	Route planning	Static or dynamic four-dimensional route planning for aircraft in a complex urban environment, considering multiple factors from the domains of air and ground risk, including the built environment, citizens, other existing transport & mobility modes as well as environmental factors.
UA	Unmanned Aircraft	Also called drone, is an aircraft without a pilot on board. In this deliverable the meaning of UA is further reduced to electric VTOL aircraft.
	U-space	A set of new services relying on a high level of digitalisation and automation of functions and specific procedures designed to support safe, efficient and secure access to airspace for large numbers of air vehicles. Not synonymous to 'U-space airspace'.
	Vertiport	Landing site designed specifically to support Vertical Take-Off and Landing operations, including taxiing, parking and servicing of the aircraft as well a cargo and passenger handling facility.
VTOL	Vertical take-off and landing	The ability of an aircraft to hover, take off, and land vertically.

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2 Introduction

Passenger eVTOLs (i.e. air taxis) and aerial drones hold the promise of providing a time- and energy-efficient means of transportation of personnel, equipment, and supplies in time-constrained cases often in congested or geographically challenging areas. The technology allowing safe, routine operations at scale in cities with both manned and unmanned air vehicles is quickly maturing from its current pilot phase, so it is crucial that the actors from urban planning and design, aviation / transportation and vertical stakeholder groups achieve a mutual understanding on how this new UAM concept can be safely and securely rolled out to ensure public acceptance and sustainability in both the environmental and economic senses.

Specifically, in relation to flight operations and usage of aerial drones and passenger eVTOLs, the role of governments and regulating bodies might need to go beyond certification and authorising based on a mitigation of risk, as is the basis of the SORA methodology. Simultaneously, the present development of U-space might benefit from a deeper understanding of public perceptions and acceptance. Likewise, for the other stakeholders, there might be an interest to better consider the public perceptions and acceptance in the development of the devices, selection of routes, and design of the services. Beyond public acceptance, it is also about safeguarding the public interest in relation to sustainable growth, environment, and socio-economic impacts.

This report will assist the UAM community to better integrate the requirements and needs of the public, as well as the public's point of view when starting and scaling up UAM services.

It provides a tool to the city authorities and other public representatives to measure public acceptance, moderate between the public and other UAM stakeholders, and steer the emerging UAM sector in line with evolving public acceptance, dynamics, and public interests.

2.1 Objective

This report is a deliverable within the EU-funded AiRMOUR project. It is part of the work package 'Acceptance, public interest and socio-economic impacts toward the integration in SUMPs and other local policies' and has one main objective:

Assess evolving public attitudes following the introduction of EMS UAM services toward a wider understanding of public acceptance for an EU implementation of Urban Air Mobility.

This interim report details the results and findings from the first round of extensive stakeholder and public engagement undertaken during the first half of the project. There are live demonstrations planned for the second half of the project during which there will be further engagement with citizens to see whether attitudes towards UAM change after seeing and hearing drones first-hand and after more information is disseminated to the public on EMS UAM services. In addition, a second round of the citizen questionnaire will be circulated in some of the AiRMOUR replicator cities and in the cities where demonstrations and simulations are occurring. The results will be presented in a final report due next year and will discuss evolving public attitudes.

2.2 Scope

Public engagement

The scope of Task 4.1 includes engagement with a sample of 1,000 citizens in the locations of the AiRMOUR project's demonstrations and simulations. Over 1000 responses were

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gathered from the six countries of our consortium. The information was largely quantitative but there were a few open-ended questions to gather qualitative results also. More details on the method are provided in Chapter 4.

Stakeholder engagement

The scope of Task 4.1 is to interview 15 experts from the EMS UAM area and engage with 50 other representatives of different UAM stakeholder groups. In order to compare the views of stakeholders and citizens and to test out different engagement strategies, it was decided to circulate a questionnaire to stakeholders and run a virtual stakeholder workshop. This was useful in obtaining both quantitative and qualitative data from respondents. Over 90 stakeholders were engaged during these activities.

2.3 Targeted audience

There are many different stakeholders in the public and private sector who will benefit from this study. The key ones are as follows:

- **City representatives** – For cities it is imperative to know how their citizens perceive UAM and equally important to have the ability to inform inhabitants properly and truthfully. This report will equip them with the knowledge on current levels of societal acceptance in specific locations in Europe to help inform future discussions and development of UAM services in their own city.
- **UAM industry** – For those working in the UAM industry, this report will provide useful insight into current societal acceptance levels on aerial drones and passenger eVTOLs to help mitigate concerns, focus on acceptable use cases and inspire further community engagement on activities, such as demonstrations.
- **Medical sector workers** – The focus of the AiRMOUR project is on UAM EMS operations, therefore discussions with the public and stakeholders were tailored to EMS use cases and how UAM could support the healthcare sector in the future. Medical sector workers would benefit from reading this report to understand the opportunities and constraints in adopting this new technology and current levels of acceptability in relation to different types of medical services. This will help them make an informed decision on whether or not to incorporate UAM into their own operations.

2.4 Outline

This section details the structure of this report and outlines the content covered in each chapter.

Chapter 3: Literature review

- Provides key discussions in the current literature on the topic of public and stakeholder acceptance of UAM.
- Sets a basis of research for the AiRMOUR study to build upon.

Chapter 4: Methodology

- Outlines a theory for measuring levels of acceptability.
- Discusses the method used to gather data from stakeholders and citizens to inform this study.

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- Presents factors influencing responses to the citizen questionnaire (e.g. age, gender, location of residence, level of prior knowledge and exposure of participants).

Chapter 5: Public engagement

- Presents overall acceptability of UAM based on the results from the citizen questionnaire.
- Identifies similarities and differences in responses based on social and personal values, prior knowledge, prior experience and if the participants are employed in the healthcare sector or not.

Chapter 6: Stakeholder engagement

- Details responses from qualitative engagement with experts and general stakeholders on the themes of; public and stakeholder acceptance of UAM (in particular for EMS), safety and risk, environment, privacy, policy and legislation and socio-economics, all in the context of UAM.
- Presents results from the stakeholder questionnaire.

Chapter 7: Discussion

- Discusses the key findings from the public and stakeholder engagement activities undertaken.
- Comments on the results from this study in comparison to previous studies undertaken on the topic of public acceptability of UAM.

Chapter 8: Conclusion

- Summarises the research undertaken to date by the project on the topic of public acceptability of EMS UAM services.
- Outlines next steps for the second round of engagement.

Annexes

- Annex A – Citizen questionnaire.
- Annex B – Maps showing locations of responses.

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3 Literature review

The volume of literature surrounding Urban Air Mobility (UAM) has increased considerably over the past five years. Its expansion coincides with growing investment from private companies (including but not limited to; logistics providers, healthcare companies and private aviation) as well as public bodies (such as, NASA and the European Commission), with both sectors showing a willingness to fund research which helps to better understand the potential of UAM and support its advancement. Though the existing literature takes various forms, its conclusions are frequently drawn from random surveys of public respondents from a given location, as well as the information extracted from interviews and workshops with stakeholders.

This chapter will review the findings of existing research that focuses on public and stakeholder acceptance of UAM, which the AiRMOUR engagement study aims to build upon. After briefly describing what the literature defines as public and stakeholder acceptance, this review will illustrate the strong consensus in the existing literature, not only in favour of the importance of gaining public acceptance for UAM schemes, but also the current public enthusiasm towards UAM schemes. It will also discuss the segments of society where public acceptance is currently highest and conversely the areas where public acceptance could increase. It concludes with different suggestions proposed by the authors as next steps that policymakers and other promoters of UAM should take to cultivate further public acceptance.

Yedavalli & Moorberry (2019)[2], who research on behalf of the aircraft manufacturer Airbus, describe public and stakeholder acceptance broadly as "the aggregate view of a group of people". According to EASA (2021)[3], UAM stakeholders can be categorised into distinct groups, which include; the corporations which comprise the UAM industry, national governments, public institutes and regulators, potential users and indirect affected third parties. A.M Dietrich from the Community Air Mobility Initiative ("CAMI") (2020)[4] identifies four key factors which influence public and stakeholder acceptability, namely; trust, public benefit, limited adverse impacts and integration.

There is strong alignment in the existing literature around the importance of gaining public acceptance both for the rollout of UAM operations and, where practicable, obtaining public and stakeholder input in the development of UAM. While the nature of public engagement may vary in national contexts, the 'Budesministirum fur Bildung und Forschtung's' Skylimits programme[5] in Germany states that debates surrounding UAM must be widened to include the whole of society since "drone flights are always public" (2021). Similarly, Dietrich (2020) reinforces CAMI's commitment that the benefits of UAM must be accessible to the public at large and hence he insists on the need for their involvement and engagement. By highlighting the persistence of "psychological fears" towards drone technology in some segments of

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[2] Yedavalli, P. and Moorberry, J. (2019) 'An assessment of Public Perception of Urban Air Mobility (UAM)' Airbus UTM: Defining Future Skies. Retrieved from: https://storage.googleapis.com/blueprint/AirbusUTM_Full_Community_PerceptionStudy.pdf

[3] European Union Aviation Safety Agency (EASA), (2021) 'Study on the societal acceptance of Urban Air Mobility in Europe'. Retrieved from: https://www.easa.europa.eu/full-report-study-societal-acceptance-urban-air-mobility-europe

[4] Dietrich, A.M. (2020) 'Components of Public Acceptance for AMM and UAM' The Community Air Mobility Initiative (CAMI). Retrieved from: https://www.communityairmobility.org/resourcefiles/components-of-public-acceptance-for-aam-and-uam

[5] Budesministirum fur Bildung und Forschtung. Sky Limits (2021) 'Delivery drones and air taxis in cities'. Retrieved from: https://skylimits.info/delivery-drones-and-air-taxis-in-cities-twelve-research-based-recommendations-for-handling-future-traffic-in-lower-airspace/

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society, Cetin et al's (2022)[6] recent paper argues that steps to overcome these fears are crucial for obtaining the public acceptance of UAM. In parallel, research also shows similar enthusiasm from the public to be involved in debates surrounding UAM, with EASA's (2021) study of EU countries finding that European residents and existing public authorities are keen to engage and play an active role in UAM implementation.

With many studies using survey data in their respective contexts, existing papers align also on the public's overall optimism and favourability towards UAM. Yedavalli & Moorberry's (2019) survey across four continents around the use of urban air transportation concludes that a large proportion (44.5%) of public respondents are in "strong" or "very strong" support of UAM. EASA's (2021) survey conducted by McKinsey in Europe concludes that EU citizens are positive towards UAM, while Eissfelt et al's (2020)[7] sample from the German population concludes a "balanced but slightly positive attitude" towards civil drones in Germany.

Despite differences in the geographical location of the survey participants within the research conducted to date, the segments of society where support for UAM is strongest appears very similar across most countries. One of the first surveys into public attitudes towards commercial and non-commercial use of drone technology in the United States in 2016[8] found a divergence in support for UAM depending on the age of respondents, such that support for drone technology was highest among millennials (defined as 18-34 age group) and lowest amongst the baby boomer generations defined as 50-75 age group), leading the study's authors to conclude that millennials were more knowledgeable, open and positive towards drone delivery than preceding generations (USPS: 2016). Similarly, Eissfelt et al's (2020) survey results show that in Germany, younger survey participants from urban areas are more likely to accept UAM, while older generations living in rural areas express more hesitation, citing concerns over safety, noise and the impact of drone technology on landscapes. Other research illustrates that variations in enthusiasm for UAM, as well as Automated Vehicle (AVs) technologies in general, appear across different lines of society, including in average income (Yedavalli & Moorberry, 2019) and gender (Park [2021][9], Golbabaei et al.[10] [2020]), with studies suggesting more affluent and male respondents being more likely to react positively to UAM schemes and welcome its use for a broader range of activities.

Given the apparent similarities in the societal groups that existing studies have found to be less enthusiastic towards UAM schemes, it is perhaps unsurprising that their concerns and hesitations also appear to have much in common. Safety concerns are regularly found to be the primary concern among the public, with USPS (2016), Tan et al (2020)[11], Park (2021) and EASA (2021) all citing the risk to physical safety to both users and bystanders to drones and

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[6] Cetin, E. et al. (2022) 'Implementing Mitigations for Improving Societal Acceptance for Urban Air Mobility' *Drones.* Vol. 6 No. 28 Retrieved from: https://www.mdpi.com/2504-446X/6/2/28

[7] Eissfelt, H. et al. (2020), 'The acceptance of civil drones in Germany' CEAS *Aeronautical Journal*. Retrieved from: https://elib.dlr.de/134782/3/Ei%C3%9Ffeldt%20et%20al%20%282020%29%20The%20acceptance%20of%20civil%20drones%20in%20Germany.pdf

[8] Office of Inspector General United States Postal Service (2016) 'Public Perception on Drone Delivery in the United States'. Retrieved from: https://www.uspsoig.gov/sites/default/files/document-library-files/2016/RARC_WP-17-001.pdf

[9] Park, S. W. (2021) 'Social Acceptability of Urban Air Mobility by Aircraft Category and Autonomous Phases'. KDI School of Public Policy and Management . Master Thesis. Retrieved from: https://archives.kdischool.ac.kr/bitstream/11125/42255/1/Social%20acceptability%20of%20urban%20air%20mobility%20by%20aircraft%20category%20and%20autonomous%20phases.pdf

[10] Golbabaei, F. et al (2020) 'Individual predictors of autonomous vehicle public acceptance and intention to use: A systematic review of the literature' *Journal of Open Innovation Technology Market and Complexity* Vol. 6 No. 4 (106). Retrieved from: https://www.researchgate.net/publication/346178076_Individual_Predictors_of_Autonomous_Vehicle_Public_Acceptance_and_Intention_to_Use_A_Systematic_Review_of_the_Literature

[11] Tan et al. (2020) 'Public acceptance of drone applications in a highly urbanized environment' *Technology in Society.* Vol. 64. Retrieved from: https://www.sciencedirect.com/science/article/abs/pii/S0160791X20312653

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other low-flying aircraft as a concern in the USA, Singapore, South Korea and the European Union respectively. Other negative concerns that are most commonly raised include noise, both high volume and duration, (Eissfelt et al. [2020], EASA [2021] Yedavalli & Moorberry [2019]), the environmental impact of drone technology (EASA [2021], Eissfelt et al. [2020]) and the cost of implementation and use of drone technology (Park 2021) also feature prominently as concerns and risks across the different survey populations. In studies undertaken this year, survey respondents have started to call out security and privacy concerns as risks of UAM schemes (Drive2TheFuture [2022][12] and Oksman & Kulju [2022][13]). This includes both the traditional concern of physical privacy of aircraft flying at low altitude in residential areas, but has expanded to include respondents' concerns over cyber security and the potential for theft of their personal data (Cetin et al. [2022]).

Alongside the existing literature's consensus on public concerns for UAM is the frequent outcome that the public support "non-commercial" use of UAM technology (for example, for search and rescue missions, medical emergencies and for environmental monitoring and preservation) over and above "commercial use" (for example, for retail goods delivery, photography, and personal transportation). Though country specifics may vary, these outcomes remain reasonably consistent across the existing research and appear to transcend the different national and cultural contexts of survey respondents. The EASA survey of EU citizens finds highly favourable attitudes towards medical and emergency transport and improving connectivity for remote populations. The Skylimits project (2021) in Germany finds that only use of drones for emergencies is currently acceptable to the German public. Similarly, Oksman & Kulju (2022) observed that Finnish and Swedish respondents found emergency uses, such as for fire and rescue, as the most acceptable use case for drones. Tan et al's (2020) respondents in Singapore react less favourably towards private drone use in residential areas and insist on uses that prioritise the public good. The Drive2TheFuture project (2022) found environmental monitoring and inspections as the most acceptable use case by the public. The USPS (2016) study presents a possible outlier, finding that speedy delivery of goods was the most important potential usage of UAM technology amongst survey respondents, while emergency use featured only second in a ranking of potential uses for UAM.

Finally, the existing research frequently concludes by making recommendations which, based on their analysis, the authors believe that policymakers and other influential stakeholders must take to further improve public acceptance for the advancement of UAM schemes. Recent studies strongly align on the important role that educating the public on UAM technology and its uses can have as a tool for public engagement and hence for driving public acceptance. Eissfelt et al. (2020) find that public acceptance in German is positively correlated with respondents feeling well-informed on the use and features of drones. Cetin et al. (2022) emphasise the role that education on the technical and operational aspects of UAM can have on reducing psychological fears around the new technology. Moreover, Tan et al. (2020) suggests that public acceptance is boosted initially by the dissemination of information on the benefits and safety of drone use and even more so by a "pleasant first-hand experience".

Beyond the significant role of public education in fostering greater trust in and hence acceptability of UAM schemes, existing research tends to diverge in the practical solutions that they promote to enhance public acceptance. Where the work has been authored by or on behalf of a public institution, the solutions proposed unsurprisingly take into consideration the national context. For example, the Skylimits programme (2021) working on behalf of

[12] Drive2The Future (2022) 'Investigating the level of acceptance of civil drones by the general public'. Retrieved from: Pilot AV1 Rome (DBL) - Drive2Thefuture

[13] Oksman, V. and Kulju, M. (2022) 'Nordic study on public acceptance of autonomous drones'. VTT Technical Research Centre of Finland.

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Germany's Budesministirum fur Bildung und Forschtung propose the need to upgrade the infrastructure in local authorities to deal with delivery drones and air taxis, and suggest the need for a German drone charter. Practical solutions are also recommended to tackle public concerns and limit the negative externalities which reach third parties. For CAMI, Dietrich (2020) states that public acceptance first requires adverse impacts of drone technology to be acknowledged by the proponents, while Cetin et al. (2022) define a list of safeguards in the operational use of drones, including minimum altitudes, no-fly zones and the mandate for eco-friendly drones.

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4 Methodology

This chapter details the theory behind the method in gathering public and stakeholder opinions on the acceptability of UAM and the method for data collection.

4.1 Public acceptance

Public perceptions and related acceptance of passenger eVTOLs and drones are different from objective measures of benefits, risks, and opportunities of the use of such engines. A UAM flight and future UAM network can be considered from a service provision as a bundle of attributes (e.g. drone, transportation service, take-off and landing site, flight path). These attributes can be both tangible and intangible. The tangible elements are in this case specific to the drone itself and the take-off and landing sites. Whereas the intangible elements are the service provided and service provision processes.

At a more abstract level, the UAM services can be considered as a bundle of impacts that can be positive (benefits) or negative (disadvantages). The impacts can be divided between functional impacts (e.g. receiving a package delivered by a drone, a drone passing over a neighbourhood), and societal impacts (e.g. lives are saved through the usage of drones, jobs are lost / created).

Perceptions on the level of the different impacts can be defined as “potential benefits” and “concerns” related to the design of the UAM service as presented in the table below.

Table 4.1: Potential benefits and concerns of the UAM service

Potential benefits	Concerns
Economic growth through efficiency gains to businesses and workers, and the creation and delivery of new skills, jobs, products, and services.	Noise and visual pollution as a result of drone operations scaling up or carrying out tasks across cities, including impact on nature.
Environmental benefits by replacing road vehicles with airborne drones for some types of delivery and transport.	Cybersecurity of the drones both in terms of software and hardware to prevent hacking or malfunctions.
Health and safety benefits to workers taken out of hazardous and challenging environments; to citizens that benefit from efficiencies that would be generated to emergency and health services.	Privacy of personal data being collected and processed by the drones, ownership of the data, how and where it is going to be used and for what purpose. Transparency over what the drone is doing and who it belongs to.
Cost and time savings to public bodies such as local government, EMS service providers, through faster access to locations, more efficient service provision and the automation of certain processes.	Safety of the drones flying above or around people and buildings, as well as drones landing in and taking off from populated environments, especially if operating autonomously and/ or beyond visual line of sight.
Impact on the city image through connected visions of smart cities, congestion solved, services streamlined and modernity.	Impact on existing jobs, how will drones affect employment, public budgets and the way current jobs are being performed.

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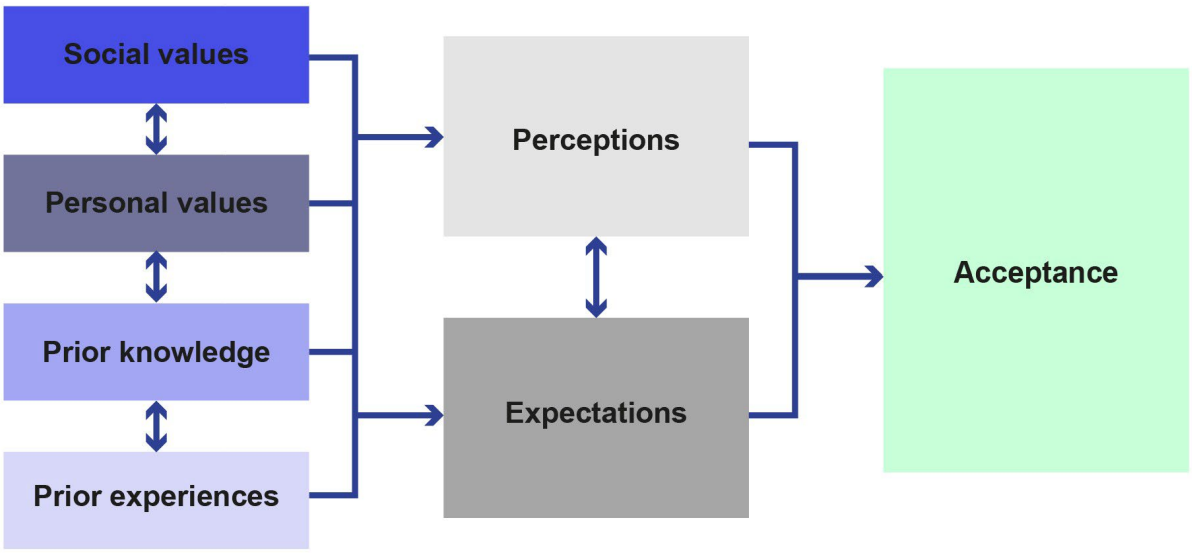
Most cited potential benefits in the literature relates to economic growth, health benefits, costs and time savings, potential environmental benefits, and impact on city image. Issues of concern mentioned in the literature were items including noise, transport safety, damages and injuries, violation of privacy, and misuse. Depending on; the personal and social values, level of knowledge, prior experiences, expectations, and delivered UAM service, perceptions are formed and lead to a level of acceptance. This principal can be applied to societal acceptance for any new technology.

This public acceptance study will measure the influence of the values as well as the influence of knowledge and prior experience on public perception and expectations which feed into the level of acceptance. This is shown diagrammatically in the figure below.

Figure 4.1: Influencing factors on the level of public acceptance



For the purposes of assessing social values, patterns in responses to the public questionnaire and the country of residence and location (urban, suburban, rural) of the respondent have been assessed. To assess personal values, demographics, including the age and gender of respondents, has been taken into account when assessing responses. Specific questions related to prior knowledge of the topic of UAM and prior experiences in exposure to drones have been used to identify any correlations between the response to these questions and subsequent questions relating to acceptability.

Perceptions differ from expectations. Perceptions are influenced by expectations before service delivery, his/her state of being, and the actual delivered service. In the current public acceptance study, as it is not linked yet to a real demonstration or simulation, the perceptions are equal to expectations and lead to a level of acceptance. At a later stage of the project a distinction can be made between real perceptions of different types of UAM service provision, expectations and how this will lead to different levels of acceptance.

4.2 Public acceptance survey

The recent public acceptance survey was set up to provide an inclusive pool of items measuring acceptance, benefits, and possible concerns.

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Further on in the project, a second round of the survey will be realised with a selected population of 250 citizens in the AiRMOUR validation sites (Stavanger, Helsinki, Northern Hesse, and Luxembourg following a simulation, as well as in the replicator cities). During the AiRMOUR demonstrations and simulations 8 citizen focus groups will be engaged (2 in each of the 4 sites) to test a set of citizen engagement strategies. This will allow the assessment of how changing levels of knowledge, perceptions and expectations influence acceptance.

This overall setup is intended to allow us to measure more specifically the evolving public acceptance and attitudes following the introduction of EMS UAM services and to assure effective citizen engagement in line with the SUMP principles.

4.3 Method of production

The questionnaire was produced in close collaboration with AiRMOUR project partners and external advisory board members. Workshops were held with project partners to ensure the right questions were asked in the best possible format to provide the utmost flexibility and comprehension for participants and to feed into the research for the WP4 tasks. It was decided a short introduction was needed to introduce the purpose of the study and define key terms required for answering the questions. The language used was neutral to avoid influencing responses (positively or negatively). The original questionnaire was produced in English and was translated into seven different languages (German, French, Luxembourgish, Dutch, Finnish, Swedish, Norwegian). **Annex A** presents the full questionnaire disseminated in English.

