Study on the Societal Acceptance of Urban Air Mobility (UAM) Operations

Press briefing

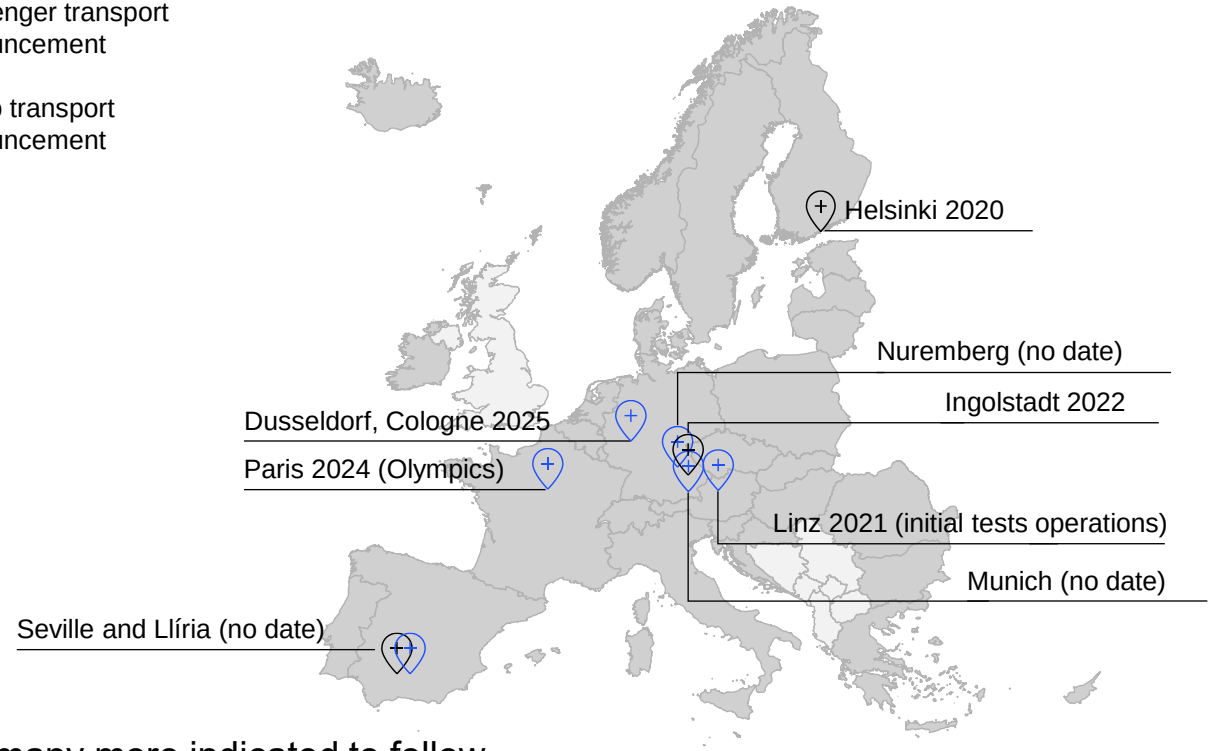
19th May 2021

Europe is at the forefront in the newly emerging UAM industry

Cities announcing UAM services within the EU

Passenger transport announcement

Cargo transport announcement



…and many more indicated to follow

- Geneva
- Hamburg
- Ghent
- Plovdiv
- Euregio
- Cross-border (Enschede, Munster), Antwerp
- Toulouse Metropole
- Region Aquitaine & Bordeaux MAHHL region
- Northern Hesse reg.

Many European OEMs leading developments

Passenger UAM Vehicles

VOLOCOPTER

LILIUM

AIRBUS

Ascendance Flight Technologies

Cargo Drones

VOLOCOPTER

PIPISTREL

WINGCOPTER

UAM has the potential to create major benefits for European Citizens and EASA will enable the success of this industry

Focus on the EU or Europe

~90,000

jobs created in the Europe in 2030[3]

~4.2 bn €

market size in Europe in 2030[1]

~31%

of global UAM market to be located in Europe in 2030[1]

1,500 times

less likely to be involved in a fatal accident compared to road transport on a passenger kilometre basis[2]

2x - 4x

faster travel time by UAM for a city to airport transfer[4]

~73%

faster delivery of organs between city hospitals possible[4]