As this study can be considered as the most extensive since the EASA study published in July 2021, some similar questions were asked for comparative purposes. This includes questions on the acceptability of general use cases, level of trust in the technology and level of comfort as a user or observer of delivery drones and passenger eVTOLs. The questions were adapted to increase flexibility in responses. For example, instead of ranking options, like in the EASA study, participants were asked to rate each option on a scale of 1 to 5 and based on these results it is possible to identify the most common responses.

For GDPR reasons only citizens over the age of 18 were engaged for this study. To ensure data quality, a simple mathematical question was included and if respondents answered this wrong their response was not included. Only fully completed surveys were assessed.

Qualtrics was the software used to produce the survey and was chosen because it was considered to be the most user-friendly and had been tested in previous projects involving large-scale engagement. The outputs of the survey were analysed using excel software and Power BI. The results are presented graphically and descriptively in Chapter 5.

To ensure efficient and effective dissemination of the citizen questionnaire, an award-winning market research company was sub-contracted to utilise their citizen panels in the specified locations and ensure target quotas were met. This proved to be a successful approach as with their support it was possible to exceed the total number of responses. Note, in addition to the scope of Task 4.1, the AiRMOUR citizen questionnaire has been disseminated in the Greater Helsinki region, in co-ordination with the project partner Forum Virium Helsinki, and also in Stavanger, co-ordinated by City of Stavanger. The results of these two additional surveys will be reported on in future communication activities during the project lifecycle and will greatly benefit these cities in understanding citizen views of EMS UAM operations.

4.4 Factors influencing responses

The survey asked questions to participants related to their demographics, location of residence, prior knowledge of UAM, exposure to drones, and line of work to see whether these

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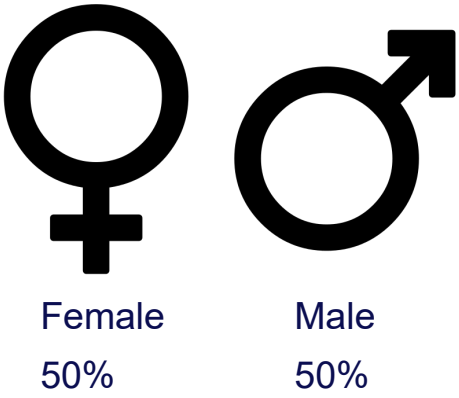
factors influence responses to the other questions. The results are presented in this section and have been used to analyse differing levels of acceptability on UAM EMS operations which is discussed in Chapter 5.

4.4.1 Demographics

The results of the questions related to citizen demographics are provided in the tables below. As previously mentioned, a gender balance of participants was ensured as well as a balance between the different age groups. Participants were not asked their level of education as it was considered of greater important to understand their level of prior exposure to drones and knowledge on Urban Air Mobility which are more likely to influence their responses. It was also not desirable for those less educated to potentially feel that their response was not worth as much as those with a higher education, which is another reason this question was not asked.

Figure 4.2: Participant demographics



Age group	Percentage
18-30	16.5%
31-40	16.5%
41-50	17%
51-60	17%
61-70	16.5%
70+	16.5%

4.4.2 Location of residence

Participants were selected from six countries in Europe where the AiRMOUR project partners are based. Participants from the cities where the demonstrations will be taking place later this year and next year were targeted to ensure a good representation of perceptions before and after the demonstrations.

The locations of participants were as follows:

- **Germany** – Nordhessen region
- **Luxembourg** – whole country
- **Netherlands** – whole country
- **Sweden** – Stockholm, Göteborg, Norrköping and Linköping
- **Finland** – Uusimaa region
- **Norway** – Stavanger, Oslo, Bergen

The number of filtered responses from each country are shown in the figure below. This totals 1,104 responses.

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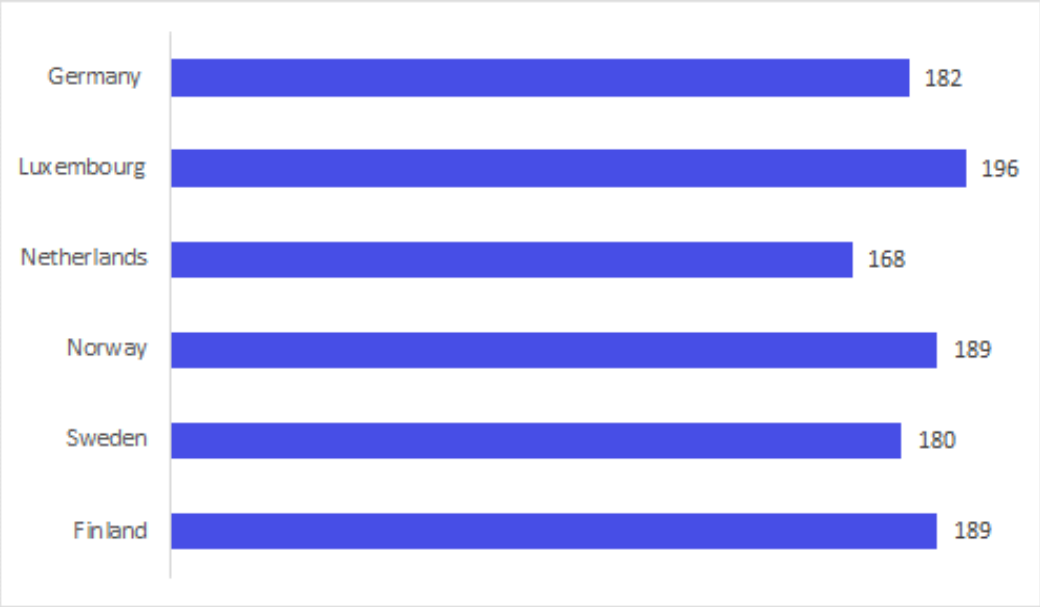
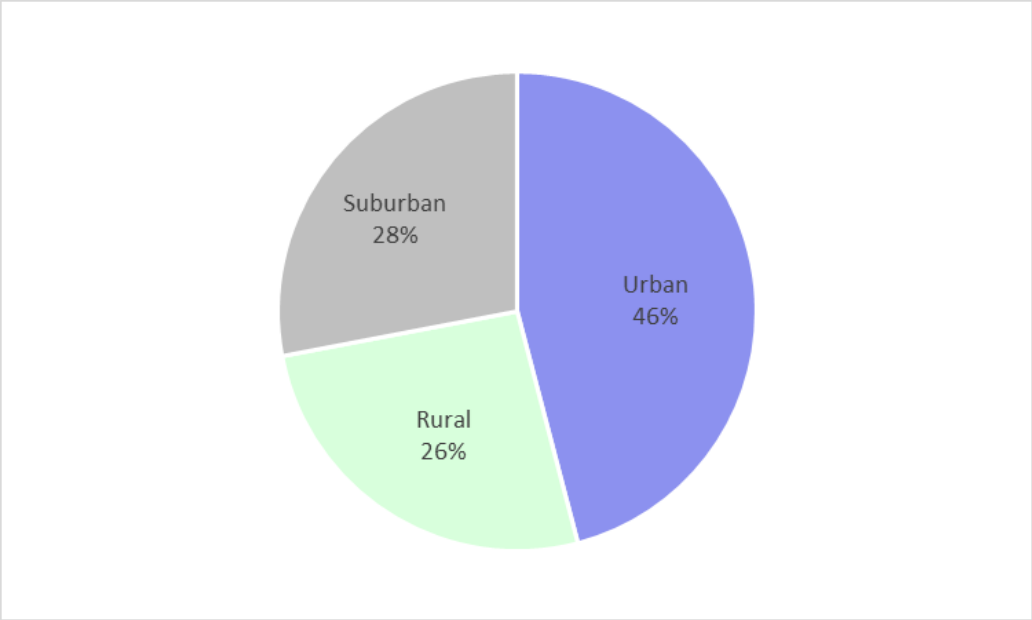
Figure 4.3: Number of filtered responses by country



Maps showing the location of citizen responses are provided in **Annex B.** As expected in Luxembourg and the Netherlands, respondents are widespread, but for the other countries in the targeted locations (e.g. Helsinki, Stavanger, Nordhessen), responses are clustered.

Another factor that was important to consider was whether participants lived in an urban, suburban or rural location. The topic of Urban Air Mobility applies to the urban environment but also includes inter-city and peri-urban travel. In emergency situations, although drones may start off from the city they could fly to any location where an incident occurs, such as a remote location. Therefore it was important to also achieve representation of participants living outside an urban location. Figure 4.4 shows that the majority of participants live in an urban environment, which reflects the cities targeted, but also approximately one quarter reside in a suburban location and one quarter reside in a rural location.

Figure 4.4: Classification of residence



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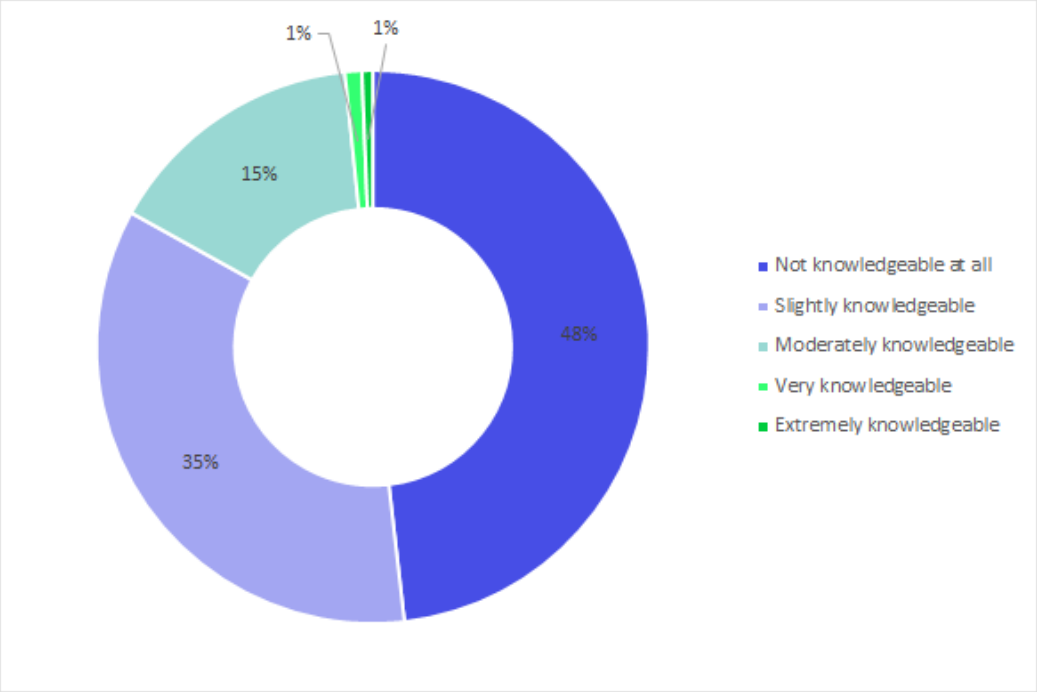
4.4.3 Level of knowledge and exposure

The level of prior knowledge and exposure to drones was asked to participants so it can be compared with responses after the demonstrations take place and also to see whether this influenced how participants responded to subsequent questions.

The results in Figure 4.5 show that the majority of participants were either ‘not knowledgeable at all’ about Urban Air Mobility or were ‘slightly knowledgeable’. Very few were very knowledgeable or extremely knowledgeable on the topic.

Figure 4.5: Level of knowledge on Urban Air Mobility (citizens)



The results in Figure 4.6 show that the majority of participants knew either ‘not much about drones’ or ‘a bit about drones’. 17% knew nothing about drones and very few knew a lot about drones, had their own drone or worked in the industry. Interestingly the level of exposure to drones was higher than the level of exposure to the topic of Urban Air Mobility, indicating participants had not linked the two concepts.

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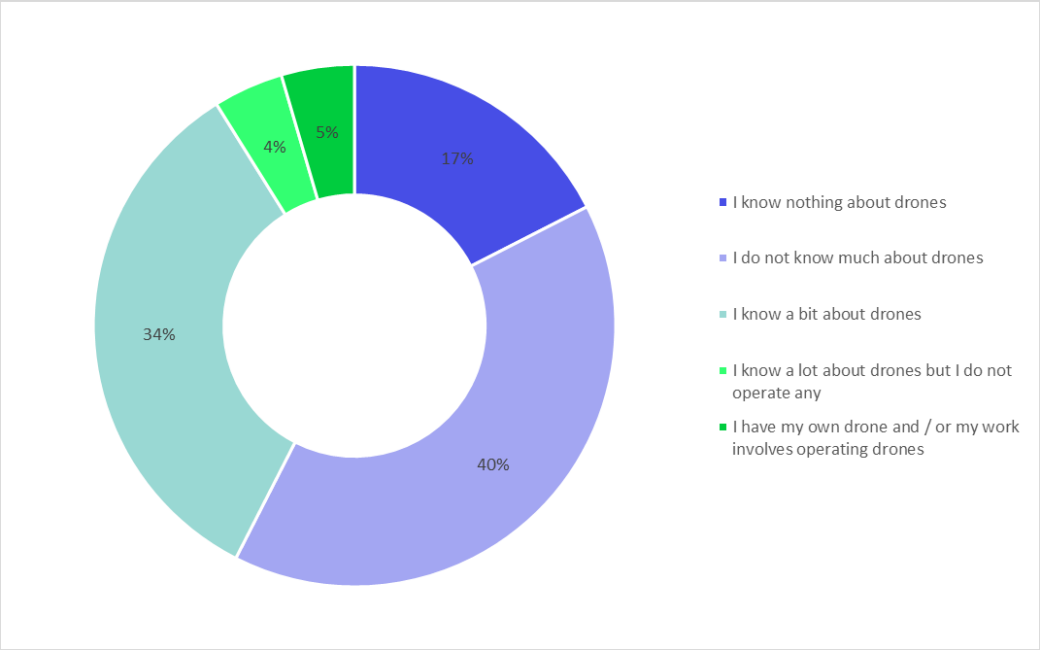
Figure 4.6: Level of exposure to drones (citizens)



4.4.4 Employment in healthcare

It was important to ask participants whether they worked in the emergency medical services (EMS) or healthcare sector as this could influence responses related to the medical use case for passenger eVTOLs and delivery drones. The results showed that 9% of respondents worked in the EMS or healthcare sectors the remaining 91% did not.

4.5 Stakeholder engagement

To identify key consequences of different UAM solutions and missing dimensions of acceptance, benefits, and concern, 15 semi-structured expert interviews were conducted with experts of each EMS UAM area (e.g. aviation, urban, EMS, drone technology, communication, and infrastructure). Questions were tailored to the expertise of the individual but the running theme of public acceptability was discussed along with the different factors influencing opinions.

Stakeholders from the project consortium and external advisory board were engaged in a workshop to discuss public perceptions on the topics of safety, privacy, environment, policy and legislation and socio-economics, in relation to drones and passenger eVTOLs. This not only informs the work in Task 4.1, but also subsequent tasks focusing on these topics including Task 4.2 related to safety and risk, Task 4.3 related to visual and noise pollution, Task 4.4 related to privacy and Task 4.5 related to policy.

In addition to this, 25 stakeholders completed a questionnaire. This was a slight adaptation of the citizen questionnaire and included more open-ended questions for qualitative analysis. This activity allows opinions between stakeholders and citizens to be compared, albeit the stakeholder questionnaire was circulated to a much smaller sample set. It also allowed observation of potential biased views on levels of public perceptions and acceptance in relation to UAM stakeholders' interests.

During these activities over 90 stakeholders were engaged to allow commentary on the opinion of stakeholders compared to the public on the topic of UAM for EMS operations.

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Figure 4.7 provides a graphical representation of the groups of stakeholders engaged to inform this study.

Figure 4.7: Stakeholder engagement map

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5 Public engagement

5.1 Introduction

This chapter outlines the results from the initial public questionnaire that was carried out between February to April 2022 in six countries in Europe with 1,104 participants.

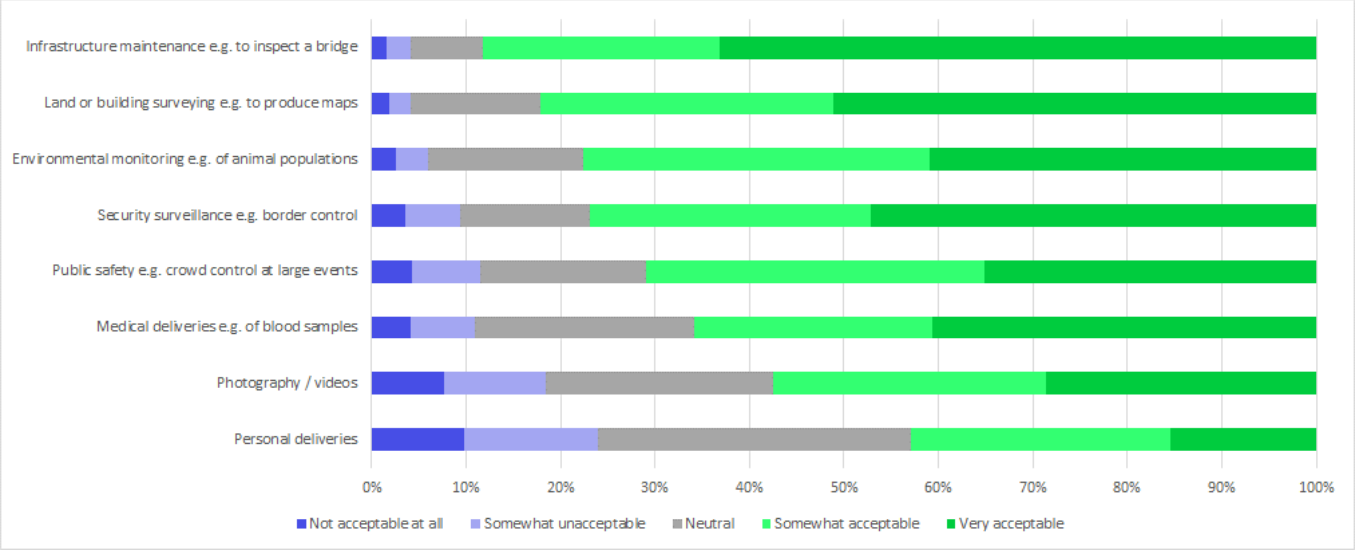
5.2 Overall acceptability

5.2.1 General use cases

This section provides an overview of the results from the public questionnaire, highlighting the key findings from the activity.

Participants were asked about the acceptability of different use cases for drones. The results are shown in the figure below in order of acceptability. It shows the top four most acceptable use cases for drones overall are infrastructure maintenance, land or building surveying, environmental monitoring and security surveillance. Interestingly, the use case of medical deliveries ranked relatively low overall, however this may be because it was not stated whether or not the delivery was urgent / an emergency. An explanation for the top three most acceptable use cases could be because they are perceived to be less disturbing due to the lower frequency of flights in controlled or localised environments with limited risk to personal safety or privacy.

Figure 5.1: Acceptability of uses for drones (citizens)



5.2.2 Delivery drones

There were a few questions asked to participants related specifically to the use of delivery drones. This section provides the results from the total respondents.

Figure 5.2 illustrates that there is significantly more support for the use of delivery drones for medical purposes compared to non-medical purposes. However, it is impotant to also recognise that approximately 30% were neutral on the use of delivery drones for non-medical

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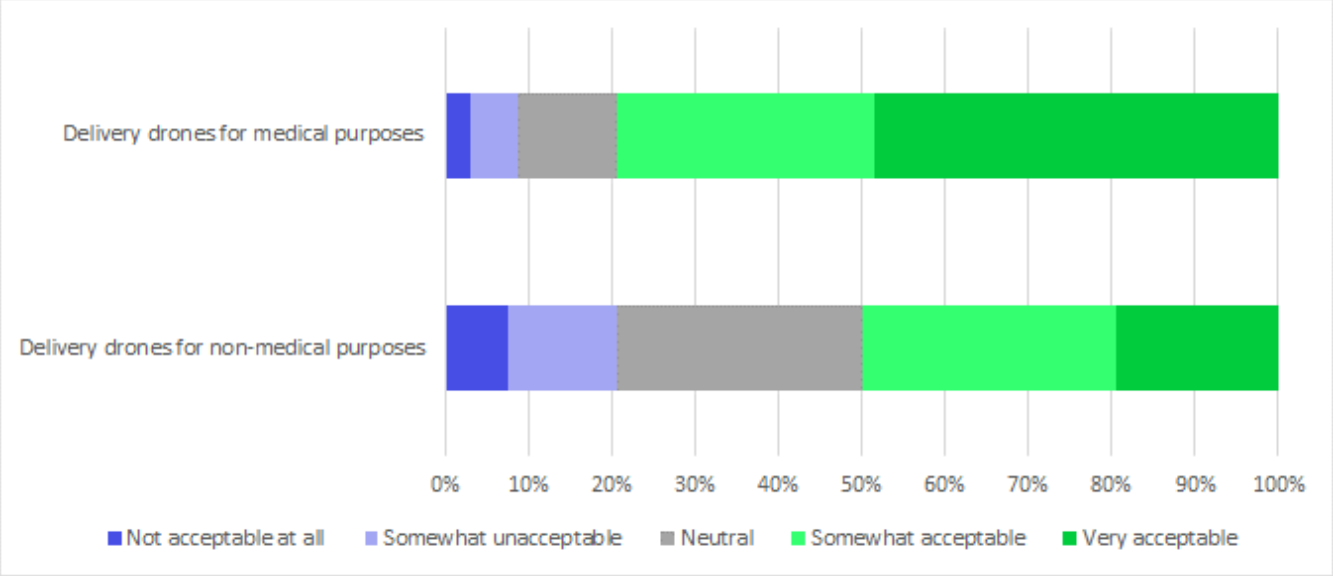
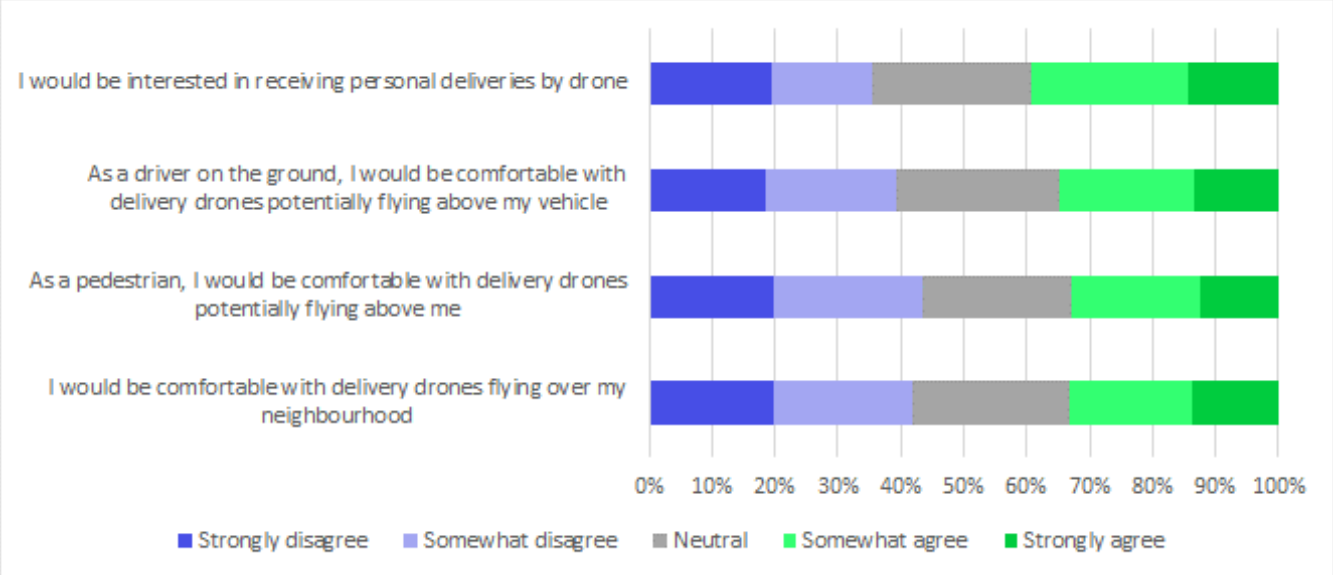
purposes which shows many are undecided and could be persuaded for or against this in the future.

Figure 5.2: Delivery drones medical vs non-medical use (citizens)



Participants were asked to rate statements based on how much they agree or disagree with them. To provide context they were told the delivery drones would fly at an altitude between 120 and 150 metres (equivalent height of a 10 to 13 storey building). The figure below shows the results.

Figure 5.3: Comfort with delivery drones



The results show that the large majority of respondents did not feel comfortable with delivery drones flying above them or their neighbourhood. There was also only 40% of respondents who were interested in receiving personal deliveries by drone. This is fairly consistent with Figure 5.1.

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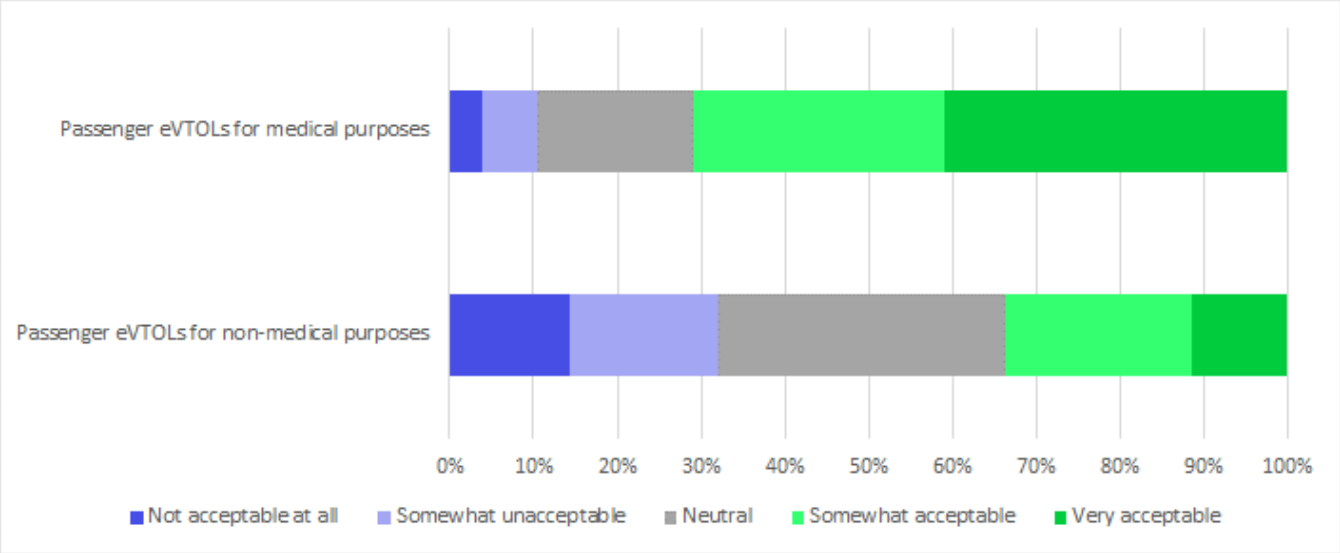
In terms of the benefits of delivery drones, the large majority of respondents (95%) could see at least one benefit. Many respondents thought (in order of popularity) that delivery drones will reduce traffic jams, reduce journey times, reduce local emissions and pollution and improve access to remote areas. To a lesser extent, 10% thought they would improve safety and 6% thought they would boost economic growth in the city and create new jobs.

5.2.3 Passenger eVTOLs

The same questions asked to respondents about delivery drones were also asked about passenger eVTOLs. The results are detailed in this section.

The figure below illustrates that, similar to delivery drones, there is signifantly more support for the use of passenger eVTOLs for medical purposes compared to non-medical purposes. There is slightly less support for both uses compared to delivery drones. It is important to also recognise that 34% were neutral on the use of passenger eVTOLs for non-medical purposes, similar to the results for delivery drones.

Figure 5.4: Passenger eVTOLs medical vs non-medical use (citizens)



Participants were asked to rate statements based on how much they agree or disagree with them. To provide context they were told the passenger eVTOLs would fly at an altitude between 120 and 150 metres (equivalent height of a 10 to 13 storey building). Figure 5.5 shows the results.

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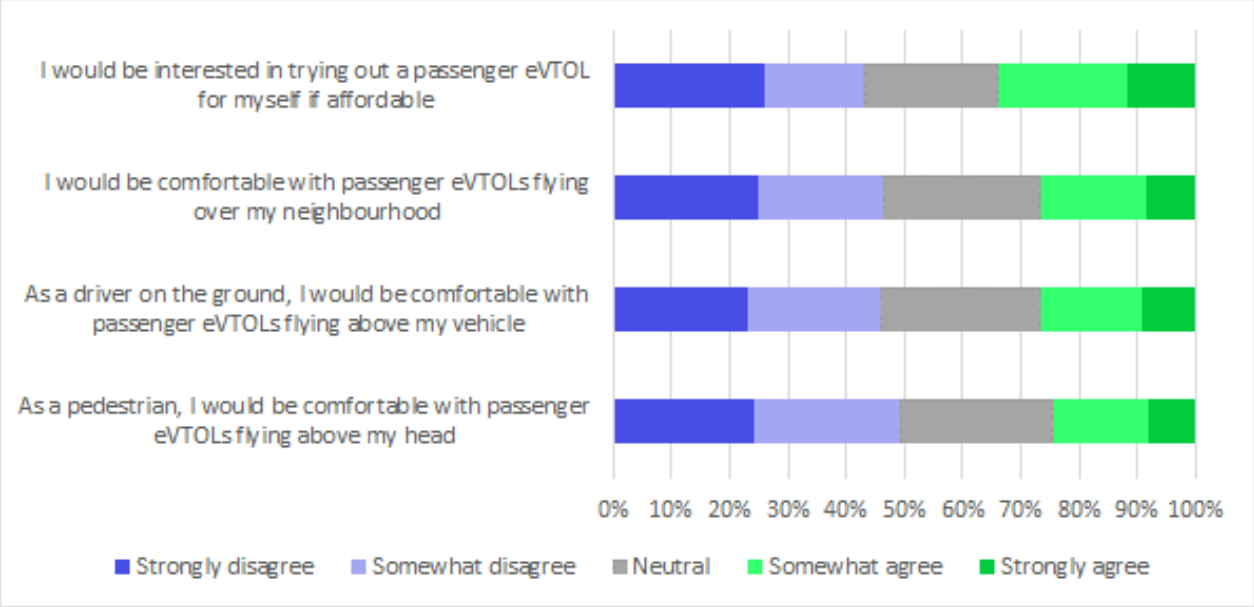
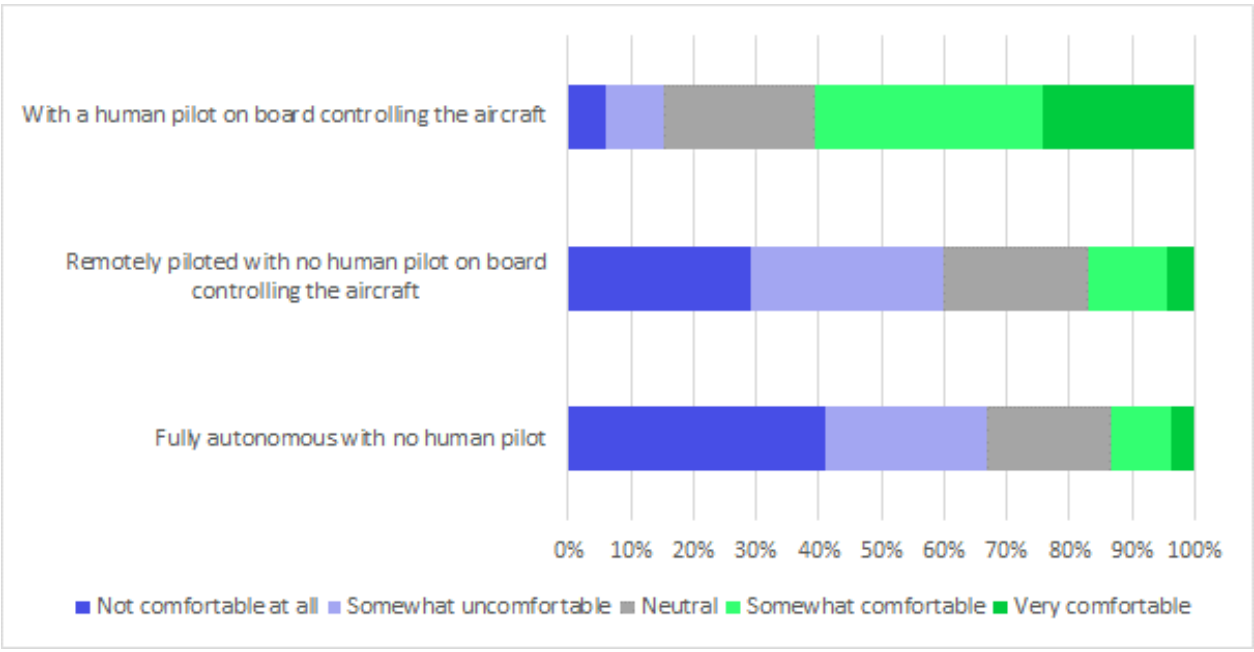
Figure 5.5: Comfort with passenger eVTOLs



The results show that for each statement more participants disagreed than agreed and 20-25% were neutral. A similar proportion of participants agreed with each statement, but slightly more agreed they would be interested in trying out a passenger eVTOL if it was affordable. This shows that there is clearly a level of mistrust in passenger eVTOLs and lack of information could be an influencing factor in this.

An additional question on travelling in a passenger eVTOL with varying levels of autonomy was asked to participants. The results are presented in Figure 5.6.

Figure 5.6: Comfort with autonomy travelling in passenger eVTOLs



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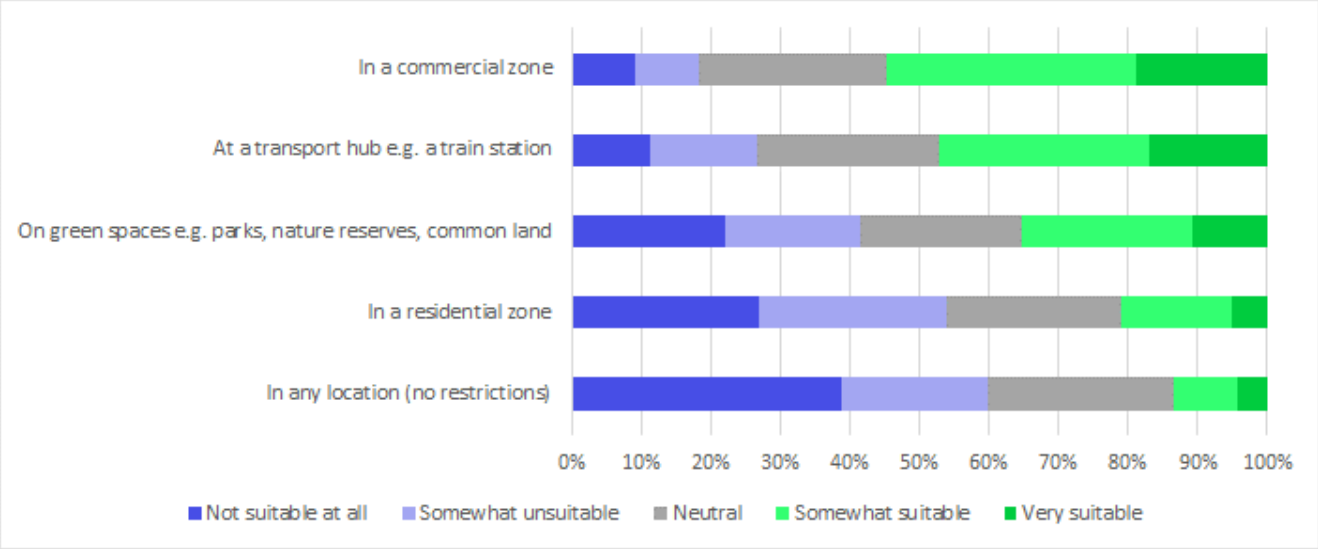
The graph shows there is a significant difference in respondents feeling comfortable travelling in a passenger eVTOL with a human pilot on board compared to one piloted remotely or fully autonomously. This is not surprising given that people are used to a physical pilot on board an aircraft. It is important to consider this finding in initial flights of passenger eVTOLs which would be more accepting to the public if there is a pilot on board.

The suitability of the type of location for a passenger eVTOL landing site was asked to participants. The results are shown in Figure 5.7.

Figure 5.7: Suitability for a passenger eVTOL landing site



The results indicate that the most suitable location for a passenger eVTOL landing site is considered to be in a commercial zone, closely followed by at a transport hub. Less suitable locations were considered to be on green spaces, in a residential zone or with no restrictions. This is not surprising as it aligns with the responses from other questions where commercial locations are considered more suitable for flying drones than residential locations. This would be problematic for the personal delivery use case as users would need to travel to a built-up area in order to pick up their packages if operators cannot fly in residential zones and may require additional trips.

5.2.4 Perceived benefits

The participants were asked to rate the perceived benefits of delivery drones and passenger eVTOLs and also there was the option to choose ‘no benefits’. Table 5.1 presents the results.

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Table 5.1: Perceived benefits of delivery drones and passenger eVTOLs

	Delivery drones	Passenger eVTOLs
Most likely benefit	Reduction of traffic jams due to fewer road vehicles	Reduction of traffic jams due to fewer road vehicles
	Reduction of local emissions and pollution (most drones will have battery electric propulsion)	Reduced journey time
	Improved development of and access to remote areas (e.g. the countryside, regions outside of a metropolitan area)	Reduction of local emissions and pollution (eVTOLs are electrically powered)
	Reduced journey time	Improved development of and access to remote areas (e.g. the countryside, regions outside of a metropolitan area)
	Improved safety (reduced likelihood of an accident compared with road transport)	Improved safety (reduced likelihood of an accident compared with road transport)
Least likely benefit	Boost economic growth in my city and create new jobs	Boost economic growth in my city and create new jobs

Table 5.1 shows that the most likely benefit of both delivery drones and passenger eVTOLs was perceived to be 'Reduction of traffic jams due to fewer road vehicles' and the least likely benefit was perceived to be ' Boost economic growth in my city and create new jobs'. This indicates that some misinformation of the benefits of drones and eVTOLs could be filtering to the public because it is unlikely that UAM aircraft will significantly reduce traffic jams (at least not in the short-term) as they will not widely replace road vehicles due to the restrictions on carrying load capacity and will be much more likely used as an alternative mode of transport for specific use cases such as EMS transportation. Also, stakeholders in the UAM industry believe that there will be thousands of jobs created by this emerging sector, so it is interesting this was rated the least likely benefit by citizens. The most likely benefit of drones and eVTOLs, particularly for the EMS sector, is considered by stakeholders to be reduced journey times which was recognised by citizens for passenger eVTOLs but not so much for delivery drones.

It should also be noted that 5% of respondents thought passenger eVTOLs had no benefits and 2% thought delivery drones had no benefits.

5.2.5 Public concerns

The participants were asked to rate how concerned they were with different potential issues with introducing delivery drones and passenger eVTOLs into the airspace. The results are presented in Figure 5.8 in order of concern.

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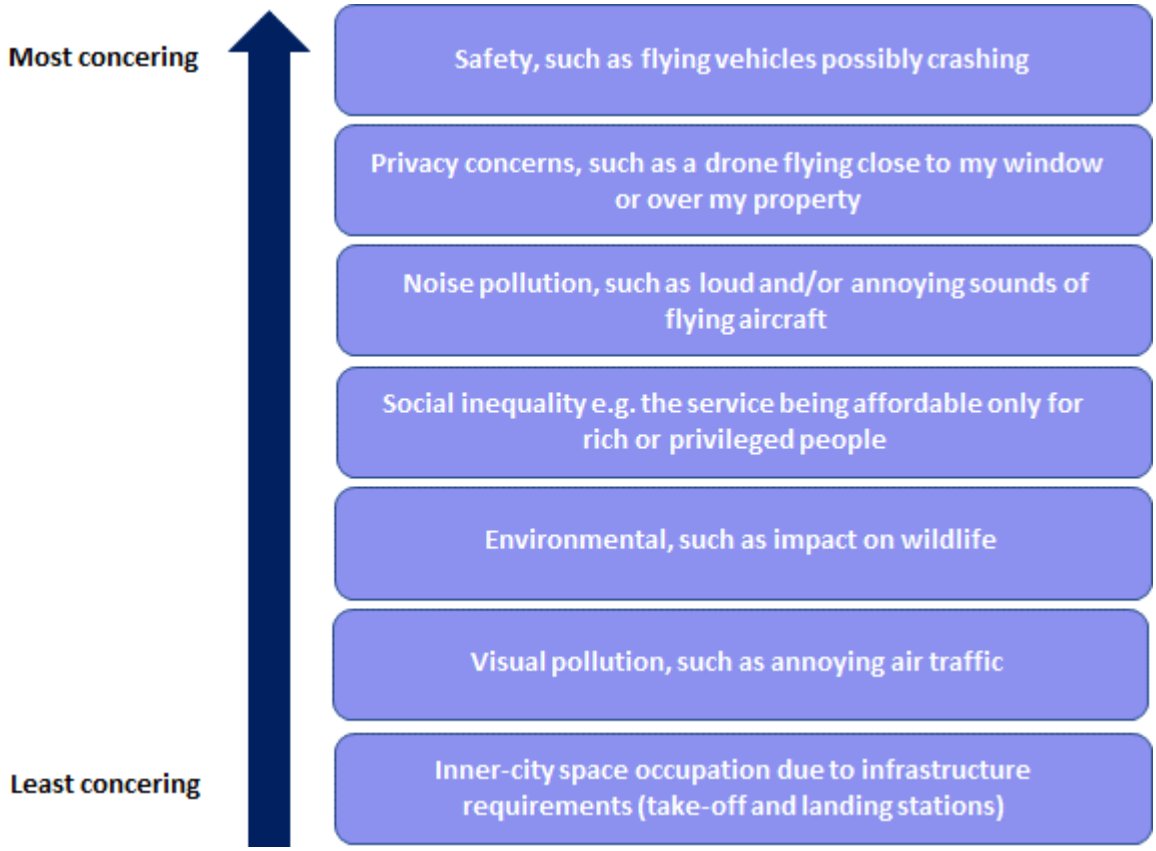
Figure 5.8: Concerns of delivery drones and passenger eVTOLs



The results show that, in order, the most concerning to participants is safety, privacy, noise and social inequality. This finding should be considered in the development of drones and passenger eVTOLs to ensure these concerns are addressed and communicated to the public to increase acceptability in the future.

5.2.6 Trust in technology

The level of participants trust in delivery drones and passenger eVTOLs was assessed. Figure 5.9 shows that the largest proportion of respondents were neutral and had not formed an opinion yet. The proportion of those who trust drones compared to those who did not was similar. It will be interesting to compare this to the results after the AiRMOUR demonstrations have taken place to see if it impacts trust levels in a positive or negative way.

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Figure 5.9: Level of trust respondents had in delivery drones and passenger eVTOLs

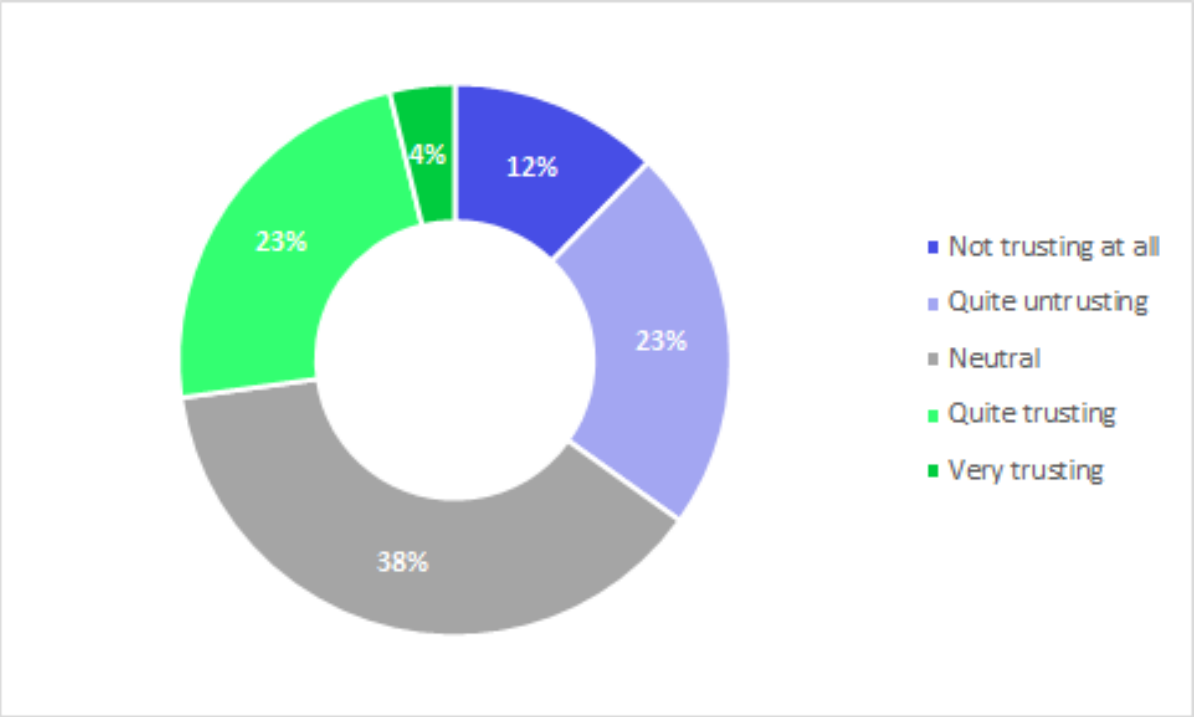
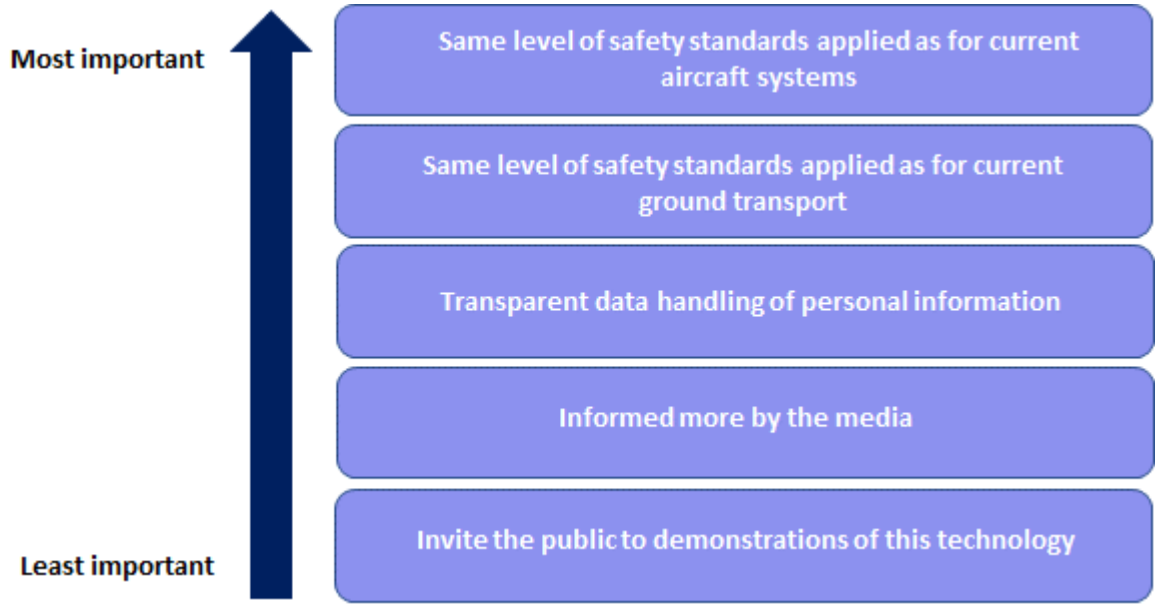


Figure 5.10 shows for the respondents who were 'quite trusting' through to 'not trusting at all' of drones and eVTOLs the factors that would increase their trust. This is shown in order of importance as rated by respondents. It shows that drones and eVTOLs would need to have the same level of safety standards applied as for current aircraft systems. It is understood that this is the aspiration of regulators, however it is currently unclear how this can be achieved at the early stage of integration into the current airspace. Many trials would need to take place beforehand to reduce the risk of collisions.