1. Based on McKinsey VTOL market model
2. Assuming same safety level as commercial air transport in the EU
3. Based on direct, indirect and induced jobs created by CAPEX and OPEX spend of UAM industry in Europe in 2030
4. Compared to a car drive on a Thursday at 5pm

Source: VTOL team, Eurostat, Google Maps

To study the societal acceptance for UAM solutions in Europe six European focus cities/regions were selected

Prioritisation of 6 most relevant use cases

1. Airport shuttle
2. Sightseeing
3. Fixed metropolitan network (<120km)
4. First aid
5. Last mile delivery
6. Medical supplies

Short list of 15 most suitable cities for each city

I. Selection of most suitable cities based on identified metrics

II. Ranking of cities based on KPIs

III. Infrastructure feasibility assessment

IV. Timeline feasibility assessment

6 use cases x 15 cities = short list of 90 cities

KPI based ranking and application of guiding principles

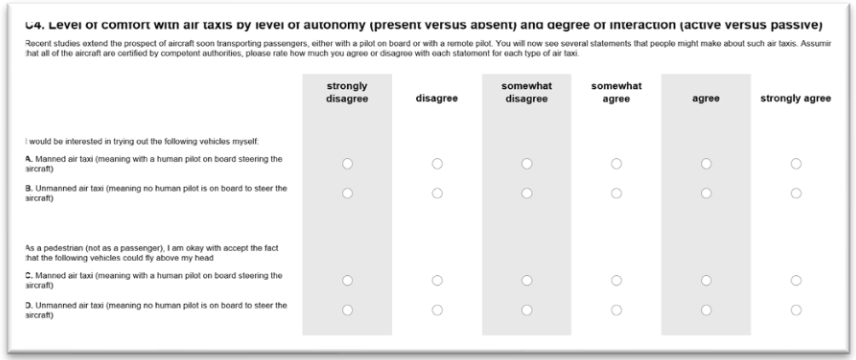
	City	Region
1	Paris	West Europe
2	Barcelona	South Europe
3	Hamburg	Central Europe
4	Budapest	East Europe
5	Milan	South Europe
6	Oresund region (Copenhagen, Hillerod, Helsingor, Malmo, Lund)	North Europe

Survey methodology

1. Quantitative survey

3690 usable responses out of 4000 contacted respondents representing the cross-section of the European population

36 questions **30-45** min survey



C4. Level of comfort with air taxis by level of autonomy (present versus absent) and degree of interaction (active versus passive)

Recent studies extend the prospect of aircraft soon transporting passengers, either with a pilot on board or with a remote pilot. You will now see several statements that people might make about such air taxis. Assumir that all of the aircraft are certified by competent authorities, please rate how much you agree or disagree with each statement for each type of air taxi.

	strongly disagree	disagree	somewhat disagree	somewhat agree	agree	strongly agree
I would be interested in trying out the following vehicles myself:						
A. Manned air taxi (meaning with a human pilot on board steering the aircraft)	○	○	○	○	○	○
B. Unmanned air taxi (meaning no human pilot is on board to steer the aircraft)	○	○	○	○	○	○
As a pedestrian (not as a passenger), I am okay with accept the fact that the following vehicles could fly above my head						
C. Manned air taxi (meaning with a human pilot on board steering the aircraft)	○	○	○	○	○	○
D. Unmanned air taxi (meaning no human pilot is on board to steer the aircraft)	○	○	○	○	○	○

2. Qualitative survey

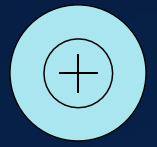
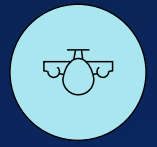
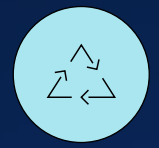
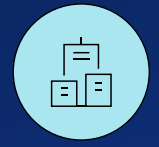
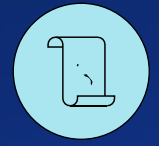
>40 in-depth interviews with prioritized stakeholders from local to European level