Figure 5.10: Factors to increase public trust in delivery drones and passenger eVTOLs



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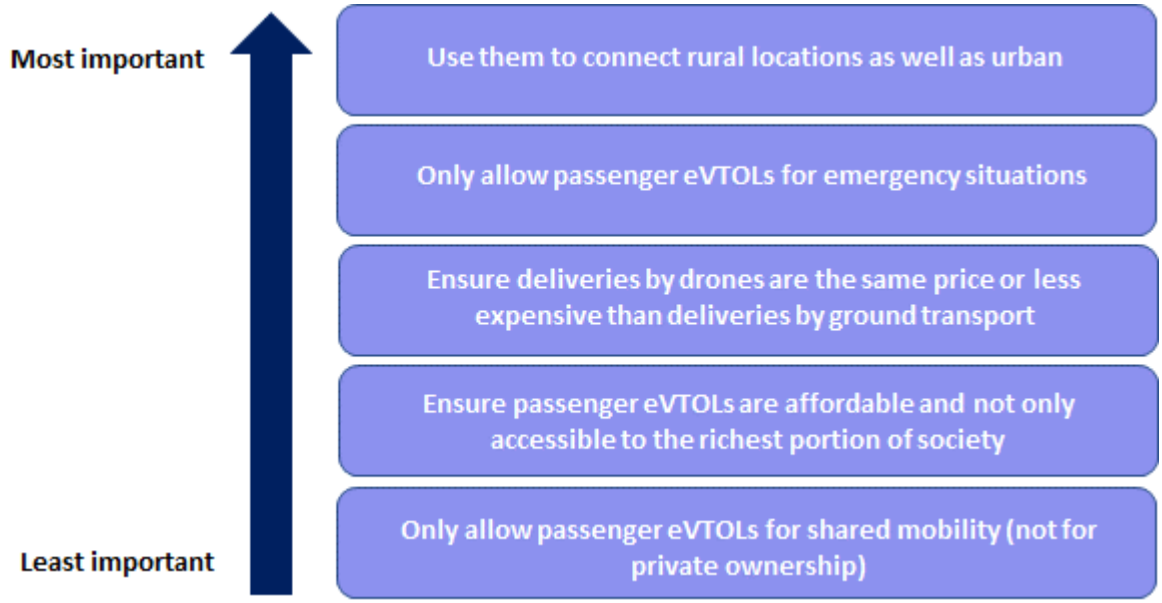
5.2.7 General acceptability

Participants were asked what factors would increase public acceptability of delivery drones and eVTOLs. The results are presented in the figure below.

Figure 5.11: Factors to increase acceptability of delivery drones and passenger eVTOLs



The most important factor was considered to be 'Use them to connect rural locations as well as urban'. This is an interesting finding because the focus is often on Urban Air Mobility and not so much on inter-connectivity outside of built-up areas which appears to be very important to the public who would be the end user of the new services. The high support for the EMS use case also appears strongly here as it was rated the second most important factor in increasing acceptability suggesting the public are not currently supportive of other use cases for passenger eVTOLs. It is also important to be aware that approximately 30% of respondents remained neutral on each factor and are undecided on how to increase acceptability for the technology.

Figures 5.12 and 5.13 show the results of questions to understand public perception on how the technology will benefit society as a whole and on an individual level. They show that there is a balanced view on both questions with a high proportion of respondents who are undecided. This indicates more information is needed for the public to form a view on whether or not they think delivery drones and passenger eVTOLs will improve society as a whole and on a personal level.

Figure 5.12: In general, do you think delivery drones and passenger eVTOLs will improve society as a whole?

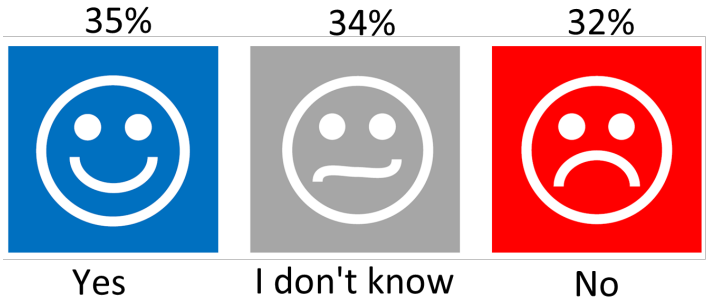


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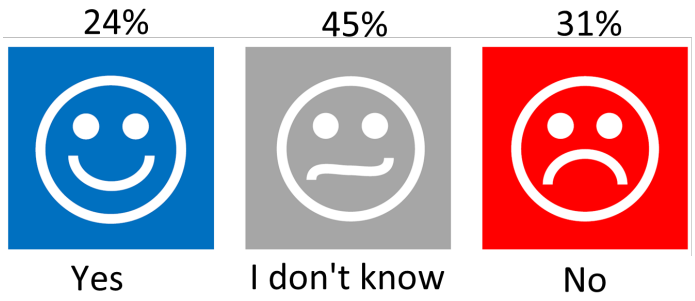
Figure 5.13: In general, do you think delivery drones and passenger eVTOLs will improve your life?



5.2.8 EMS use cases

This section details the findings from the questions specifically related to the medical use case, which is the focus of the AiRMOUR project.

Figure 5.14 clearly demonstrates a difference in acceptability of delivery drones and passenger eVTOLs for the transport of non-urgent medical products compared to urgent medical products or passengers in an emergency. The non-urgent use case is less acceptable, but it is also important to acknowledge the large proportion of neutral respondents who are undecided.

Figure 5.14: Delivery drones and passenger eVTOLs should be used to transport the following loads

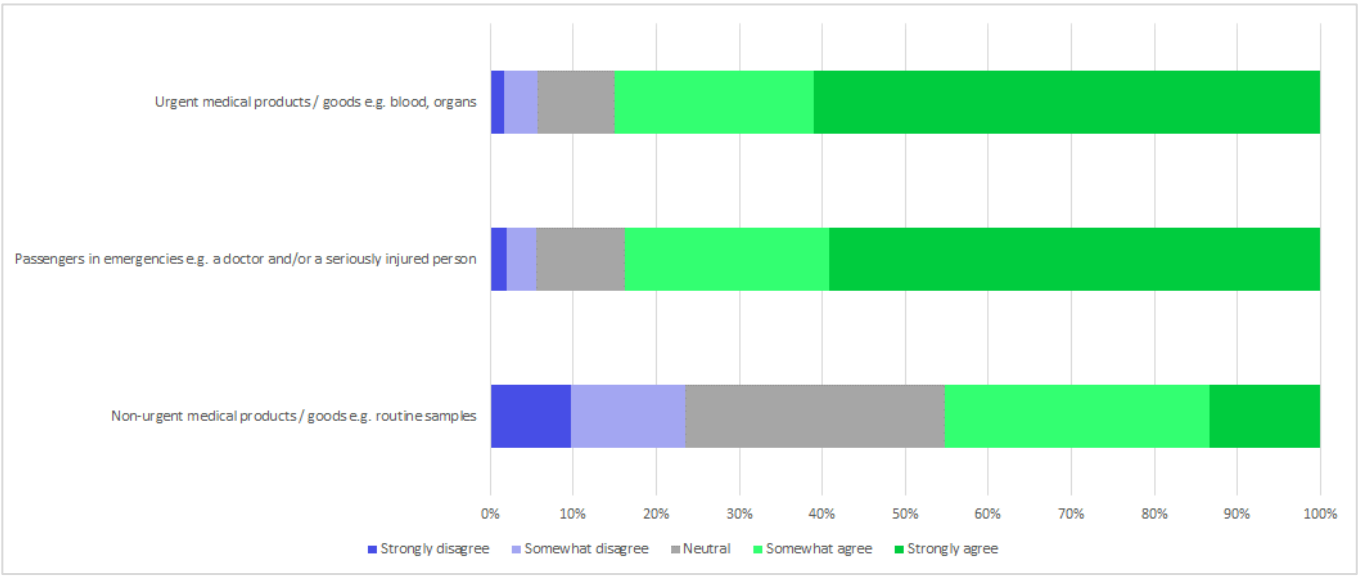


Figure 5.15 shows a high level of acceptability for all the AiRMOUR use cases (over 70%). Transfer of medical staff or products to an ad-hoc location in an emergency and blood delivery from blood bank to hospital are considered to be slightly more acceptable use cases for drones and eVTOLs than the two others.

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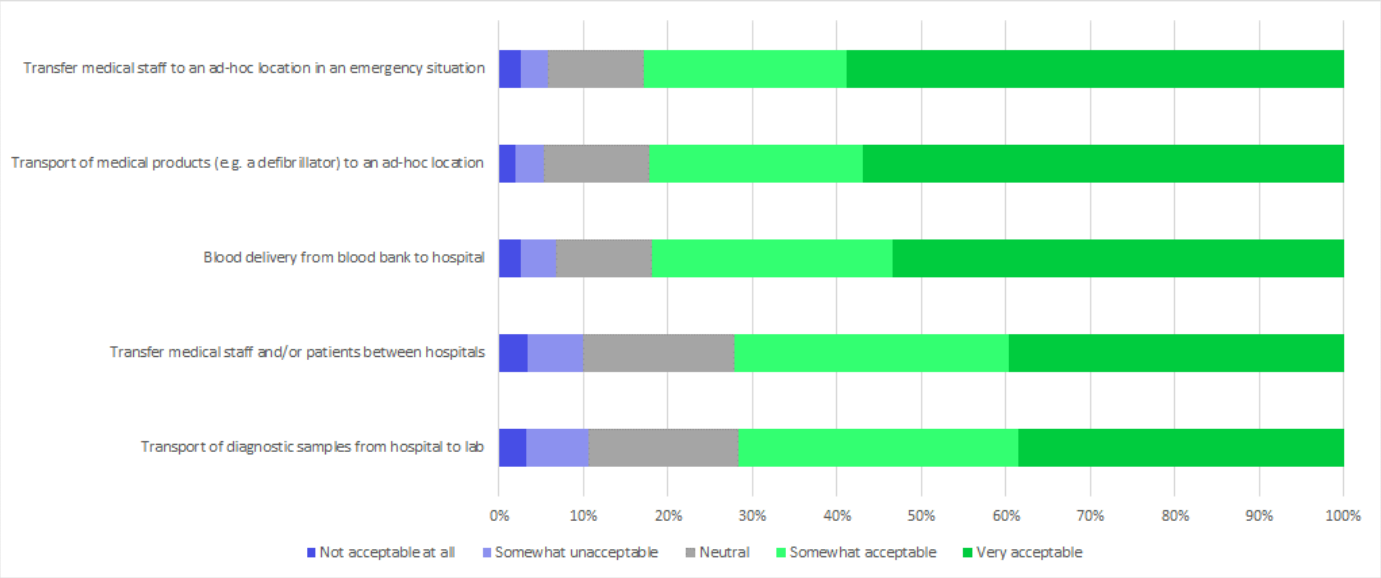
Figure 5.15: Level of acceptability of each medical use case of delivery drones and passenger eVTOLs



Figures 5.16 and 5.17 show that drones and eVTOLs flying close to people's residence or place of work is acceptable by the majority of respondents if it is for an emergency medical service, however there is a significantly lower level of acceptance if this is for the transport of a non-urgent medical service, especially close to a place of residence. Note, Figure 5.17 only shows responses for the participants who do not work from home which is why the number of respondents is lower than for Figure 5.16.

Figure 5.16: Acceptability of delivery drones and passenger eVTOLs flying close to place of residence

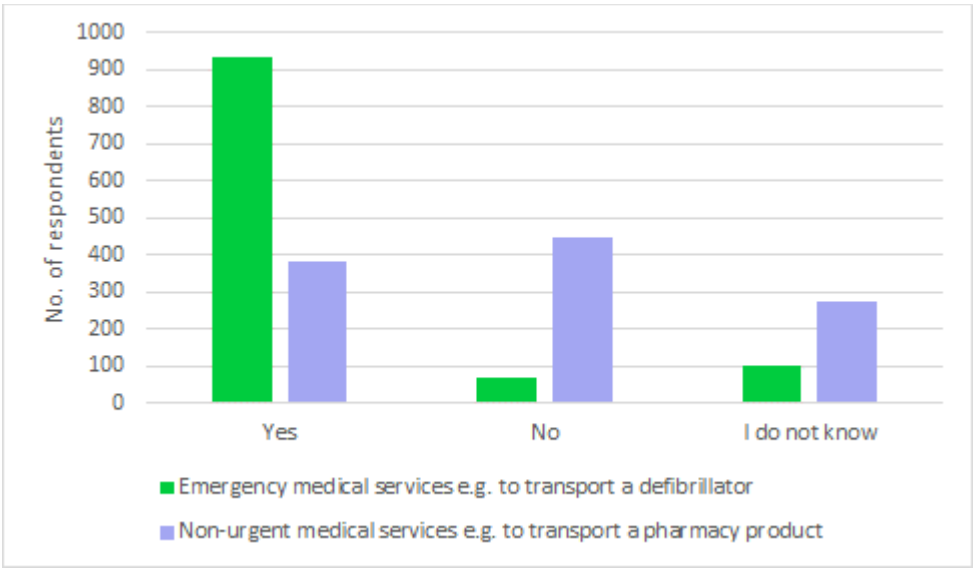


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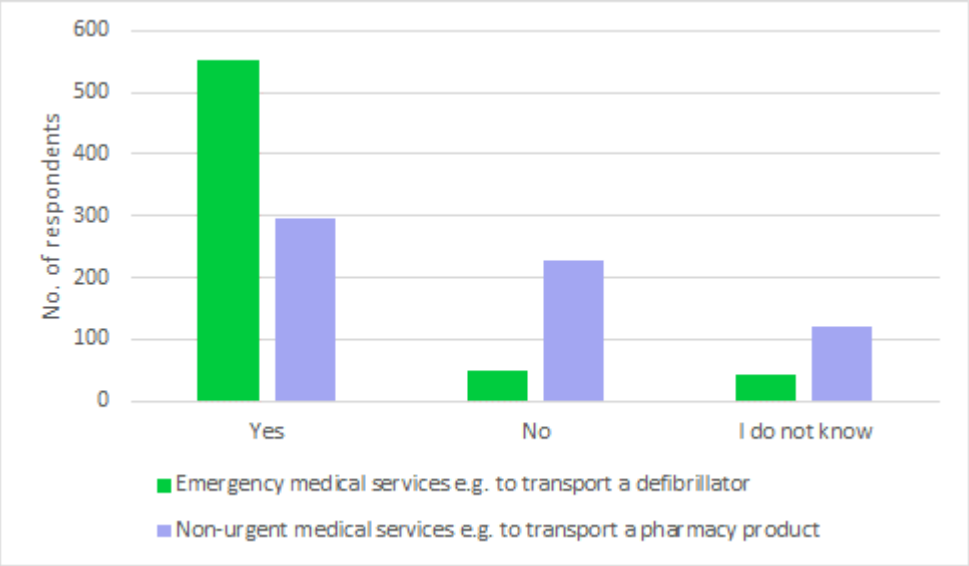
Figure 5.17: Acceptability of delivery drones and passenger eVTOLs flying close to place of work



5.3 Acceptability by locality

As mentioned in Chapter 4, for the purposes of assessing how **social values** influence acceptability of UAM, patterns in responses to the public questionnaire and the country of residence and location (urban, suburban, rural) of the respondent have been assessed.

5.3.1 Prior knowledge and exposure

The level of knowledge on Urban Air Mobility was fairly consistent in each country, however participants that were surveyed from Finland had the highest level of knowledge compared to participants from the other countries and those surveyed from Norway had the lowest level of knowledge.

The level of exposure to drones was fairly consistent in each country, however participants that were surveyed from the Netherlands, Finland and Luxembourg had the highest level of exposure compared to participants from the other countries and those surveyed from Sweden had the lowest level of exposure. This is interesting because the recent life-saving mission using a delivery drone to transport a defibrillator by Everdrone took place in Sweden and this result indicates not all of the population are aware of this, or at least it did not impact on their level of exposure.

Unlike other studies, no noticeable differences were recorded between the location of respondents (i.e. urban, suburban, rural) and their knowledge and exposure to drones.

5.3.2 Use cases

Respondents from Finland rated ‘security surveillance e.g. border control’ as the most acceptable use case for drones. This is likely due to the recent political tensions associated with the Russian invasion of Ukraine. Respondents from Luxembourg rated ‘medical deliveries e.g. of blood samples’ higher than the other countries where it was considered the 3rd most acceptable use case. The location of respondents (i.e. urban, suburban, rural) did not have significant differences in the ranking of use cases. The most noticeable variation was that respondents living in rural locations rated ‘environmental monitoring e.g. of animal populations’ more acceptable than ‘security surveillance e.g. border control’ which was the opposite for those living in a suburban and urban location.

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5.3.3 Comfort and trust

Respondents living in Luxembourg and the Netherlands were much less comfortable with delivery drones compared to the Scandinavian countries. Also, respondents from Sweden were much more comfortable with delivery drones compared to the other countries. The comfort level with passenger eVTOLs was fairly consistent in each country. In general, respondents living in a rural location were less comfortable with both delivery drones and passenger eVTOLs compared to those living in an urban or suburban location.

Respondents from Germany and the Netherlands were the most trusting of delivery drones and passenger eVTOLs. A large proportion (60%) of respondents from Sweden were neutral indicating they are currently undecided. No noticeable differences were recorded with locality of residence (i.e. urban, suburban, rural) and trust levels.

5.3.4 Concerns

In terms of concerns, all countries rated safety and privacy as the two greatest concerns with Finland, Luxembourg, Norway and Sweden rating noise pollution as the third greatest concern and Germany, Netherlands rating social inequality as the third greatest concern. Respondents from Finland were least concerned overall about the introduction of delivery drone and passenger eVTOLs than respondents from the other countries. No noticeable differences were recorded with locality of residence (i.e. urban, suburban, rural) and concerns.

5.3.5 Preference for location of flights

Respondents living in a suburban or urban locality thought the most appropriate areas for flying drones are over watercourses, whereas respondents living in a rural locality thought the most appropriate areas are over transport corridors. No noticeable differences were recorded with country of residence and preference for flying area or landing site.

5.4 Acceptability by demographic

For the purposes of assessing how **personal values** influence acceptability of UAM, patterns in responses to the public questionnaire and the age and gender of the respondents have been assessed.

5.4.1 Prior knowledge and exposure

Males appeared to have a greater knowledge on the topic of UAM compared to females. Both younger males and younger females had a higher level of knowledge than older males and females. Knowledge levels increased slightly for older females 61+ compared to females aged 41-60.

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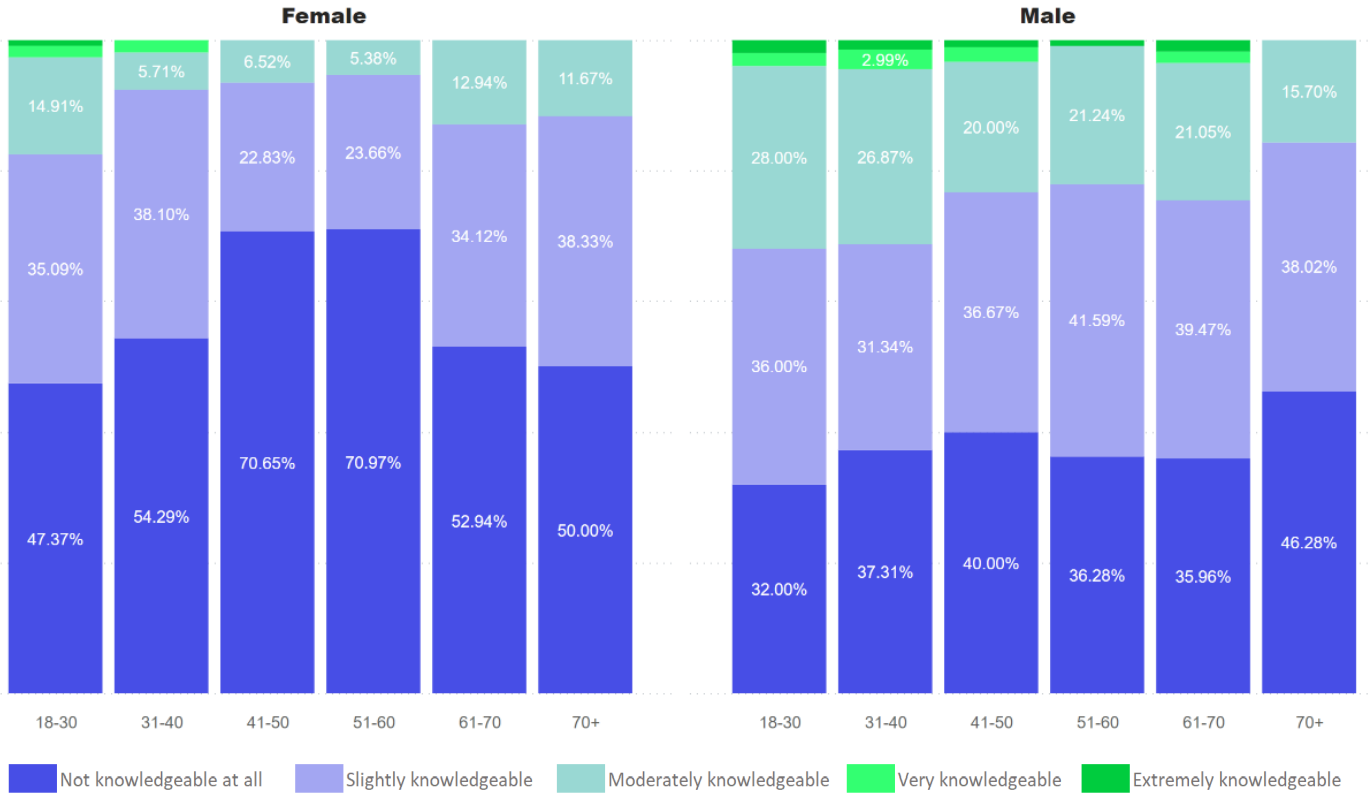
Figure 5.18: Level of knowledge on Urban Air Mobility by demographic



Males appeared to have a greater level of exposure to drones than females. This could be seen as a reflection on the higher number of males than females working in the drone industry and/or who own their own drone[14]. Males between 31 and 40 had the highest level of exposure to drones. Younger females between 18 and 40 had a greater level of exposure to drones than older females.

[14] Kuzman, J. and Dobson, K. (2019) Gender Diversity in UAV (Drone) Industry. *International Journal of Gender, Science and Technology.* Vol. 10, No. 3. Retrieved from: https://pure.roehampton.ac.uk/ws/portalfiles/portal/1186935/KuzmaDrones.pdf

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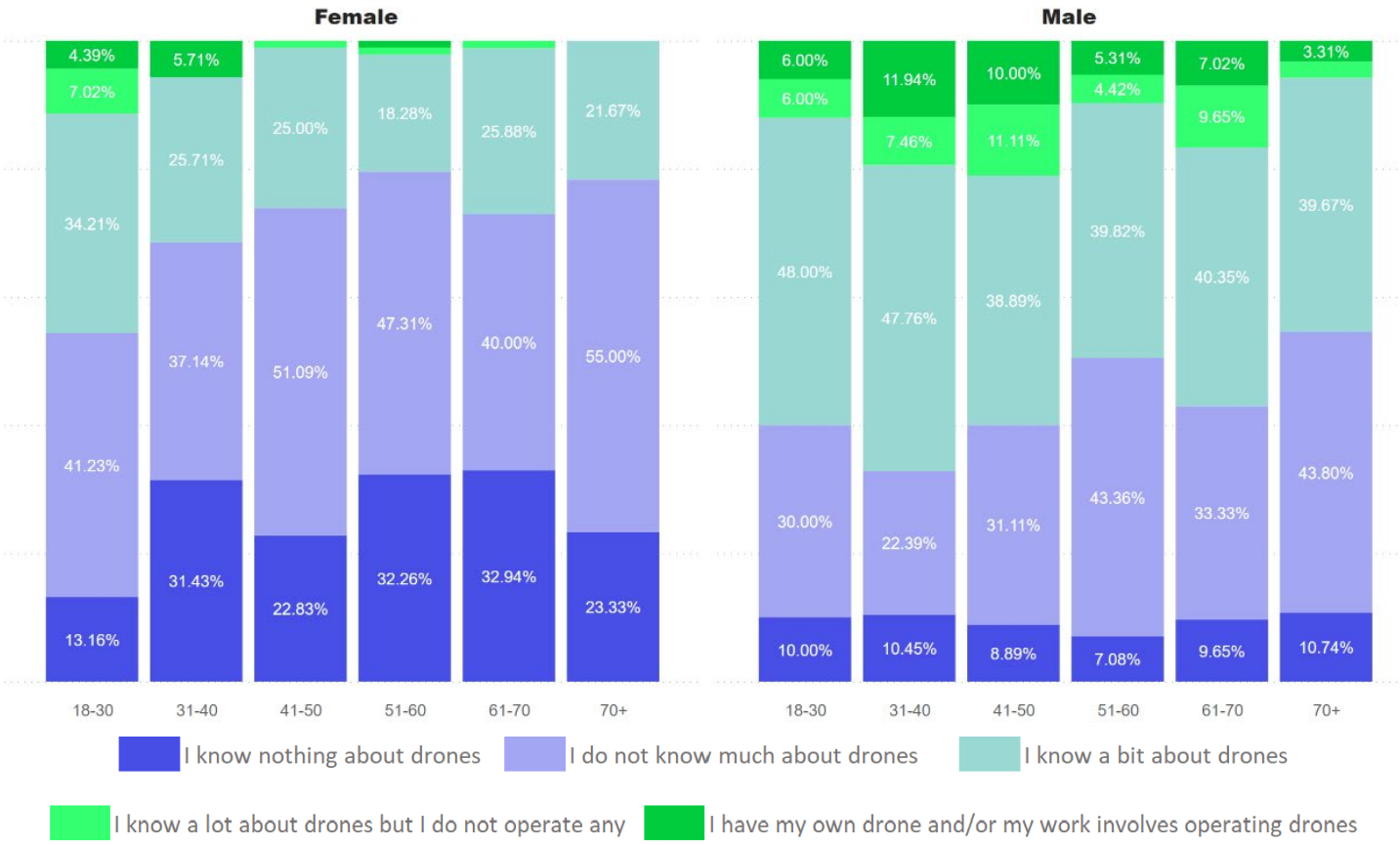
Figure 5.19: Level of exposure to drones by demographic



5.4.2 Use cases

Males were more accepting of each use case compared to females. Both males and females put the use cases in a similar order of acceptability, however females ranked medical deliveries as more acceptable than environmental monitoring, whereas males ranked them the other way around.