3. Noise perception assessment

Detailed noise perception study with

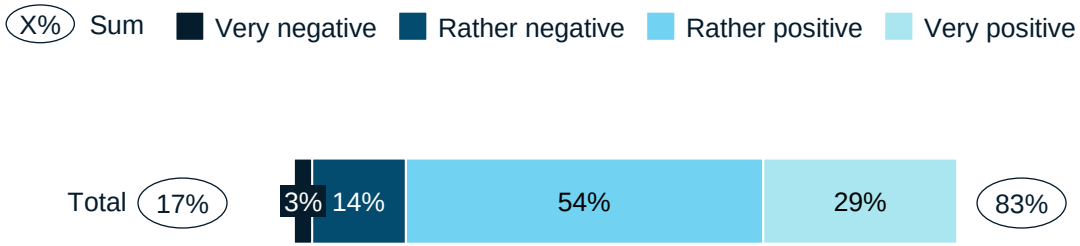
20 European residents

We derived 10 key results from the survey

1.  A positive initial attitude to UAM throughout the EU
2.  Strong support for use cases in the public interest
3.  Top 3 expected benefits: faster, cleaner, extended connectivity
4.  Top 3 concerns: safety, environment/ noise and security
5.  Safety: existing aviation safety levels are the benchmark
6.  Environment: priority is protection of wildlife
7.  Noise: acceptable at level of familiar city sounds
8.  Security: need to build confidence and trust in citizens
9.  Ground infrastructure: must be integrated well
10.  Regulatory authorities: must work together at all levels

1: A positive initial attitude to UAM throughout the EU

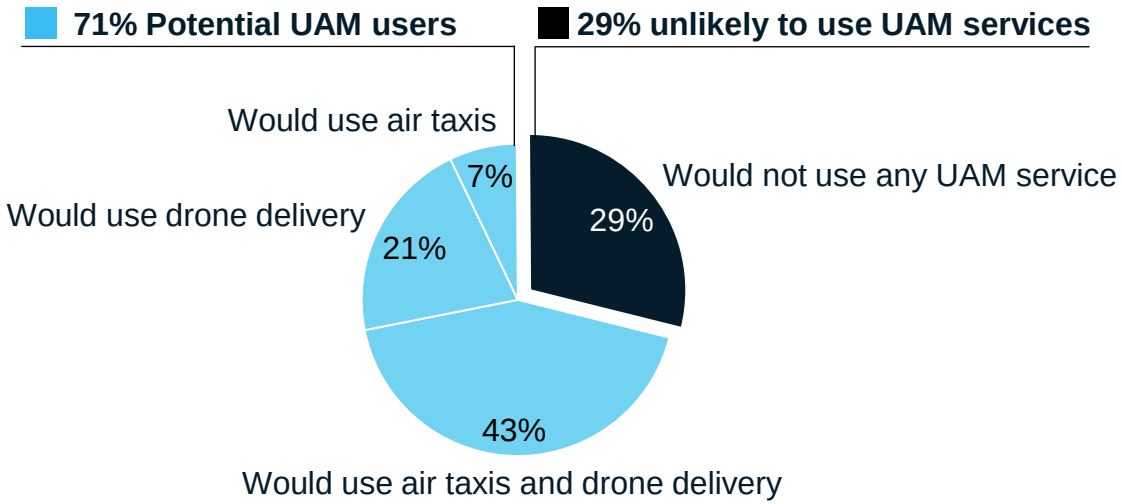
General attitude towards UAM



Vast majority of 83% feel **positive** (very positive or rather positive) about introduction of UAM overall

Only 17% with **negative** perception and **minority share of 3%** are **very negative** and probably **hard to persuade** of introduction of UAM

Interest in using UAM services



In sum, **71% of total interested in using UAM services (**either drones or air taxis or both)

Large supporters group of 43% with interest to try out both use cases

Conversely, 29% of respondents lack willingness to try out at least one UAM service

Source: EASA UAM social acceptance survey question S5. What would be your overall perception if urban air mobility solutions (such as those shown in the video) were to be introduced in your city? Please select one answer.