Interestingly, overall respondents aged 18-30 were less accepting of each use case compared to those who were older. Also, a finding was that the older the respondent the more accepting they are of the use of drones for security surveillance with the 70+ age group ranking this as the second most accepting use after infrastructure maintenance.

5.4.3 Comfort and trust

Males were more comfortable with the use of delivery drones and passenger eVTOLs compared to females and were much more willing to try out the new technology. They were also less uncomfortable with remotely or fully autonomous aircraft operations than females.

The youngest respondents were more comfortable with the use of delivery drones and passenger eVTOLs and with travelling in a passenger eVTOL compared to the eldest respondents.

Males were more trusting of delivery drones and passenger eVTOLs compared to females (35% of males were quite or very trusting compared to 20% of females who were quite or very trusting). There was no difference in the ranking of measures to increase trust between males and females.

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The level of trust of the delivery drones and passenger eVTOLs was similar across the age groups. Most notable is the slight difference between the 18-30 age group, where 29% were trusting of the technology, compared to the 70+ bracket who were 21% trusting of the technology. Also, in regard to measures for increasing trust, younger respondents age 18-40 ranked the importance of being informed by the media higher than older respondents. A reasonable explanation for this could be because they are generally more tech-savvy and exposed to many different media channels compared to older respondents.

5.4.4 Concerns

Females were slightly more concerned than males about the introduction of delivery drones and passenger eVTOLs in the airspace. Both males and females ranked concerns in a similar order. The majority of age groups ranked safety, privacy and noise as the greatest concerns but ages between 51 and 70 ranked social inequality as the third highest concern above noise.

5.4.5 Preference for location of flights

Females are more cautious than males when it comes to the suitability of flying and landing sites for drones. However, there was no difference in the ranking of suitable flying areas and landing sites between male and female responses. No noticeable differences were recorded with age group and concerns either.

5.5 Acceptability based on prior knowledge and prior exposure

For the purpose of assessing how **prior knowledge** and **prior experiences** influences acceptability of UAM, patterns in responses to the public questionnaire and the response to the questions ‘How knowledgeable are you on the subject of Urban Air Mobility?’ and ‘What exposure have you had to drones?’ has been assessed.

Unsurprisingly, knowledge levels of UAM and exposure to drones is linked as those who were moderately, very or extremely knowledgeable on UAM also knew a lot about drones, or had their own drone.

5.5.1 Use cases

There is a significant difference in responses for the acceptability of each use case based on prior knowledge and exposure. Respondents who were more knowledgeable about UAM and had increased exposure to drones were much more accepting of each use case compared to those who were not. Prior knowledge and exposure to drones did not influence the top two most acceptable use cases for drones which were infrastructure maintenance and land or building surveying. However, respondents who had the highest exposure to drones ranked the use cases of medical deliveries and environmental monitoring higher than the security surveillance use case. This may be because they have a greater awareness of the benefits of these use cases of drones.

5.5.2 Comfort and trust

Respondents who were more knowledgeable about UAM and had increased exposure to drones were much more comfortable with delivery drones and passenger eVTOLs and willing to use these services. They were slightly less comfortable with passenger eVTOLs flying overhead as a pedestrian than as a passenger in the air or driver on the ground.

As knowledge levels and prior exposure to drones increase, comfort in remotely piloted or fully autonomous passenger eVTOLs increases. However, these respondents still rated ‘a human pilot on board controlling the aircraft’ as the scenario they are most comfortable with.

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Knowledge levels of UAM and exposure to drones influence trust levels. As knowledge and exposure increases, so does the level of trust in the technology. This will need to be re-confirmed in the second round of engagement after the AiRMOUR demonstrations have taken place. As knowledge levels increase, the priority of measures to increase trust changes. Those who were more knowledgeable rated the measures 'informed by the media', 'transparent data handling' and 'invite the public to demonstrations' higher than the measures related to safety. Interestingly, this was not the case for prior exposure as the level of exposure did not influence the order of measures.

5.5.3 Concerns

Increased knowledge of UAM and, to a lesser extent, increased exposure to drones reduces the level of concern overall for the new technology. A notable difference in the priority of concerns was recorded – respondents with less knowledge on UAM rated safety and privacy as their top concerns, whereas those with the highest knowledge on UAM rated social inequality and inner-city occupation due to infrastructure requirements as their top concerns. Perhaps this is because safety and privacy are possible to mitigate and will be a requirement by the regulator, whereas social inequality and space constraints would likely be much harder to address.

5.5.4 Preference for location of flights

Increased knowledge of UAM and increased exposure to drones heightens support for drones flying over different areas and constructing passenger eVTOL landing sites. There was no significant difference in the suitability of the area to fly over and the level of knowledge of UAM or prior exposure to drones. Notably, respondents who were most knowledgeable on UAM rated a passenger eVTOL landing site in a residential zone and in a commercial zone joint first for suitability, whereas respondents who were less knowledgeable were against a landing zone in a residential area.

5.6 Acceptability based on experience in healthcare

Another factor to assess how **prior experience** influences acceptability of UAM, patterns in responses to the medical related questions and whether or not respondents worked in the healthcare sector has been assessed.

5.6.1 Medical use cases

Interestingly, acceptability of the medical use cases was slightly lower for those working in the healthcare sector compared to those who do not. This may be because they are more aware of the operational / logistic complexities and challenges in facilitating this than those outside the sector who would purely view this from a user perspective. Also, respondents working in healthcare viewed the use of delivery drones and passenger eVTOLs for the transport of non-urgent medical products much more favourably than respondents outside the sector. This is perhaps because they recognise the benefits in reduced journey times etc. for both urgent and non-urgent medical deliveries in assisting their vital work. Those working in the healthcare sector were slightly less accepting of the use of passenger eVTOLs for medical purposes than those outside the sector.

5.7 Perceptions and expectations

The four factors (**social values**, **personal values**, **prior knowledge** and **prior exposure**) discussed in Sections 5.3 to 5.6 and illustrated in Figure 4.1, feed into public perception and expectations of the technology, which in turn feeds into public acceptability. Respondents who have more knowledge and exposure to the technology appear to have a more positive perception on drones and eVTOLs. Respondents do not appear to have high expectations for

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the technology in improving society as a whole or their own life. It will be interesting to see how this view evolves over time.

As mentioned in Section 4.1, the current public acceptance study is not linked yet to a real demonstration or simulation, therefore the perceptions are equal to expectations. At a later stage of the project a distinction can be made between real perceptions of different types of UAM service provision, expectations and how this leads to different levels of acceptance.

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6 Stakeholder engagement

As mentioned in Chapter 4, engagement with stakeholders was undertaken from autumn 2021 to spring 2022 via interviews with experts from different relevant sectors, a stakeholder workshop with partners and the external advisory board and via a stakeholder questionnaire directed to those working in the aviation sector, medical sector, city representatives and those working in the UAM industry.

Discussions with stakeholders focused on the key themes being researched as part of the WP4 deliverables, namely; public and stakeholder acceptance of UAM (in particular for EMS), safety and risk, environment, privacy, policy and legislation and socio-economics, all in the context of UAM. This chapter details the findings of discussions with stakeholders for each of these themes. The purpose of these discussions is to help inform the development of the UAM industry by raising awareness of stakeholder views and perceptions that other UAM stakeholders can learn from and in which future research can build upon.

6.1 Stakeholder views on delivery drones and passenger eVTOLs

Stakeholders were asked a series of open-ended questions related to how they feel about UAM and associated aircraft, including the benefits, use cases, barriers in innovation and future opportunities / next steps. A summary of the responses for each is provided in this section.

Benefits of delivery drones and passenger eVTOLs

- Cost, speed and environmental elements are the greatest benefits.
- A major advantage is energy efficiency compared to land transport for some use cases.
- No emissions from drones / passenger eVTOLs and no noise at ground level when they are in flight.
- Alleviate ground transport problems such as poor road infrastructure, traffic jams.
- Boost economy towards autonomy transport and services. Undoubtedly new jobs will be created.
- Offers new tools to deliver services and goods especially to rural and remote areas, improving accessibility.

Acceptable use cases of delivery drones and passenger eVTOLs

- Most beneficial for the transport of medical goods (huge potential e.g. during pandemic)
- For urgent transportation e.g. organs, blood, defibrillators, medical services.
- Saving lives followed by stopping crime and support society functions.
- For search and rescue or for transporting routine medication to people.
- To survey an emergency scene and report back before the helicopter arrives rather than replacing the helicopter.

Barriers in innovation for UAM

- Lack of specific test areas.
- Technology readiness, regulations, minimising risks, communication infrastructure, public acceptance, urbanism (adapt cities for drone flights) e.g. vertiport infrastructure.

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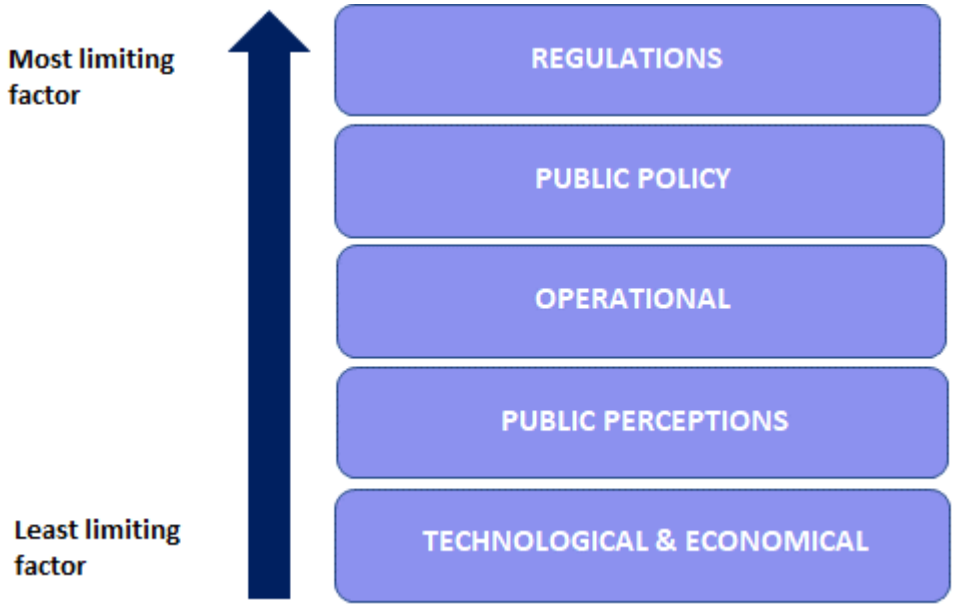
- Regulations and standards are missing, in particular for passenger eVTOLs and fully autonomous aircraft.
- 'Holistic technologic aspect' remains a key challenge, which includes how to build UAM into existing ground infrastructure.
- Drones have to be able to land anywhere e.g. to deliver a defibrillator anywhere. This creates challenges from an aviation security perspective, as drone corridors are no longer useful.

Figure 6.1 shows the results to the question 'What is the main limiting factor(s) currently for the integration of delivery drones and passenger eVTOLs into current mobility systems?' The results show that regulation is the most limiting factor followed by public policy. Public perceptions rank lower on the scale, but this may rise next year onwards after the new EASA regulations are published on the use of drones in the airspace and public acceptance becomes more pressing for advancing UAM operations.

Figure 6.1: Limitations in integration of delivery drones and passenger eVTOLs into the mobility system



Future opportunities / next steps for facilitating UAM

- Network effects and economies of scale have to be developed in order for drones to be commercially attractive.
- Architects need to take this new form of mobility into account in their designs, e.g. open windows for drone deliveries in high rise buildings.
- Well defined regulations, testing and certification, infrastructure, good network of cellular coverage.
- Vision is for the transportation, digital infrastructure, physical infrastructure, air mobility industry to be created with the user in mind. Also the industry needs to focus on the youth programme outreach in the future workforce.

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6.2 Stakeholder views on public acceptability

It was interesting to understand how stakeholders perceived public acceptability of UAM based on their own prior engagement with the public and understanding of public concerns and needs. The results of the qualitative assessment on this topic are provided in this section.

Perception of public views on UAM

- The public can often get nervous when they hear the (high frequency) noise of drones, and this can get in the way of public acceptance.
- There seem to be regional differences in public acceptance for different UAM uses, for example Germans are very hesitant to accept UAM for personal transportation compared to the Nordic countries.
- Acceptance is likely higher for first responder/health care applications than other applications.
- Public perception is positively influenced if drones are used for functions important to them such as EMS, environmental monitoring etc.
- People seem to be accepting drones more and more. EASA are ensuring UAM aircraft will be safe and this increases trust from the public.
- People tend to complain until they have a need for the new technology, e.g. with 5G / underwater communication cables.
- Support from politicians and healthcare workers (if it is a medical use) is needed to help influence public trust.

Suggestions for increase public acceptability of UAM

- Importance of giving the public transparent and factual information about the capabilities of UAM, from a technical point of view. People tend to rely on Google searches, which does not always lead to the most factual information.
- Demonstrations, such as those by volocopter in Paris, can also help public acceptance. The public should be engaged during these demonstrations.
- The focus remains on safe and secure operations. Currently it is looking into navigation without GNSS reference, as well as other forms of use case testing.
- Working with magazines to publish articles explaining the latest developments in unmanned aircraft, which will help to inform the public.
- The need to educate the press is vital. The media play a huge role in influencing public acceptance levels. The press can sway public acceptability positively or negatively.
- Information and communication to the public about good examples is important.
- Support from influencers / famous people as followers want to copy them.
- Clear signing of medical aircraft to raise public awareness of their presence / use.

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Figure 6.2: Direct quotes from stakeholders on public engagement

"The public feedback has been very good from all generations"

[*perspective from drone operator*].

"I don't see barriers from society as long as the operators follows regulations and deliver value to citizens"

[*perspective from drone operator*].

"Some will like the new technology and it's more acceptable if it's for the medical sector, others may find it disturbing especially if they don't know the purpose of the drone operation"

[*perspective from healthcare worker*].

"The ecosystem needs to be built on transparency, inclusivity and diversity"

[*perspective from UAM communications expert*].

At this point, it is important to note national differences in public acceptability which is often influenced by the political approach to engagement (e.g. a proactive approach, such as engagement prior to demonstrations, or a reactive approach, addressing concerns after demonstrations). There are positives and negatives to both approaches. The proactive approach ensures the public is engaged early in the process allowing better technological adaptions to meet public user needs and mitigate public concerns early in the process. The reactive approach can lead to faster advances in the technology and adoption leading to rapid scalability, however the risks are that the technology may not address the market and there may be less public acceptance. In Europe, national governments tend to take a more pro-active approach to public engagement and this study aims to aid this research prior to widespread commercialisation of drones in Europe.

6.3 Stakeholder views on safety and risk of UAM operations

Safety is a top priority that needs to be achieved for the operation of delivery drones and passenger eVTOLs which in turn will help increase public acceptability and trust in the technology. Stakeholders were asked about their views on the level of risk the public may be willing to take in using UAM services and how to ensure safe operations of UAM aircraft. The responses are summarised in this section.

Stakeholder views on safety of UAM operations.

- UAM and existing aircraft have to be able to simultaneously operate safely in the airspace. This requires a further need for research and demonstrations.
- There are a low number of accidents in aviation and people trust the information that air transport is safer than other modes.
- Technology (e.g. satellites / network coverage) plays a key role in identifying drones in the airspace which in turn facilitates safer operations.
- Drones should have responders so they can be easily cut-out if they pose a risk to security / safety.
- Unmanned eVTOLs may not recognise power lines or tree stumps in high grass and forms, therefore, this could be a potential safety issue.
- More data is needed for mapping accurately existing conditions (e.g. ground infrastructure, topography etc.) to assist with safe UAM aircraft flights.

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- Compared to autonomous flying, a pilot gives people a feeling of safety. In HEMS operations the flight crew also look after the aircraft after landing.
- To accommodate BVLOS above urban areas fully mastering tactical separation processes is needed.

Stakeholder views on acceptance of risk to the public

- The public is willing to accept a tolerable level of risk for EMS and other blue light businesses. It should be comparable with the risk for emergency vehicles.
- The public need to see the risk as being part of a trade-off that includes a benefit for themselves. The benefits will need to exceed potential / perceived dangers.
- If autonomous systems are an order of magnitude safer than current manned solutions people will accept the risk of utilising these services.
- The public will accept a level of risk if the flight safety record is better than for ground transportation. It must be clearly demonstrated how the aircraft operates in fault situations and how it actively avoids accidents in practice.
- Need to mitigate the risk for safety of people on the ground and have a process for third-party safety issues (e.g. a package falling from a drone directly injuring someone on the ground or falling on the road causing a car accident).

Risk and safety mitigation strategies will be the focus of Task 4.2 and will utilise the findings from this initial engagement.

6.4 Stakeholder views on environment considerations

When talking about drones, noise pollution is something that often appears as one of the top concerns for the general public. Visual pollution is not something that is so apparent as a concern in previous research, however it will likely be in the near future if and when more drones and passenger eVTOLs take to the skies in commercial operations. Task 4.3 will focus on these two aspects and will develop a mapping tool that can be used by stakeholders to plan flight paths according to prior engagement activities. The initial stakeholder engagement undertaken provides a basis for this piece of work and it also touches on other environmental factors, such as emissions reduction and impact on wildlife.

Stakeholder views on environmental considerations

- UAM aircraft will reduce emissions by shifting road traffic to more efficient electrified drone transports.
- Bird life must be carefully studied to avoid negative impact.
- Some stakeholders said they do not see ’huge’ environmental impact of drones in terms of improving sustainability.
- During a drone test, an environmental organisation complained about disturbance to seals and bird populations on the flight path. Close engagement with environmental organisations is therefore needed to mitigate any negative impact as much as possible.
- The young community is very concerned about impact on nature, such as bird migration and impact on other animals. Sustainability concerns are not so apparent from adults, but this seems to be one of the dominant topics that is currently on the minds of the generation born after 2000.
- Not only should drones be electric but sustainability in the supply chain (i.e. production of the aircraft) needs to be looked at as well as end-of-life disposal.

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- A high-pitch sound from drones will be annoying to the public, although drones will emit less noise than ground traffic there will likely be more noise complaints.
- Public stress from the visual pollution of drones may become apparent, although this is more linked to stress over privacy concerns (i.e. if the drone has a camera on it).

To help mitigate environmental concerns of drones, suggestions from stakeholders include; engagement with environmental stakeholders, flying at a higher altitude to reduce noise and visual impact on the ground, careful route planning and normalising the use of drones.

6.5 Stakeholder views on privacy of UAM operations

After safety, privacy is usually a top concern for the general public when they think of drones. Many peoples' first real-life interaction with a drone is from a hobby drone that is used to take photos or videos at altitude. This has stemmed a level of mistrust in terms of concern for personal privacy. This topic was explored during engagement with stakeholders by discussing public concerns and ways to mitigate this in the future. Task 4.4 will use this initial engagement as a starting point to develop a UAM citizen privacy handbook aimed at city planners / policy makers.

Stakeholder views on privacy concerns

- Public concern is high because people are worried about being surveilled. They are unsure about their protection rights when it comes to drones filming.
- Not knowing who is operating the drone and its purpose heightens public concern for personal privacy.
- There is public concern over data recorded from drones being transferred to non-EU countries.
- People are concerned when drones enter the airspace over their private land.
- The public generally thinks all drones have cameras on-board, however this is not always the case.

"It's important for people to know what type of drone is flying and what it's purpose is and that it's not affecting you as a citizen" [*quote from healthcare worker*]

Stakeholder views on addressing privacy concerns

- Drone operators and aerial system providers will have to go through tests to prove that their systems are adhering to a certain level of end-to-end security standards.
- Sensitive personal data has to be protected. Existing GDPR regulations and permits required from authorities are enough. Easing of regulations should be discussed for some use cases e.g. sharing of information between authorities.
- In drone pilot education GDPR is taught and has to be followed. Data integrity is ensured by coding. The film must be sent to the land registry office in order to get a permit for dissemination. If the footage shows identifiable individuals without their consent then it is in violation of the GDPR.
- Clear regulation, clear control and clear punishment for illegal use is needed.

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- Host regional data and operation centers in EU countries that do not rely on external processing.
- Simple and accurate information about who is driving the drone where, that the public have access to and can look up if they are concerned.

6.6 Stakeholder views on policy and legislation

New policy and legislation is vital to regulate UAM activities. There has been a gap identified between the advancement in technology and the authorities and policy-makers catching up with legislation to regulate the new types of aircraft and associated infrastructure. EASA is currently developing stricter requirements for operating a drone. From 2023 the open category will involve certification. This does not apply for drones with a very low weight though e.g. for domestic use.

Stakeholders were asked their views on current policy and legislation for the use of drones and how to develop this in the near future. The responses are summarised in this section.

Stakeholder views on current policy and legislation on drone use

- The legislation is in place for a good reason, as many untrained users are flying drones for recreational use near highways etc. This is why the legislation on drone experiments in uncontrolled settings is currently so strict. The legislation is nonetheless a barrier to innovation.
- Lack of comprehension of the current regulations is seen as a problem. Also the public are not well informed on the regulations.
- The regulatory framework is lagging the technical development.
- There is an imbalance in the regulation. The requirements on the operators are not proportionate if you look at the risks with operations and the opportunity to save lives.

Stakeholder views on developing future policy and legislation on drone use

- If every drone is certified / legally approved then public acceptance should increase.
- The role of local authorities and politicians in the regulation of drones should be made clear to the public. They have a duty for communicating effectively to the public and have a process in place for addressing public concerns.
- Define the responsibility of each entity who is operating and regulating drones, and who is responsible for segregating and allocating the airspace.
- A regulatory framework that is coherent and implemented on a European scale is necessary if a market for drones technologies and applications is to be developed.
- Harmonised operational rules across Europe should be applied.
- Private companies and governments should regulate the certification process for UAM aircraft and drone pilots.
- Rigorous EU approved training courses will help ensure safety of drone operations because it will prevent companies from offering drone training with low experience and low costs that undercut reputable training providers.
- Policy and regulation needs to keep in mind the end user e.g. a person receiving medical treatments via drone need a high enough cognitive level to receive the parcel from the drone and know how to use the medical product without assistance.

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- Hobby drones should be identifiable and the people flying them should have mandatory training to reduce risk of misuse or accidents.
- Policy has to consider and be discussed with non-users in addition to users.
- Regulations should be developed by both the local authorities and aviation authorities, bringing urban space and airspace together in one discussion.
- Exchange knowledge between authorities who are more experienced in enabling drone operations and those who are not for a more coordinated approach to future UAM policy integration.
- In many cities vertical space is not at the moment included in spatial planning but it should be in the future for improved integration with other modes and to facilitate UAM services.

"We need to have open and regular forums together with stakeholders from local government, academia, industry, and the public to shape future UAM policies. Without involvement of these stakeholders, we won't have a complete picture of what will be publicly accepted, what is operationally possible and how those operations could fit into the regulatory landscape." [*quote from stakeholder questionnaire respondent*]

WP4 Task 4.5 will explore the integration of UAM services into relevant policies such as SUMPs and discuss co-modality.

6.7 Stakeholder views on socio-economics

Socio-economic impacts of UAM is an important consideration when discussing the purpose of different use cases for drone operations. UAM services should aim to take an inclusive approach, benefiting the whole of society rather than solely the richest proportion of society, to ensure widespread acceptability of drones in the airspace. This is one of the reasons the EMS use case for drones is such an important one as its main purpose is to support society as a whole, and therefore public acceptance tends to be higher than for other use cases. Stakeholders were asked for their views on socio-economic values of UAM operations and how these can be facilitated. The results are presented in this section.

Stakeholder views on socio-economic values of UAM operations

- The new technology will off-set some jobs (due to automation) but also create new jobs.
- There is a danger if private sector stakes become higher accessibility to UAM across the public may not be even because of the different service levels that private providers create. Governments need to work out whether UAM is a for the 'public good' and therefore whether to intervene.
- There could be the sacrifice of public space for landing places.
- More surveys and citizen focus groups are required to actively involve citizens. Also invite representatives from minority and vulnerable groups to these discussions.
- It should not be the aim that anyone can use drones and eVTOLs at any time. These services should be niche services for special needs (e.g. EMS, time critical delivery of valuable goods etc.)