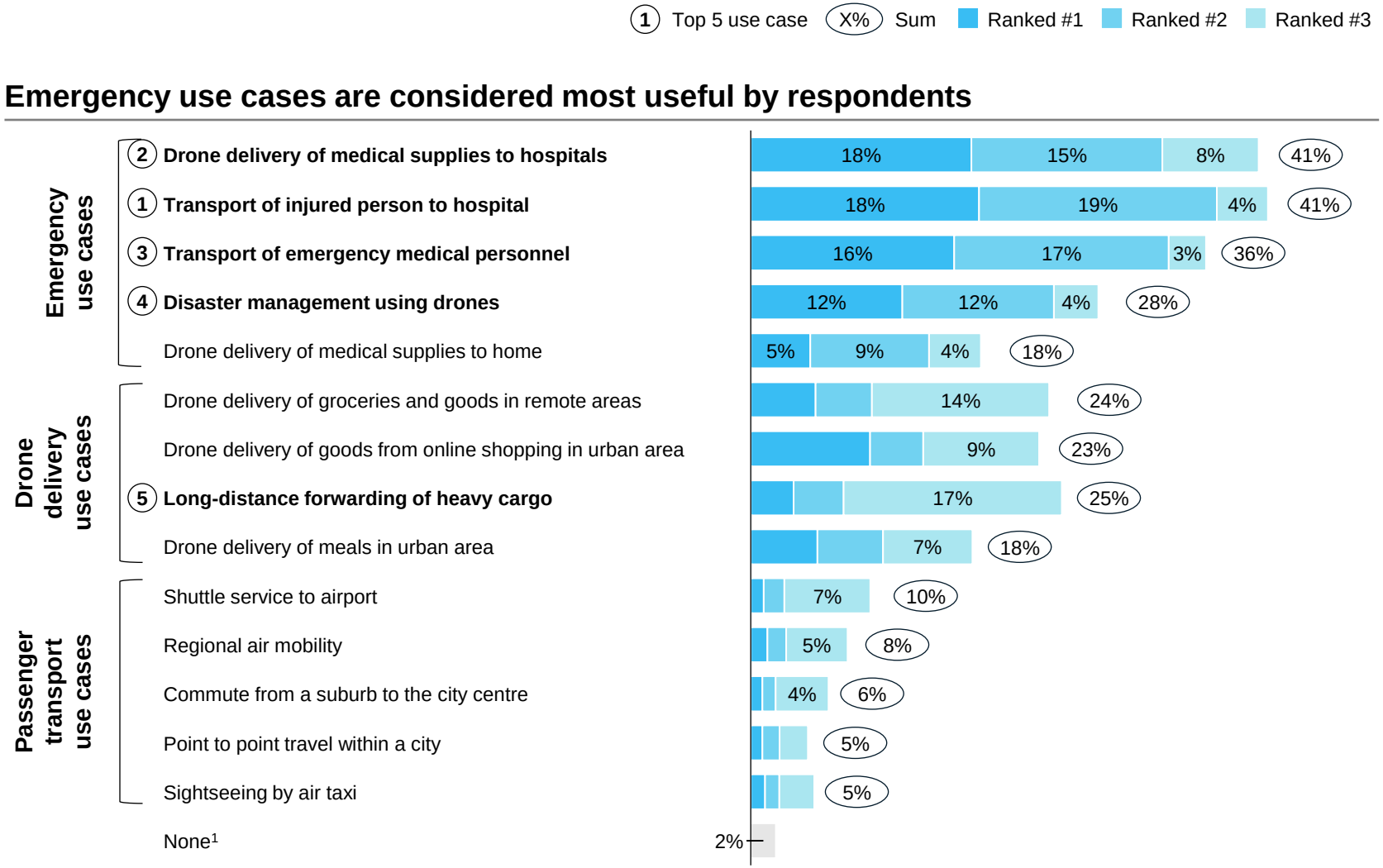
Homogeneous results across Europe

Only small deviations between regions, i.e. all deviations below 10% from average

- Southern cities Barcelona and Milan more positive
- Northern regions more reserved

2. Use cases: public interest should come first

Perceived usefulness of UAM use cases



Emergency use cases are considered most useful by respondents

1."None" stands for respondents who answered questions A2.a to A2.c with "None of these are useful“

Source: EASA UAM social acceptance survey question A3. Which of the below use cases (that were previously selected as the most useful in their categories, see A2.a, A2.b and A2.c) are the most useful overall? Please sort the following applications from ‘most useful’ to ‘least useful’.