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- Develop sustainable business models that integrate all society in the basic services. When planning integrating drones into the city, a study should be done to consider the socio-economic aspects of distribution of infrastructure e.g. landing and take-off places.
- UAM services should be accessible and affordable for all, not just a select few. This may only be achievable after large-scale operations are deployed.
- With private for-profit usage only, the benefits most likely will be unevenly distributed.

"EMS is an application that supports inclusivity"

[*perspective from aviation expert*].

"Focus on services that first, serve the wider society and lastly, are made to entertain the rich"

[*quote from stakeholder questionnaire respondent*].

It should also be noted that there was no real consensus among stakeholders as to how drones will impact the job market of the healthcare sector, suggesting this is currently unclear.

6.8 Stakeholder engagement on EMS use case

This section summarises some of the key insights from engagement with stakeholders specifically on the EMS use case for drones and passenger eVTOLs. These insights are from those working in the healthcare sector and also those in the drone industries providing medical services.

- Larger number of drones means higher availability and a better service. Drones could replace costlier helicopters. If drones are less costly then it would be a tax payer incentive. It cannot replace all EMS transports by car or aircraft though.
- Outpatient care to people living in rural locations could be developed by the use of drones, for example delivery of medicines and food.
- Drones could be used to transport antidote shots in the case of poisoning.
- Drones are being used to distribute heart defibrillators automatically and in sync with the national alarm service. In 9 out of 10 cases the defibrillator arrives before the ground vehicle and in these cases every second counts. The focus is on EMS providing defibrillators in any environment integrated with the S.O.S. community alert system.
- Patients would be more wary of a drone, they like people coming to them, they would see a drone as replacing a person. The person interaction is important in the healthcare system. Not the case for everyone though, some may prefer a drone.
- Since 2017 helicopters increasingly experience drone encounters, first they were seen as a threat but they are increasingly seen as a potential to support EMS.

6.9 Questionnaire results

Out of the stakeholder questionnaire participants, 39% were male, 26% were female and 35% preferred not to disclose their gender. 50% of participants worked in the public sector, 31% worked in the private sector and 19% worked in neither sector. The majority of participants worked in the Healthcare, City planning, Technology and Aviation sectors. Participants were from a variety of countries including France, Belgium, Sweden, Germany, USA, Poland, Finland, Hungary and Luxembourg.

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Figures 6.3 and 6.4 shows the level of prior knowledge on the topic of UAM and prior level of exposure to drones.

Figure 6.3: Level of knowledge on Urban Air Mobility (stakeholders)

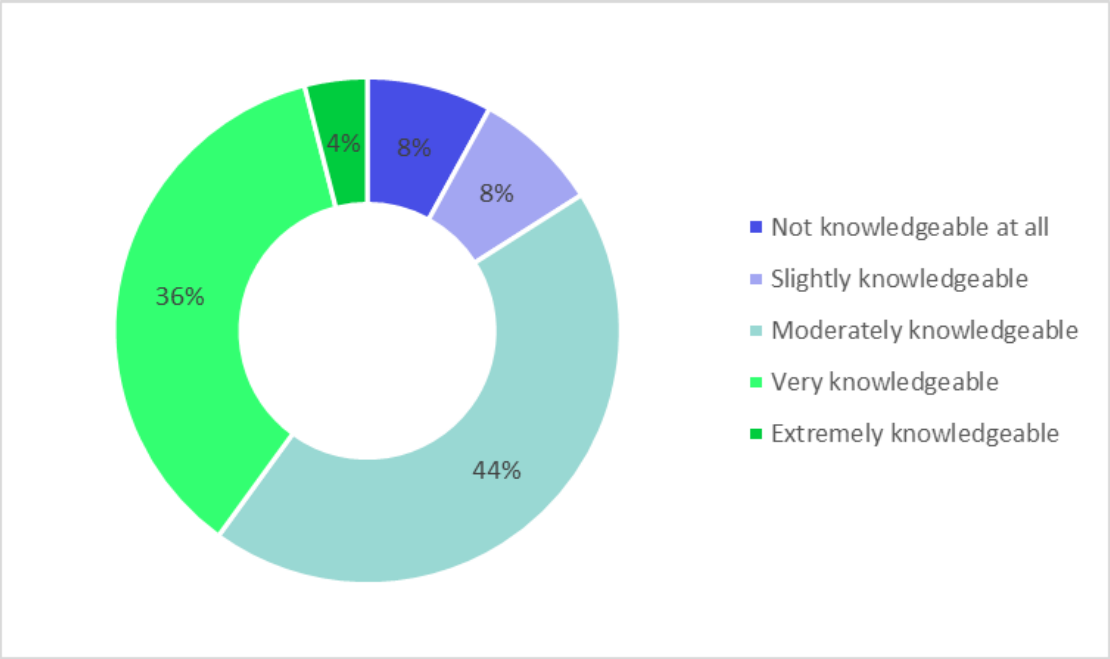
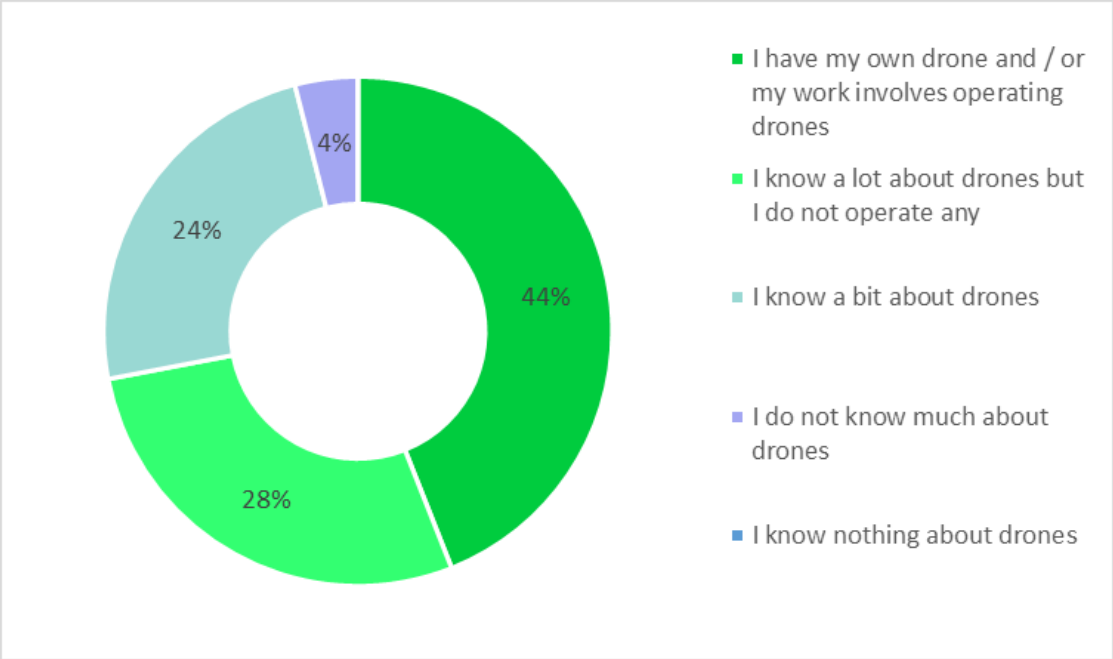


Figure 6.4: Level of exposure to drones (stakeholders)



The results show that there is a high level of knowledge on the topic of UAM amongst the stakeholder participants and the vast majority know about drones. This is unsurprising given that stakeholders were targeted who have an interest in this topic. This is significantly different to the knowledge levels on UAM and prior exposure to drones of citizens, as shown in Chapter 4.

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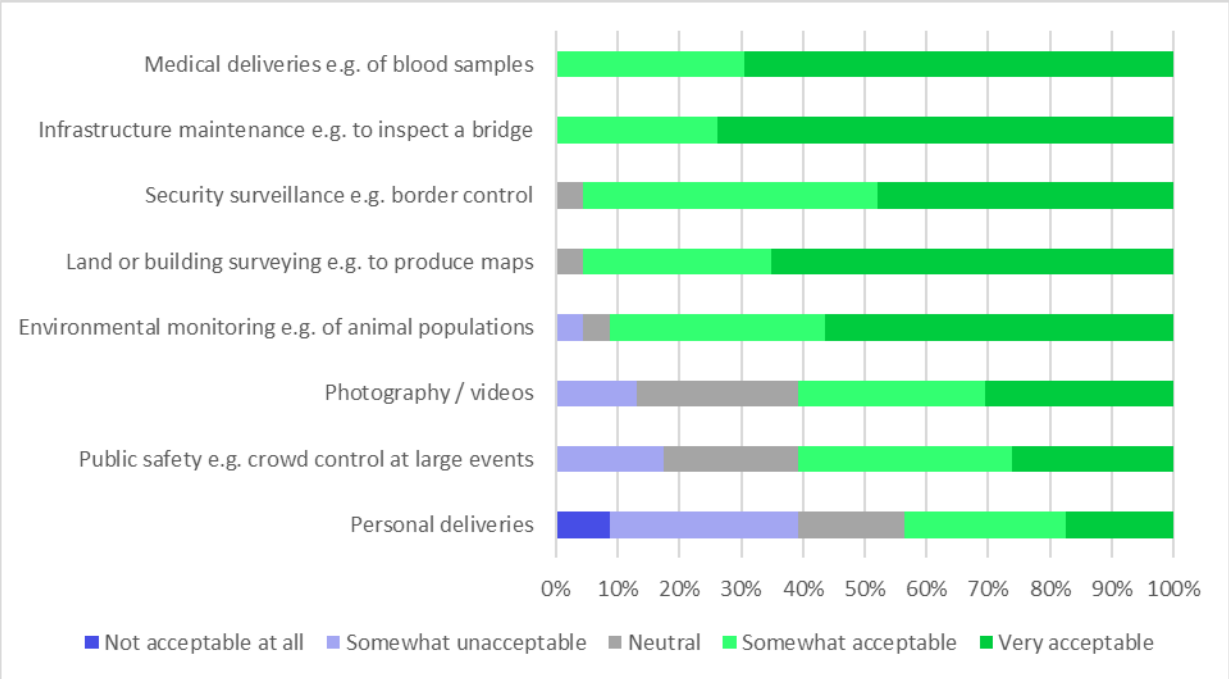
Stakeholders were asked about the acceptability of different use cases for drones. The results are shown in Figure 6.5 in order of acceptability.

Figure 6.5: Acceptability of uses for drones (stakeholders)



The results show that the most accepting use cases for drones as judged by stakeholder participants was for medical deliveries and infrastructure maintenance. This was closely followed by security surveillance and land or building surveying. This may be a reflection on the type of stakeholders, some of which came from the medical sector.

The difference in opinion of drones and passenger eVTOLs used for medical and non-medical purposes was assessed. The results are presented in Figures 6.6 and 6.7.

Figure 6.6: Delivery drones medical vs non-medical use (stakeholders)

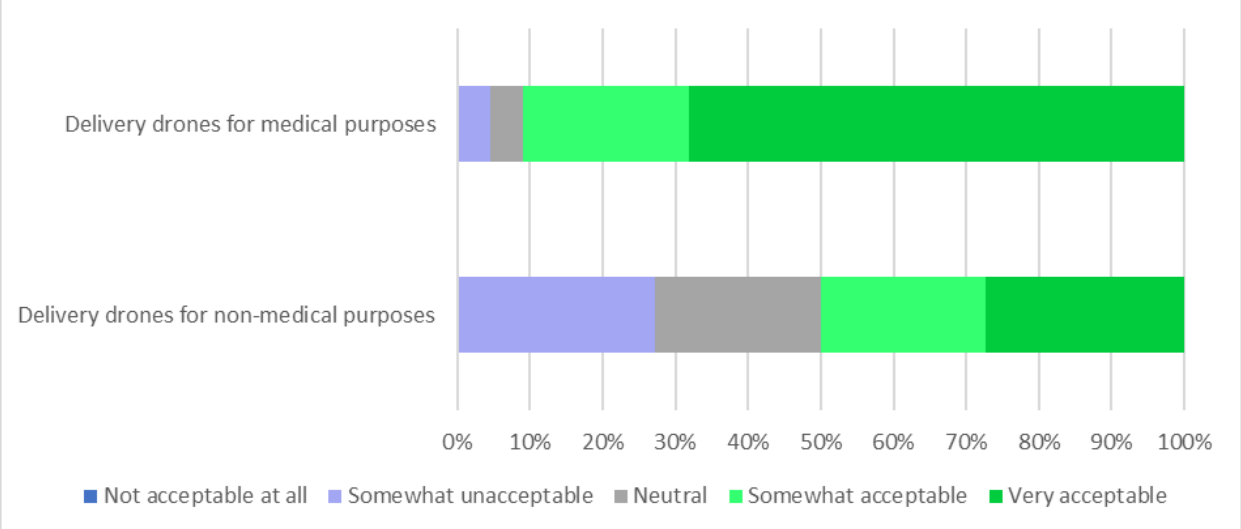


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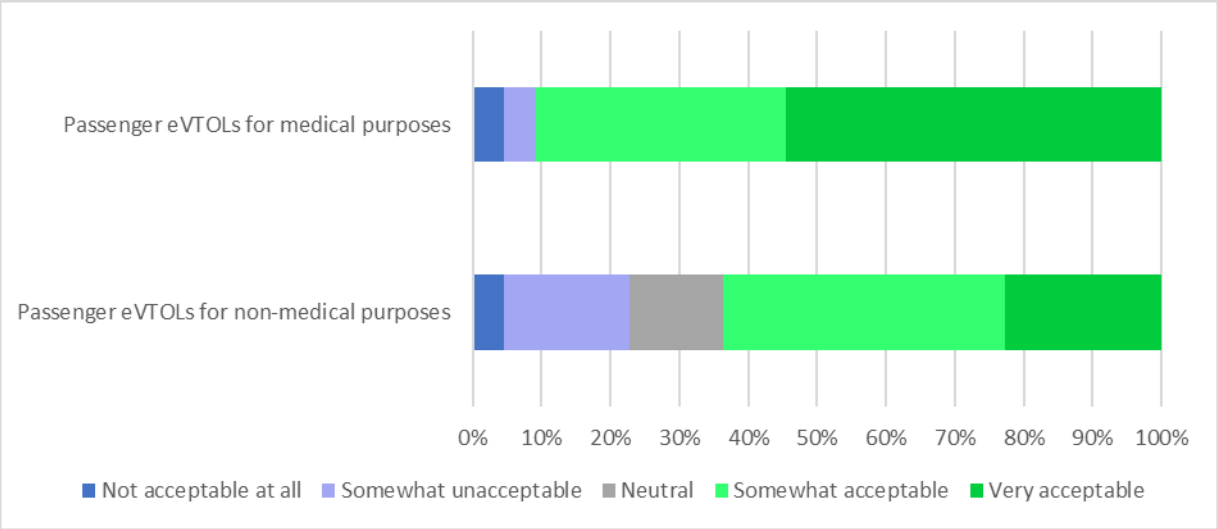
Figure 6.7: Passenger eVTOLs medical vs non-medical use (stakeholders)

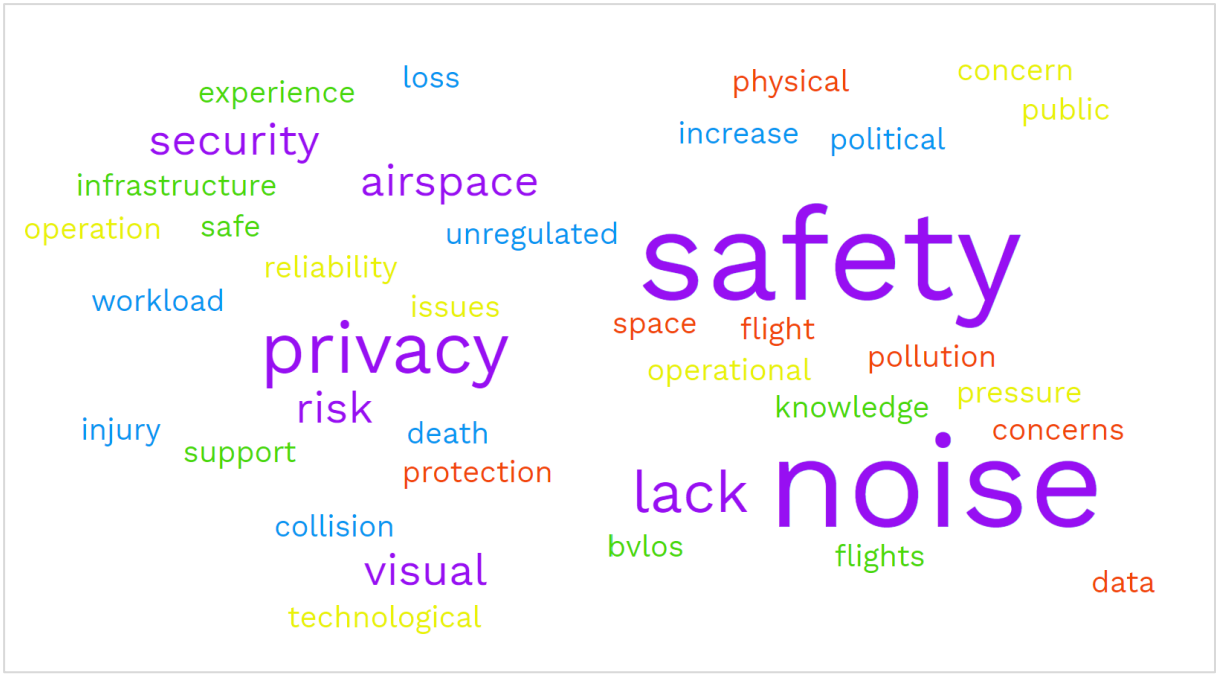


The results show that stakeholder participants were more accepting of delivery drones and passenger eVTOLs for medical purposes compared to non-medical purposes. Interestingly, in general they were more accepting overall with the use of passenger eVTOLs for non-medical purposes compared to delivery drones for non-medical purposes.

In terms of benefits, stakeholder participants thought that for both delivery drones and passenger eVTOLs the greatest benefits are 'Improved development of and access to remote areas', 'Reduced journey times' and 'Reduction of local emissions and pollution'.

Figure 6.8 shows the most common concerns stakeholders think the public will have with introducing more drones into the airspace. As can be seen, the most common perceived concerns are safety, noise and privacy.

Figure 6.8: Stakeholder perception on public concerns with drones



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7 Discussion

This chapter discusses the findings from the public and stakeholder engagement results presented in Chapters 5 and 6. It also considers how findings from this study differ or align with previous studies mentioned in the literature review. The findings have been grouped into topics for conciseness.

7.1 Level of knowledge

- **The majority of citizen respondents were either 'not knowledgeable at all' on the topic of UAM or were 'slightly knowledgeable'.** Contrastingly, the majority of stakeholders were either 'Moderately knowledgeable' or 'Very knowledgeable' on UAM. This is considered to be a reflection of current knowledge levels amongst the public and stakeholders and aligns with the findings from previous studies to date.
- **Male citizens are more knowledgeable on the topic of UAM and have a higher level of exposure to drones than females.** This is considered unsurprising given that there are more males working in the aviation and UAM industry and more males own their own drone compared to females. This suggests more needs to be done to attract women to the industry and address a potential skill-gap, for example by educating younger generations, in particular females, about the topic who will later grow up to be the future workforce.
- **The youngest respondents are most knowledgeable on the topic of UAM.** This confirms findings from previous studies that have come to the same conclusion when assessing a correlation between age and level of knowledge.
- **People who are more knowledgeable and have been exposed to drones are more accepting of them and are more trusting and comfortable with the technology.** This can be seen both in the citizen questionnaire and also when comparing general citizen and stakeholder responses. It aligns with the results from previous studies that identify this correlation. This finding will be tested in the second round of engagement after citizens in the validation sites have experienced drones first-hand and once more information is disseminated to the public on UAM services over the next year.
- **A high proportion of citizens answered 'neutral' which is reflective of their lack of knowledge on the topic.** During the second round of engagement after more information is disseminated, it will be interesting to see whether the proportion of 'neutral' responses decreases and whether the respondents answer more positively or negatively to the different questions asked.
- **Respondents from Finland were more knowledgeable on UAM than other countries and were more comfortable with the technology.** This confirms the finding that a higher level of knowledge increases comfort. Another finding was that Finnish respondents were more concerned about security than respondents from other countries, likely due to current cross-border political tensions. This indicates that **there is a link between current affairs and levels of acceptability**.

7.2 Concerns

- **Social inequality appeared as a high concern for citizens if delivery drones and passenger eVTOLs are introduced in the airspace.** This differs from previous studies where social inequality has not been highlighted as a concern. However similar to previous studies, such as EASA, safety, privacy and noise pollution are still the top

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concerns for citizens which stakeholders appear to be aware of. To help mitigate the concern of social inequality UAM use cases should benefit the whole of society, not just a select few.

- **Stakeholders feel that regulations are currently the most limiting factor in the advancement of UAM.** They identified the need for an easier process to enable test flights for drones and designated test environments. However, they also acknowledge the need for tighter restrictions in some areas (such as, certifying all drones and ensuring all drone operators (including hobbyists) take a mandatory test to fly) and identify the need for clarity from authorities by ensuring responsibilities are clear and transparent and the public know who to call in case of an unidentified drone. This finding will be assessed next year after the new EASA regulations come out which is likely to have an impact on stakeholder opinion.

7.3 Use Cases

- **Infrastructure maintenance, land or building surveying and environmental monitoring are the most acceptable use cases for drones according to citizens.** This is likely because they are the least impactful as they are less frequent, often operating in controlled environments and are already in operation. This finding aligns with the results from the recent Drive2TheFuture public engagement study undertaken this year. Contrastingly, stakeholders thought drones for medical deliveries is the most acceptable use case.

- **Non-urgent medical use cases are less acceptable than urgent medical use cases**. This finding aligns with previous studies and is something that needs to be carefully considered by the UAM industry. Some stakeholders think EMS should be the first use case to focus on due to its acceptability, however operationally this could be challenging. Emergency / urgent medical use cases for drones often require ‘A to N’ flights from a known origin to an unknown destination. This is often operationally more difficult to achieve than an ‘A to B’ flight where both the origin and destination of the drone is known and the flight conditions are more easily monitored. Therefore, non-urgent ‘A to B’ flights will likely be more frequent and introduced before ‘A to N’ flights in many locations. It should also be noted that there was a high proportion of citizens who answered neutral and could be swayed for or against the non-urgent medical use case.

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8 Conclusions

To conclude, this study has presented the results from recent extensive engagement with the public and stakeholders on the acceptance of UAM and in particular the medical use case for delivery drones and passenger eVTOLs. It was identified that social values (influenced by location of residence), personal values (influenced by age and gender), prior knowledge on UAM and prior exposure to drones are all factors that shape perceptions and expectations which ultimately leads to a level of acceptability. Both public and stakeholders with more knowledge on UAM were more accepting of the use cases and had a lower level of concern and increased level of comfort in the technology. This finding will be tested during the second round of engagement after more information is disseminated on the topic. The youngest respondents were more knowledgeable on the topic of UAM and were less concerned about security than older participants. Also, differences were apparent between countries, for example Finnish respondents had a higher level of knowledge on UAM and were more concerned about safety. The EMS use cases had a very high level of acceptability overall, including all the use cases being explored as part of the AiRMOUR study.

Key learnings can be drawn from this initial research to assist in future advancement of UAM services by stakeholders in particular, city representatives, the UAM industry and medical workers. The use of different engagement strategies have been tested in this first round of engagement and will be tested further in the second round when citizen focus groups are planned. Additional cities will be engaged in the second round to help compare and contrast opinions on findings to date. The discussion on public acceptability of UAM is increasing and opinions are rapidly evolving along with advancements in the technology. It will be very interesting to report on the future findings of other studies, as well as our own, after the second round of engagement to inform part of this important discussion.

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11 Annexes

11.1 Annex A – Citizen questionnaire.

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AiRMOUR

English (United Kingdom)

Introduction

The objective of this survey is to collect responses to questions related to Urban Air Mobility and its potential to support Emergency Medical Services. The survey will help the cities and researchers in the European AiRMOUR project understand the level of public acceptance of Urban Air Mobility technology in the cities or regions where we will be carrying out simulations and demonstrations of delivery drones and eVTOLs for medical purposes. We will publish the results in a report later this year, in June 2022, and it will be available to view on our website **https://airmour.eu**

If you would like to be kept informed about our study and invited to participate in citizen focus groups during the demonstrations then please provide us with your email address when asked to do so at the end of the survey.

We will store data in line with GDPR requirements (see downloadable file below for more information). Responses will be anonymous and will not be traced to individuals.

To help you fill out the survey we have provided some clarifications on terminology below. Please read through this carefully before proceeding.

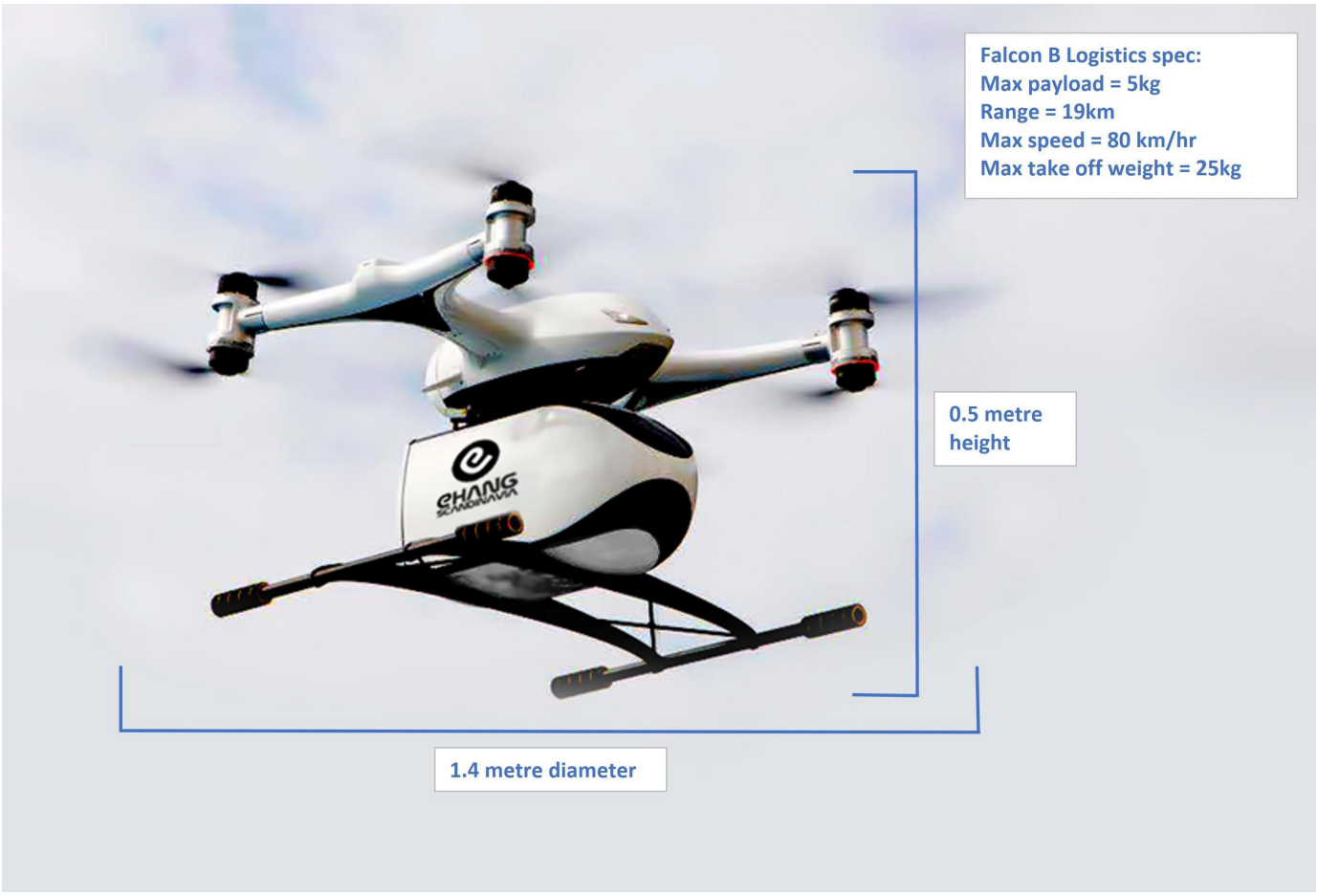
Urban Air Mobility is an extension of transportation systems in metropolitan areas, or between them, for distances that are not covered by regular aviation.

Delivery drones are referred to in this survey as drones that can transport small items over short distances with no people on board and are operated autonomously or piloted remotely. An example is shown in the image below.

Passenger eVTOLs are referred to as aircraft that can transport a small number of people over short distances and are able to electrically vertically take-off and land. They can be piloted by a human on board, remotely piloted, or completely autonomous with no human pilot. An example is shown in the image below.

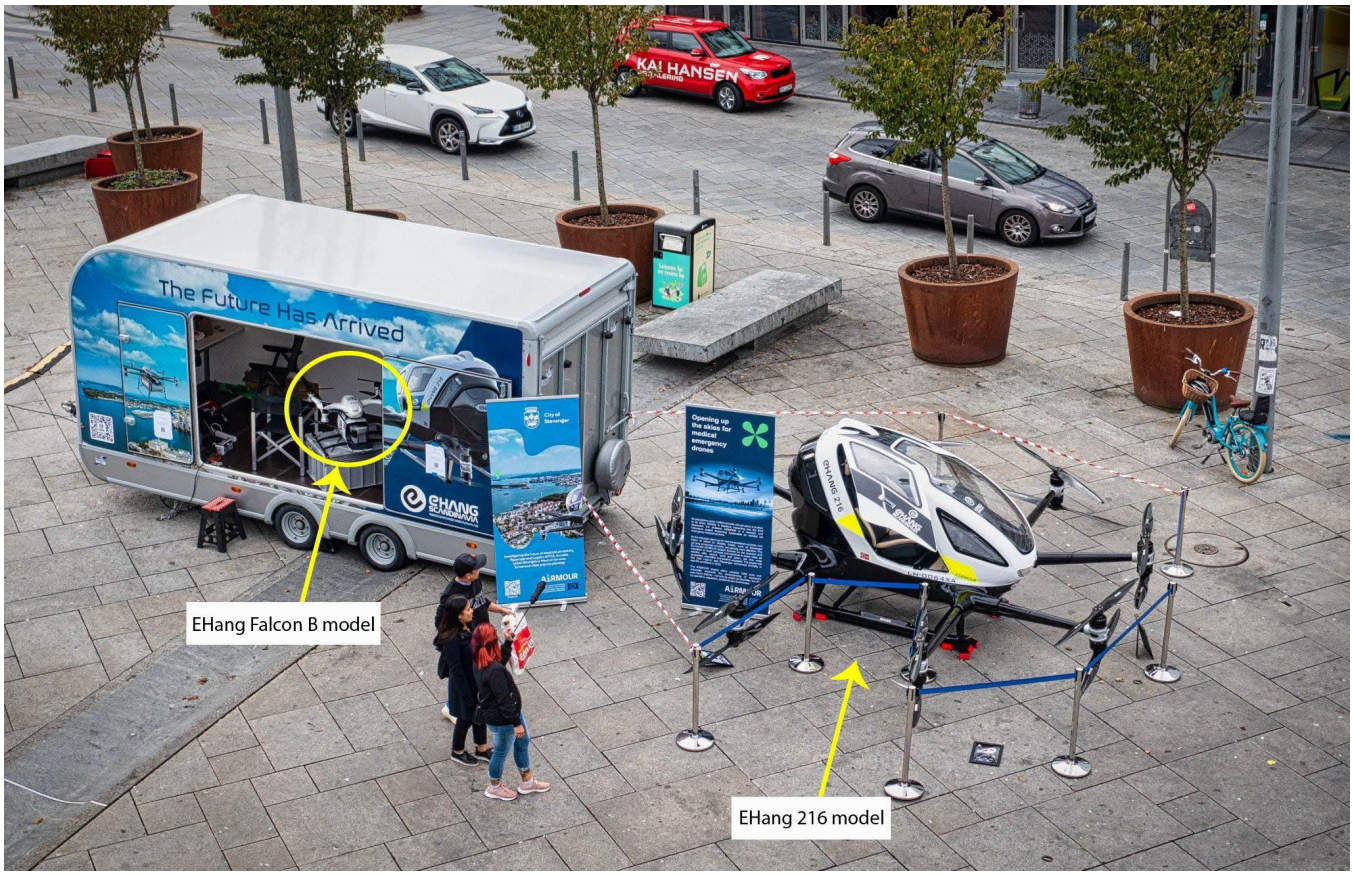
Airmour privacy statement

Example of a delivery drone



Example of a passenger eVTOL

Passenger eVTOL and delivery drone showcased on Town Square in Stavanger



Demographics

What is your gender?

- ○ Male
- ○ Female

What is your age bracket?

- ○ <18
- ○ 18-30
- ○ 31-40
- ○ 41-50
- ○ 51-60
- ○ 61-70
- ○ 70+

General questions on Urban Air Mobility and drones

How knowledgeable are you on the subject of Urban Air Mobility?

- ○ Not knowledgeable at all
- ○ Slightly knowledgeable
- ○ Moderately knowledgeable
- ○ Very knowledgeable
- ○ Extremely knowledgeable

What exposure have you had to drones?

- ○ I have my own drone and / or my work involves operating drones
- ○ I know a lot about drones but I do not operate any
- ○ I know a bit about drones
- ○ I do not know much about drones
- ○ I know nothing about drones

In your opinion, how acceptable are the following uses of drones?

	Not acceptable at all	Somewhat unacceptable	Neutral	Somewhat acceptable	Very acceptable
Environmental monitoring e.g. of animal populations	○	○	○	○	○
Public safety e.g. crowd control at large events	○	○	○	○	○
Security surveillance e.g. border control	○	○	○	○	○
Infrastructure maintenance e.g. to inspect a bridge	○	○	○	○	○
Medical deliveries e.g. of blood samples	○	○	○	○	○
Personal deliveries	○	○	○	○	○
Photography / videos	○	○	○	○	○
Land or building surveying e.g. to produce maps	○	○	○	○	○

Questions on delivery drones* (see images below for examples)

*Delivery drones can transport small items over short distances with no people on board and are operated autonomously or piloted remotely.

Image sources: Everdrone - https://everdrone.com/, EHang - https://www.ehang.com/logistics/, Zipline - https://flyzipline.com/how-it-works/

In your opinion, how acceptable are the following uses for delivery drones?

	Not acceptable at all	Somewhat unacceptable	Neutral	Somewhat acceptable	Very acceptable
Delivery drones for non-medical purposes	○	○	○	○	○
Delivery drones for medical purposes	○	○	○	○	○

Drones intended for the delivery of goods are remotely piloted aircraft systems. Assume that they would fly at an altitude between 120 and 150 metres (equivalent height of a 10 to 13 storey Please rate how much you agree or disagree with the following statements.

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
I would be interested in receiving personal deliveries by drone	○	○	○	○	○
As a pedestrian, I would be comfortable with delivery drones potentially flying above me	○	○	○	○	○
As a driver on the ground, I would be comfortable with delivery drones potentially flying above my vehicle	○	○	○	○	○
I would be comfortable with delivery drones flying over my neighbourhood	○	○	○	○	○

What benefits do you think delivery drones can bring to society in the future? (select all that apply)

- [ ] Improved development of and access to remote areas (e.g. the countryside, regions outside of a metropolitan area)
- [ ] Reduction of traffic jams due to fewer road vehicles
- [ ] Reduction of local emissions and pollution (most drones will have battery electric propulsion)
- [ ] Reduced journey time
- [ ] Boost economic growth in my city and create new jobs
- [ ] Improved safety (reduced likelihood of an accident compared with road transport)
- [ ] I do not think there are any benefits
- [ ] Other - please specify

_____

Questions on passenger eVTOLs* (see images below for examples)

*Passenger eVTOLs are referred to as aircraft that can transport a small number of people over short distances and are able to electrically vertically take-off and land.

Image sources: CityAirbus - https://www.airbus.com/en/innovation/zero-emission/urban-air-mobility/cityairbus-nextgen, Volocopter - https://www.volocopter.com/solutions/, EHang - https://www.ehang.com/ehangaav/

In your opinion, how acceptable are the following uses for passenger eVTOLs?

	Not acceptable at all	Somewhat unacceptable	Neutral	Somewhat acceptable	Very acceptable
Passenger eVTOLs for non-medical purposes	○	○	○	○	○
Passenger eVTOLs for medical purposes	○	○	○	○	○

How comfortable are you travelling in a passenger eVTOL in the following circumstances?

	Not comfortable at all	Somewhat uncomfortable	Neutral	Somewhat comfortable	Very comfortable
With a human pilot on board controlling the aircraft	○	○	○	○	○
Remotely piloted with no human pilot on board controlling the aircraft	○	○	○	○	○
Fully autonomous with no human pilot	○	○	○	○	○

Passenger eVTOLs remotely piloted could be a reality in the near future. Assume that they would fly at an altitude between 120 and 150 metres (equivalent height of a 10 to 13 storey building). Please rate how much you agree or disagree with each statement.

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
I would be interested in trying out a passenger eVTOL for myself if affordable	○	○	○	○	○
As a pedestrian, I would be comfortable with passenger eVTOLs flying above my head	○	○	○	○	○
As a driver on the ground, I would be comfortable with passenger eVTOLs flying above my vehicle	○	○	○	○	○
I would be comfortable with passenger eVTOLs flying over my neighbourhood	○	○	○	○	○

What benefits do you think passenger eVTOLs can bring to society in the future? (select all that apply)

- [ ] Improved development of and access to remote areas (e.g. the countryside, regions outside of a metropolitan area)
- [ ] Reduction of traffic jams due to fewer road vehicles
- [ ] Reduction of local emissions and pollution (eVTOLS are electrically powered)
- [ ] Reduction in journey time
- [ ] Boost economic growth in my city and create new jobs
- [ ] Improved safety (reduced likelihood of an accident compared with road transport)
- [ ] Other - please specify _____
- [ ] I do not think there are any benefits

How suitable would a passenger eVTOL landing site be in the following locations?

	Not suitable at all	Somewhat unsuitable	Neutral	Somewhat suitable	Very suitable
In a commercial zone	○	○	○	○	○
In a residential zone	○	○	○	○	○
On green spaces e.g. parks, nature reserves, common land	○	○	○	○	○
At a transport hub e.g. a train station	○	○	○	○	○
In any location (no restrictions)	○	○	○	○	○

Other suitable locations for a landing site not mentioned above:

_____

Questions on both delivery drones and passenger eVTOLs

How suitable would delivery drones and passenger eVTOLs flying over the following areas be?

	Not suitable at all	Somewhat unsuitable	Neutral	Somewhat suitable	Very suitable
Over business districts (where buildings are predominatly commercial use)	○	○	○	○	○
Over residential neighbourhoods	○	○	○	○	○
Over green spaces e.g. parks, nature reserves, common land	○	○	○	○	○
Over transport corridors e.g. highways and train tracks	○	○	○	○	○
Over watercourse e.g. rivers, seas	○	○	○	○	○
Over any location (no restrictions)	○	○	○	○	○
Over busy public areas e.g. pedestrian zone in a town square	○	○	○	○	○

Other suitable locations not mentioned above:

_____

Indicate your level of concern for each potential issue caused by introducing delivery drones and passenger eVTOLs into the current airspace.

	Not concerned at all	Somewhat unconcerned	Neutral	Somewhat concerned	Very concerned
Noise pollution, such as loud and/or annoying sounds of flying aircraft	○	○	○	○	○
Visual pollution, such as annoying air traffic	○	○	○	○	○
Safety, such as flying vehicles possibly crashing	○	○	○	○	○
Environmental, such as impact on wildlife	○	○	○	○	○
Privacy concerns, such as a drone flying close to my window or over my property	○	○	○	○	○
Social inequality e.g. the service being affordable only for rich or privileged people	○	○	○	○	○
Inner-city space occupation due to infrastructure requirements	○	○	○	○	○

Indicate the level of your concern for each potential privacy issue in the introduction of delivery drones and passenger eVTOLs into our airspace.

	Not concerned at all	Somewhat unconcerned	Neutral	Somewhat concerned	Very concerned
Misuse of personal information by operator(s) or other involved parties e.g. air traffic controller	○	○	○	○	○
Increased likelihood for interception of personal information on route	○	○	○	○	○
Hacking of personal information (cyber-security risk)	○	○	○	○	○
Increased liklihood of being watched, in case there is a camera onboard	○	○	○	○	○

Other privacy concerns you have that are not mentioned above:

_____

Indicate the level of your concern for each potential safety issue in the introduction of delivery drones and passenger eVTOLs into our airspace.

	Not concerned at all	Somewhat unconcerned	Neutral	Somewhat concerned	Very concerned
Air collisions	○	○	○	○	○
Malfunction resulting in falling parts onto the ground	○	○	○	○	○
Terrorism / organised crime e.g. by hijacking equipment	○	○	○	○	○
Physical attack / tampering of equipment by the governments of other countries	○	○	○	○	○

Other safety concerns you have that are not mentioned above:

_____

Under what conditions would you accept a slightly higher risk to your safety when using delivery drones and passenger eVTOLs compared to other modes of transport? (select all that apply)

- [ ] If I or someone in my neighbourhood requires urgent medical attention
- [ ] If it is more affordable than current transport modes
- [ ] If it would be a more convenient and quicker mode of transportation than other modes I use
- [ ] If it would be a more convenient and quicker mode of transporting deliveries
- [ ] If it would be better for the environment than current transport modes
- [ ] Other - please specify _____
- [ ] Under no conditions

Indicate the level of trust you have in delivery drones and passenger eVTOLs.

- ○ Not trusting at all
- ○ Quite untrusting
- ○ Neutral
- ○ Quite trusting
- ○ Very trusting

Rate the importance of each measure to increase your trust in delivery drones and passenger eVTOLs.

	Not important at all	Somewhat unimportant	Neutral	Somewhat important	Very important
Invite the public to demonstrations of this technology	○	○	○	○	○
Same level of safety standards applied as for current aircraft systems	○	○	○	○	○
Same level of safety standards applied as for current ground transport	○	○	○	○	○
Informed more by the media	○	○	○	○	○
Transparent data handling of personal information	○	○	○	○	○

Other measures to increase your trust that are not mentioned above:

_____

Rate the importance of each measure to ensure people will accept delivery drones and passenger eVTOLs.

	Not important at all	Somewhat unimportant	Neutral	Somewhat important	Very important
Only allow passenger eVTOLs for shared mobility (not for private ownership)	○	○	○	○	○
Only allow passenger eVTOLs for emergency situations	○	○	○	○	○
Ensure passenger eVTOLs are affordable and not only accessible to the richest portion of society	○	○	○	○	○
Ensure deliveries by drones are the same price or less expensive than deliveries by ground transport	○	○	○	○	○
Use them to connect rural locations as well as urban	○	○	○	○	○

Other measures to increase acceptability that are not mentioned above:

_____

In general, do you think delivery drones and passenger eVTOLs will improve society as a whole?

- ○ Yes
- ○ No
- ○ I do not know

In general, do you think delivery drones and passenger eVTOLs will improve your life?

- ○ Yes
- ○ No
- ○ I do not know

If a passing delivery drone makes the same level of noise as a passing car vehicle, would that be an issue for you?

- ○ Yes
- ○ No
- ○ I do not know

If a passing passenger eVTOL makes the same level of noise as a passing ambulance with its siren, would that be an issue for you?

- ○ Yes
- ○ No
- ○ I do not know

Do you have any issues with delivery drones and passenger eVTOLs from a visual perspective?

- ○ Yes
- ○ No
- ○ I do not know

What issues do you have from a visual perspective?

_____

_____

_____

_____

_____

Data authenticity question: What is the sum of 5 + 3?

- ○ 2
- ○ 6
- ○ 4
- ○ 8

Emergency Medical Services

If technology allows for it, delivery drones and passenger eVTOLs should be used to transport the following:

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
Urgent medical products / goods e.g. blood, organs	○	○	○	○	○
Non-urgent medical products / goods e.g. routine samples	○	○	○	○	○
Passengers in emergencies e.g. a doctor and/or a seriously injured person	○	○	○	○	○

Select the level of acceptability of each medical use case of delivery drones and passenger eVTOLs. These will be simulated and / or demonstrated as part of the AiRMOUR study.

	Not acceptable at all	Somewhat unacceptable	Neutral	Somewhat acceptable	Very acceptable
Blood delivery from blood bank to hospital	○	○	○	○	○
Transport of diagnostic samples from hospital to lab	○	○	○	○	○
Transport of medical products (e.g. a defibrillator) to an ad-hoc location	○	○	○	○	○
Transfer medical staff to an ad-hoc location in an emergency situation	○	○	○	○	○
Transfer medical staff and/or patients between hospitals	○	○	○	○	○

Would you be accepting of delivery drones and passenger eVTOLs flying near to your place of residence for the following purposes:

	Yes	No	I do not know
Emergency medical services e.g. to transport a defibrillator	○	○	○
Non-urgent medical services e.g. to transport a pharmacy product	○	○	○

Do you always work from home?

- ○ Yes
- ○ No
- ○ I do not work

Would you be accepting of delivery drones and passenger eVTOLs flying near to your place of work for the following purposes:

	Yes	No	I do not know
Emergency medical services e.g. to transport a defibrillator	○	○	○
Non-urgent medical services e.g. to transport a pharmacy product	○	○	○

Participant information

Do you work in the Emergency Medical Services or Healthcare Sector?

- ○ Yes
- ○ No

Which location best describes your location of residence?

- ○ Urban
- ○ Suburban
- ○ Rural

What is the name of your town or city of residence?

_____

What are the first 3 letters or numbers of your postcode? This will not be disclosed to any third parties and will be stored in line with European data protection rules (GDPR).

_____

Please provide your email address if you would like to be invited to participate in our drone demonstrations and citizen focus groups for this study. This will not be disclosed to any third parties and will be stored in line with European data protection rules (GDPR).

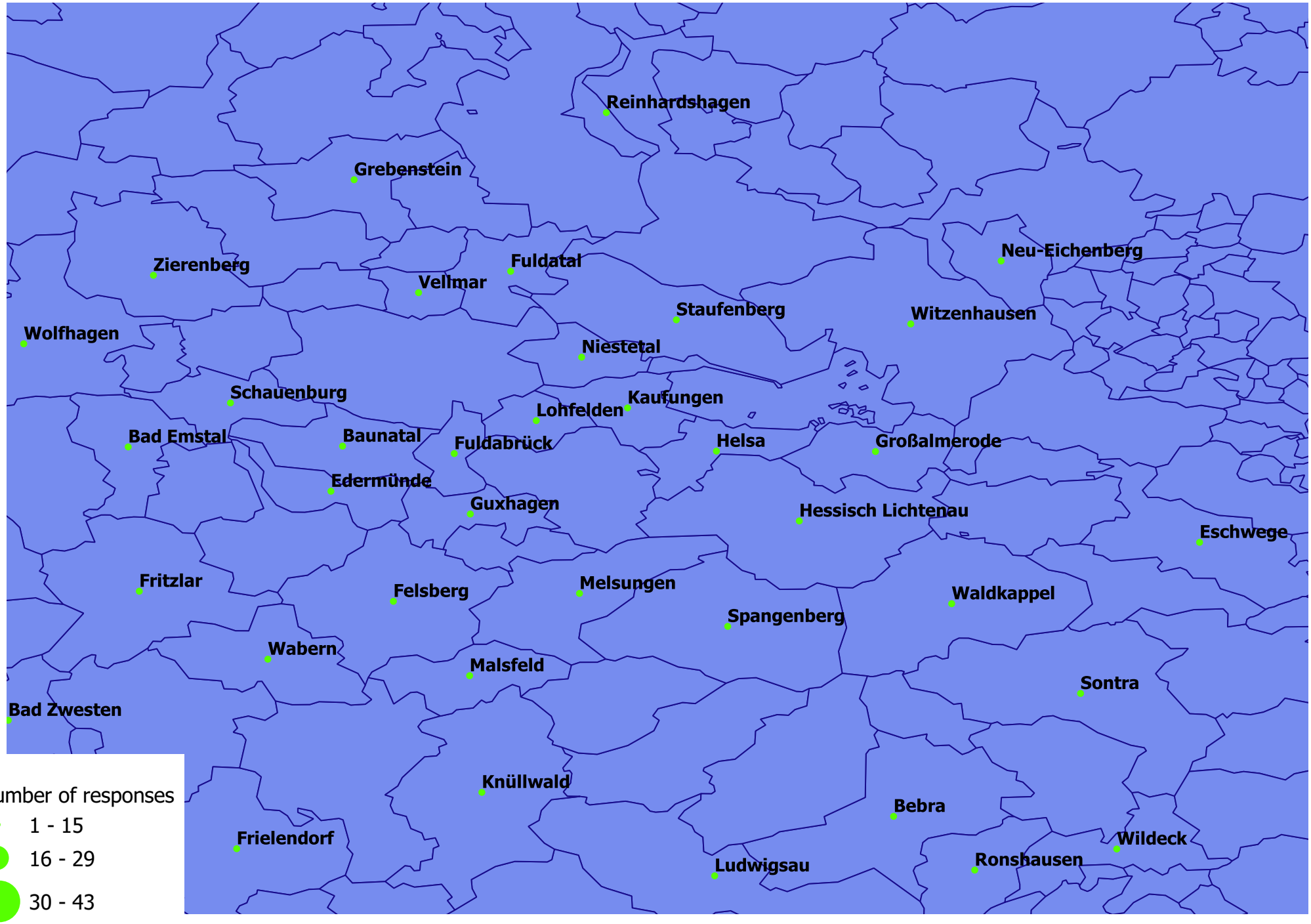
_____

11.2 Annex B – Maps showing locations of responses

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101006601.

LuxMobility - 2022

AiRMOUR Citizen Questionnaire - Number of participants for cities in Deutschland



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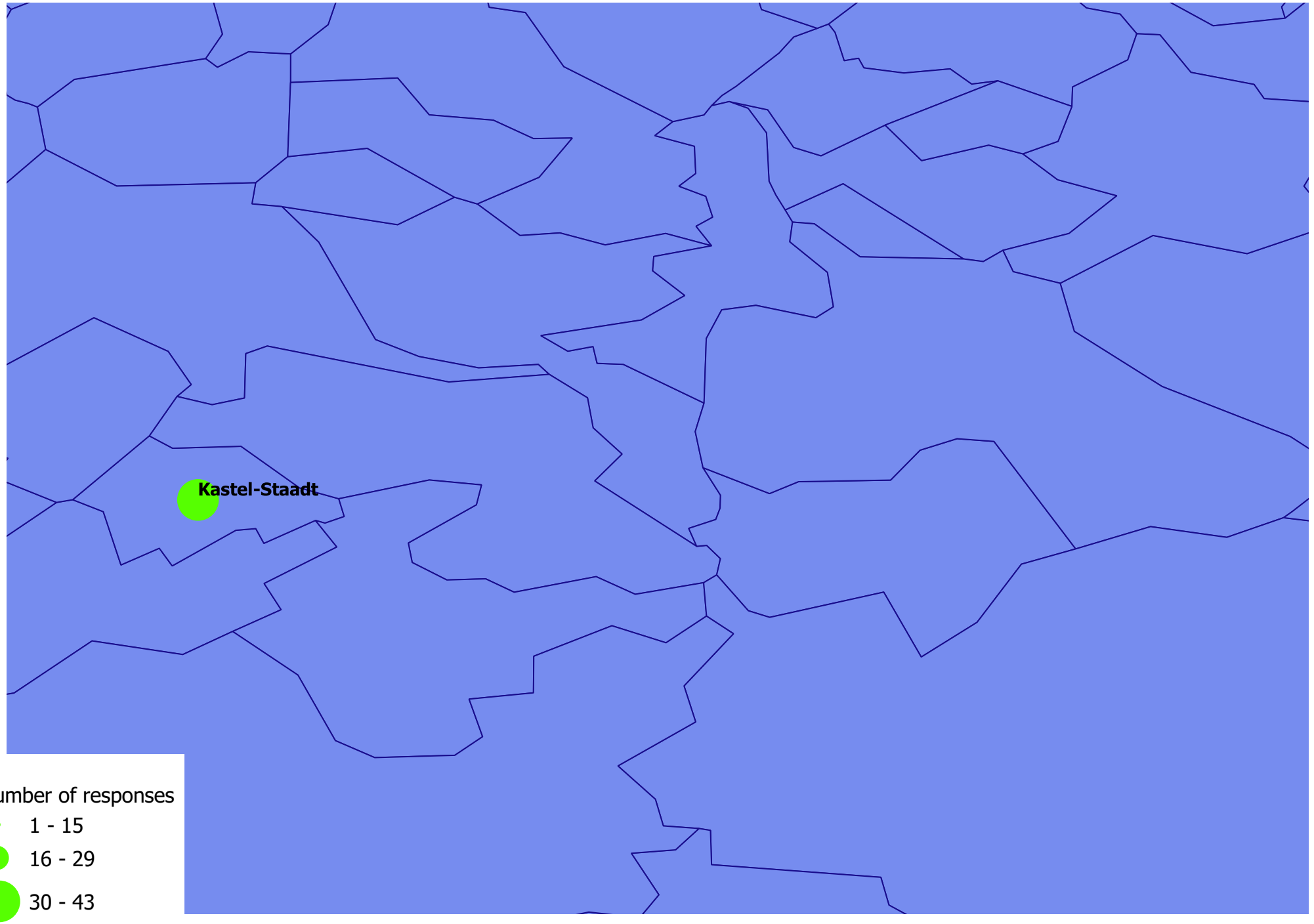
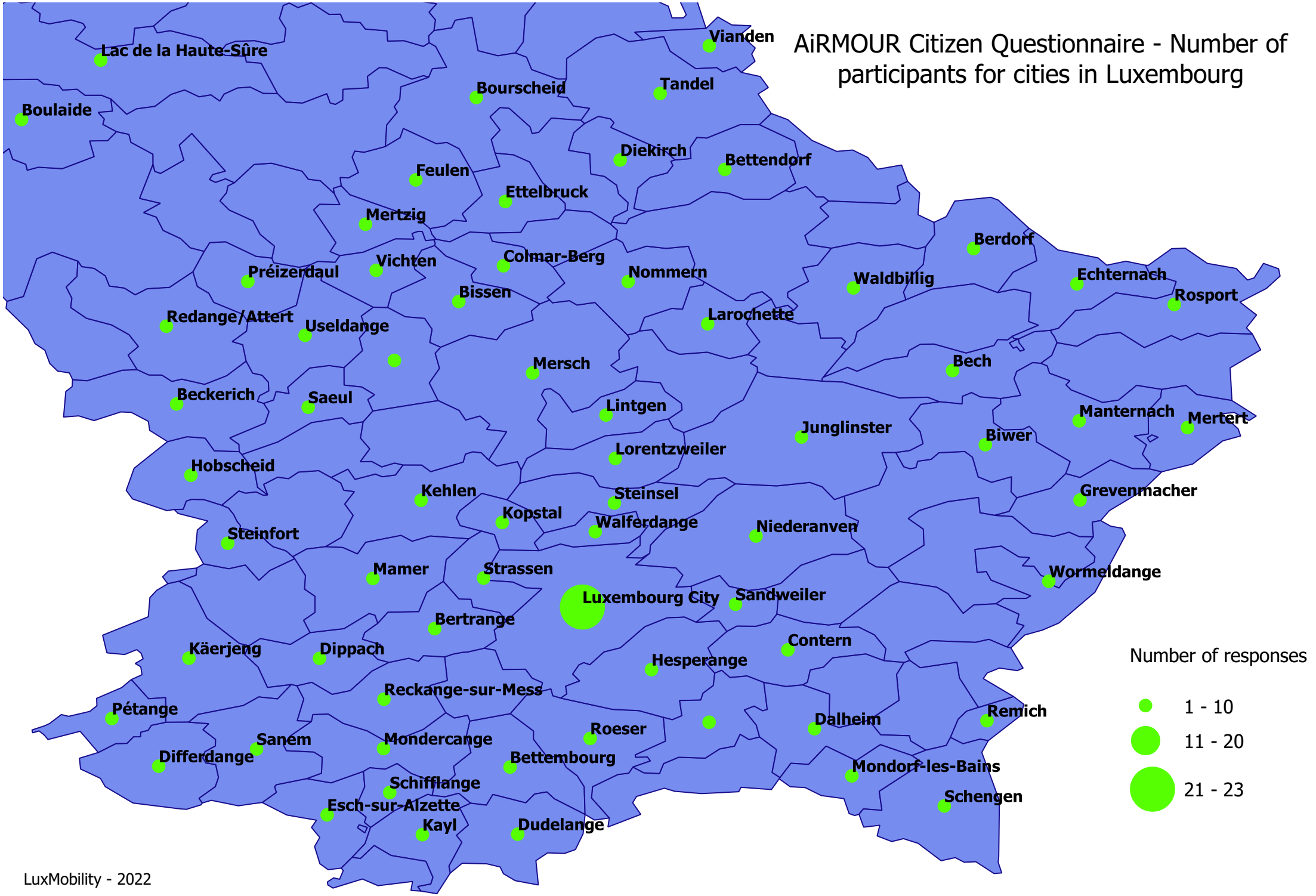
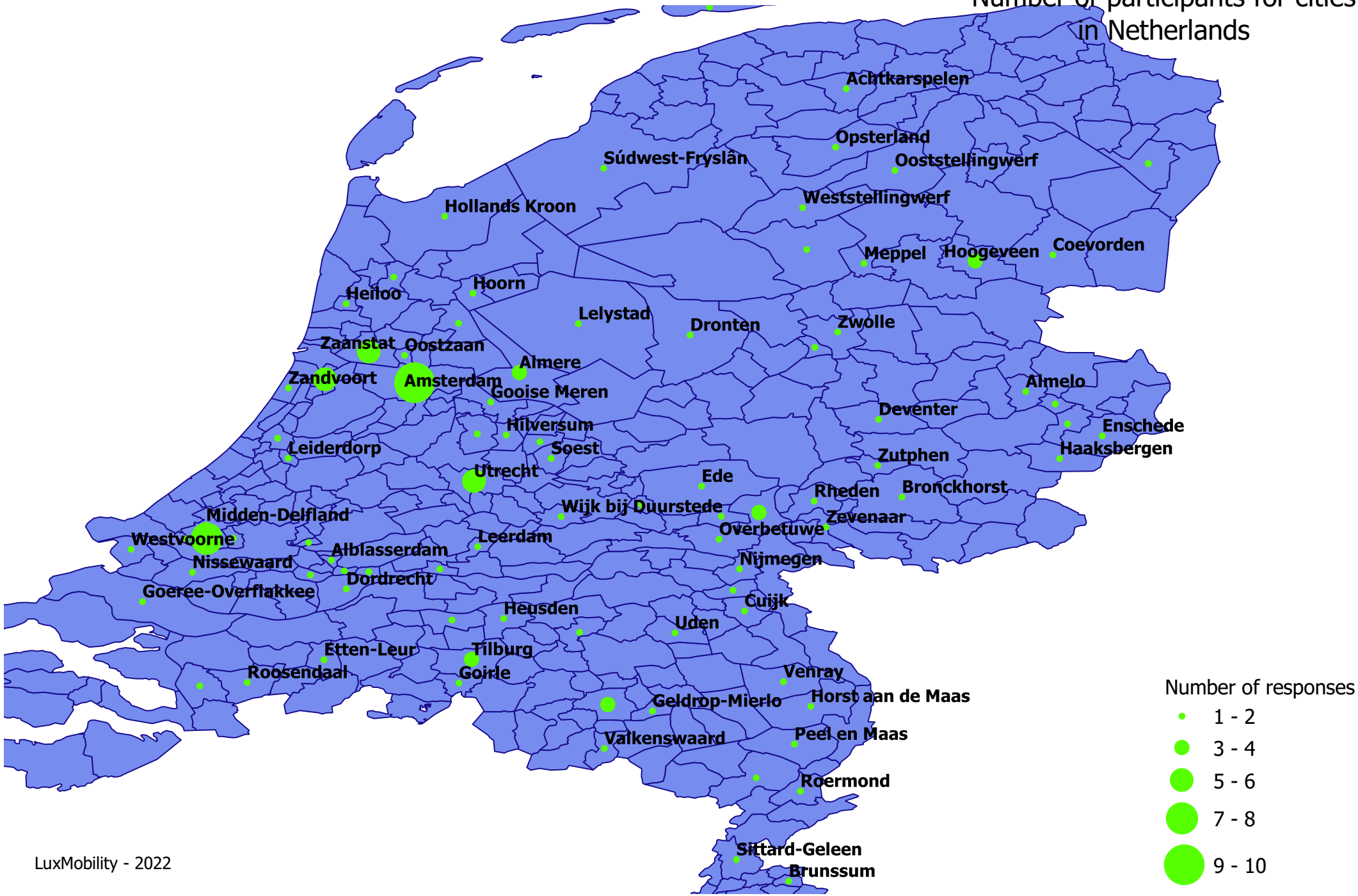
AiRMOUR Citizen Questionnaire - Number of participants for cities in Deutschland




AiRMOUR Citizen Questionnaire - Number of participants for cities in Luxembourg
Vianden
Lac de la Haute-Sûre
Bourscheid
Tandel
Boulaide
Diekirch
Bettendorf
Feulen
Ettelbruck
Mertzig
Berdorf
Vichten
Colmar-Berg
Nommern
Waldbillig
Echternach
Rosport
Préizerdaul
Bissen
Redange/Attert
Useldange
Larochette
Mersch
Bech
Beckerich
Saeul
Lintgen
Manternach
Mertert
Junglinster
Biwer
Lorentzweiler
Hobscheid
Kehlen
Steinsel
Grevenmacher
Kopstal
Walferdange
Niederanven
Steinfort
Mamer
Strassen
Wormeldange
Luxembourg City
Sandweiler
Bertrange
Contern
Käerjeng
Dippach
Hesperange
Reckange-sur-Mess
Pétange
Dalheim
Remich
Roeser
Sanem
Mondercange
Differdange
Bettembourg
Mondorf-les-Bains
Schifflange
Schengen
Esch-sur-Alzette
Kayl
Dudelange
Number of responses
1 - 10
11 - 20
21 - 23
LuxMobility - 2022

AiRMOUR Citizen questionnaire - Number of participants for cities in Netherlands



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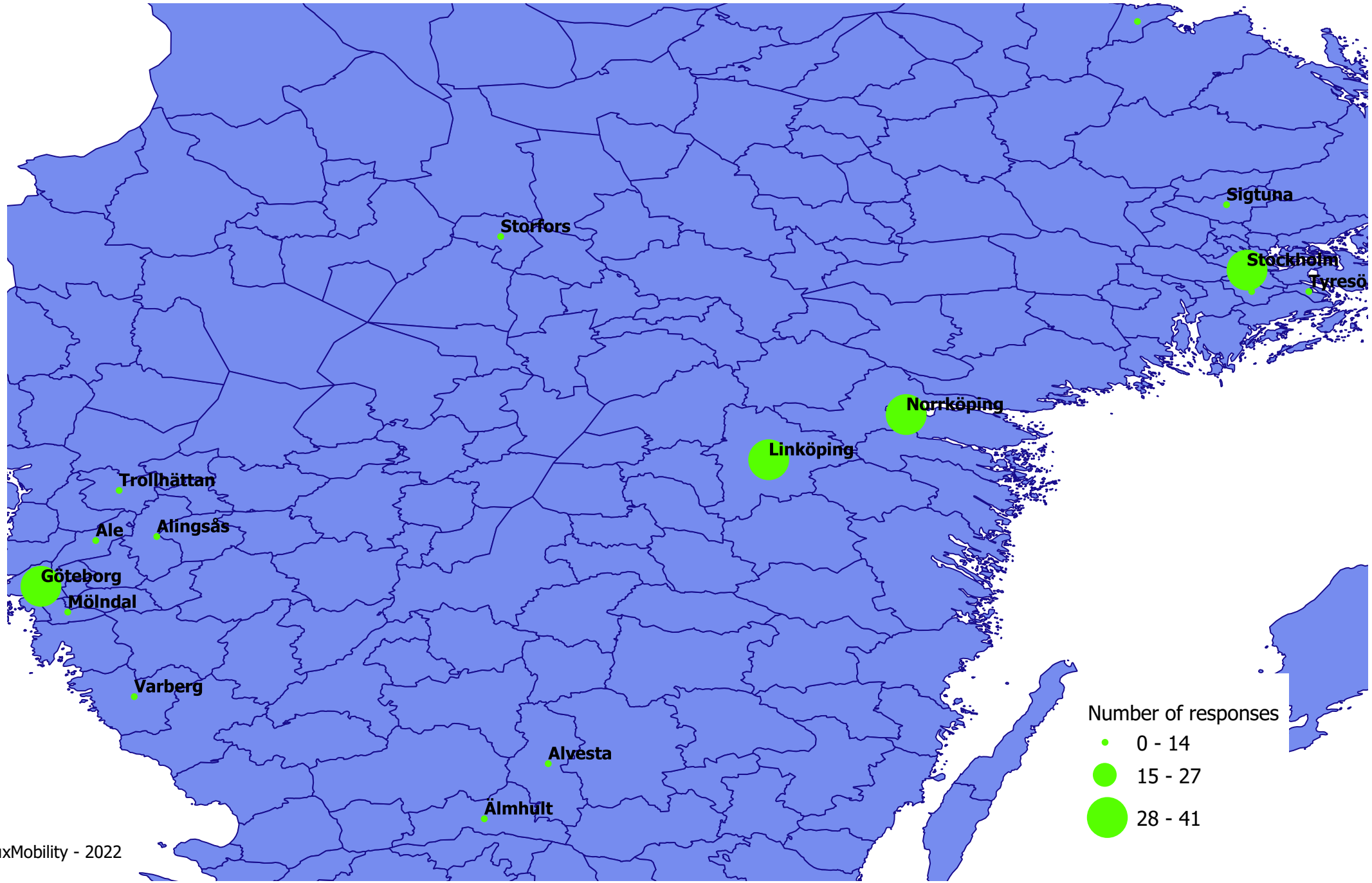
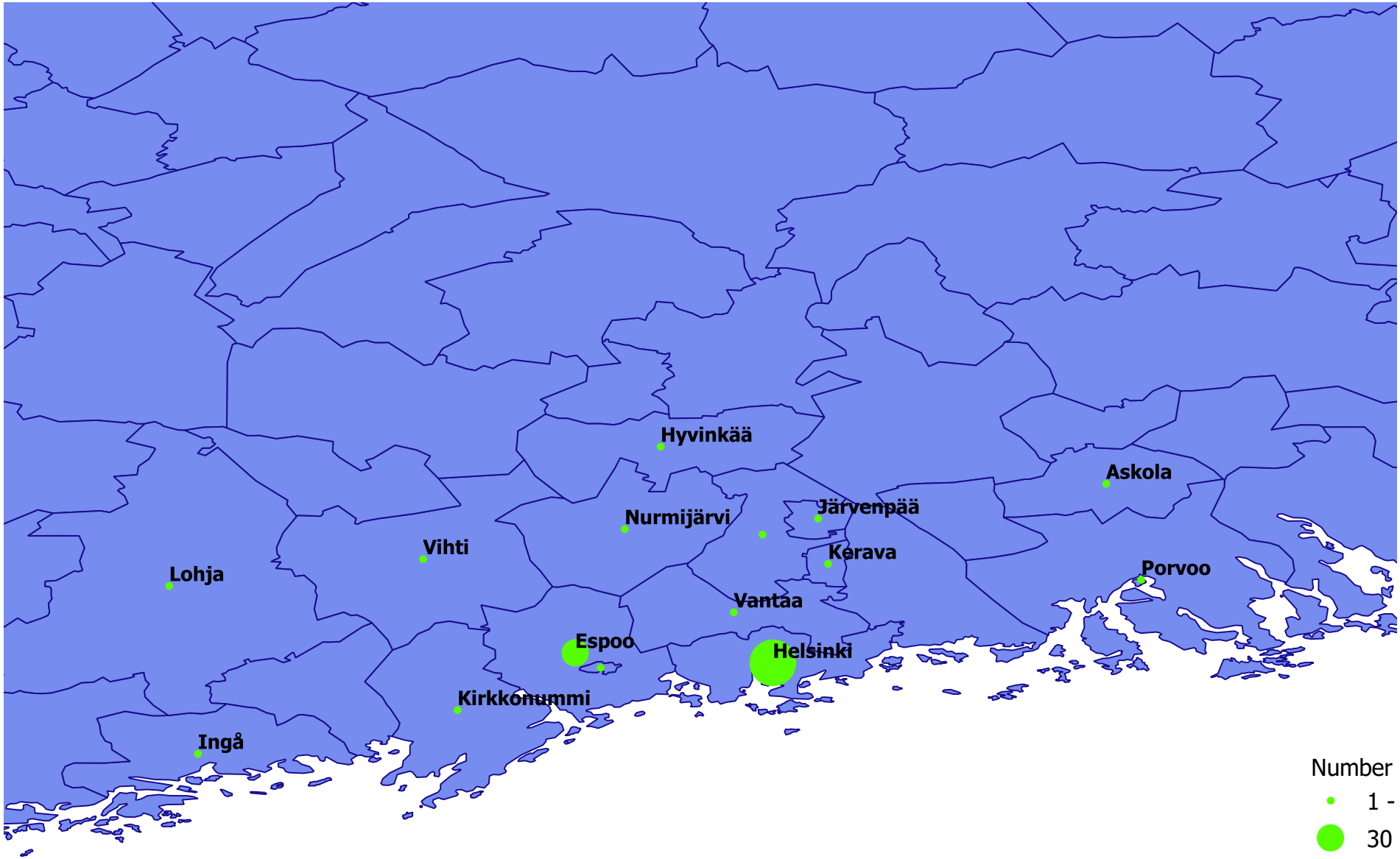
AiRMOUR Citizen Questionnaire - Number of participants for cities in Sweden



LuxMobility - 2022

AiRMOUR Citizen Questionnaire - Number of participants for cities in Finland



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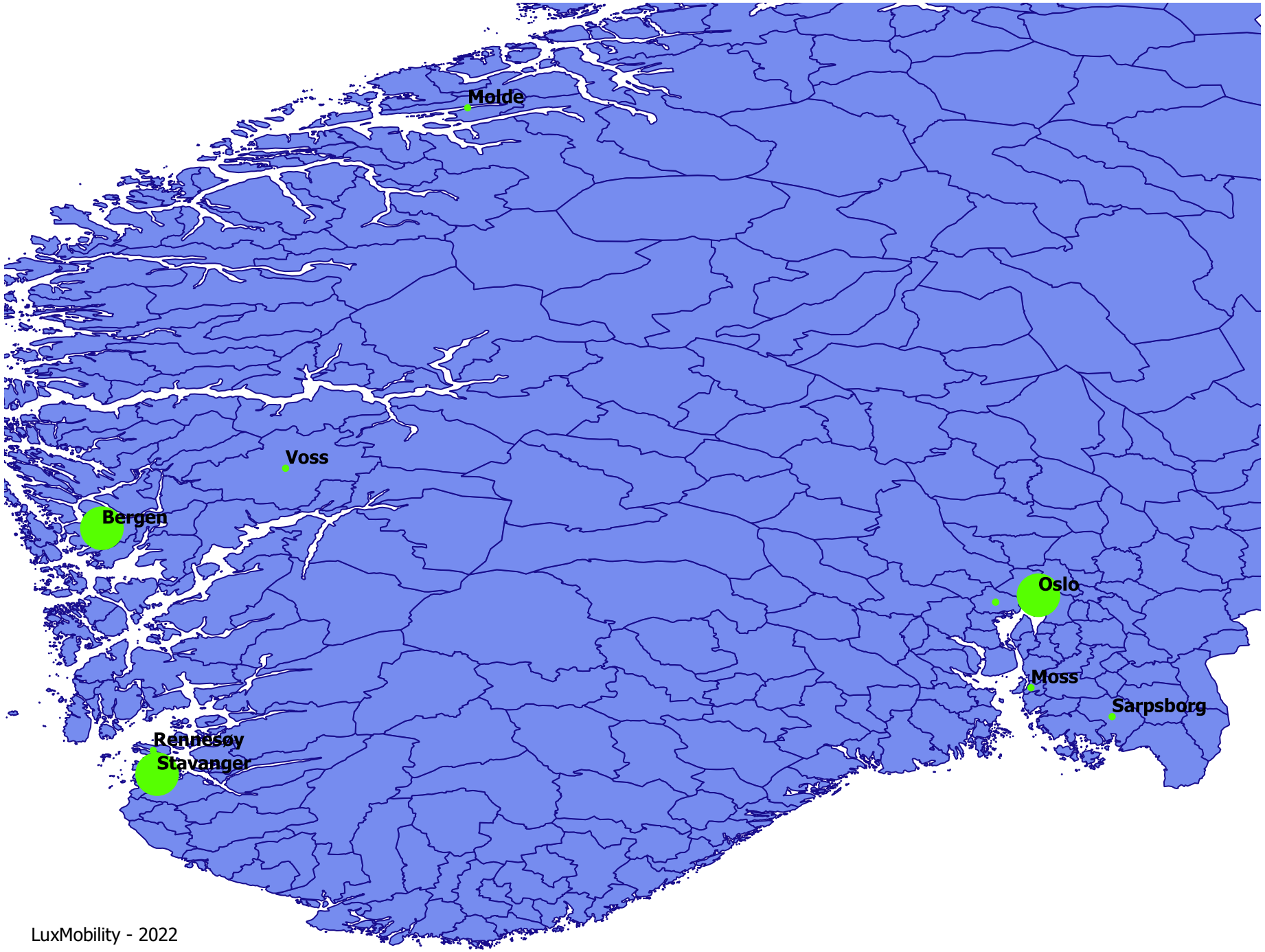
AiRMOUR Citizen Questionnaire - Number of participants for cities in Norway



LuxMobility - 2022

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