In overall ranking **(1) emergency use cases** are perceived as most useful (most beneficial for society) followed by **(2) drone delivery use cases** and **(3) passenger transport** use cases

- In **(1),** drone delivery of medical supplies and transport of injured persons are leading; only use case that falls back is delivery of medical supplies to home (comparable to other delivery to end consumer use cases)
- Within **(2),** the top three use cases rank almost the same – drone delivery of meals considered the least useful
- Within category **(3)** airport shuttle and regional air mobility rank highest

3. Top 3 expected benefits: faster, cleaner, extended connectivity

(absolute %, +/- difference to avg % in total)

Improved response time is clearly perceived as top benefit with all cities ranking it first

Similar perception in all cities as suggested by low spread and steepness of trend curve

Hamburg and Öresund with similar opinions

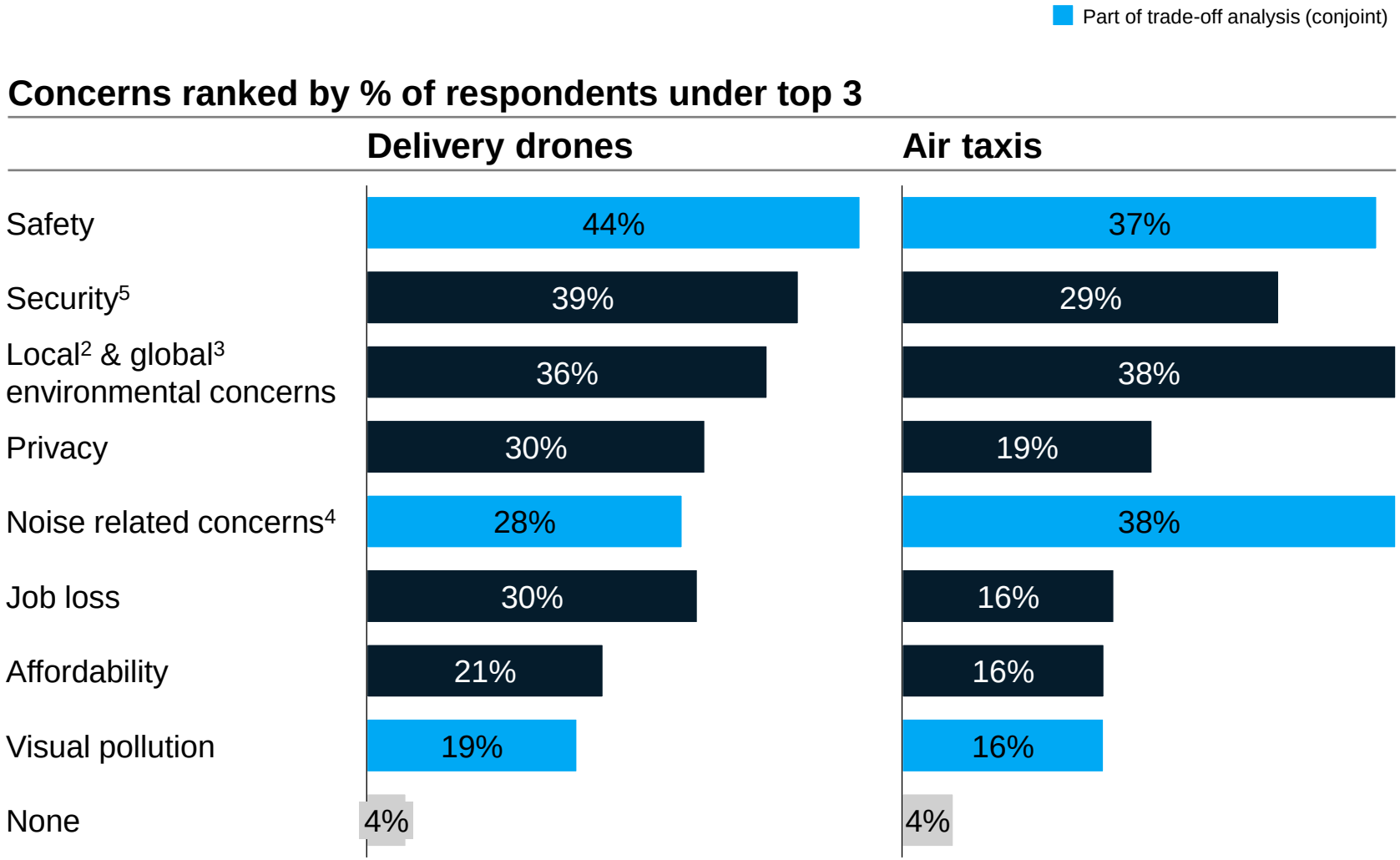
Reduction of local emissions with highest spread between Paris (37%, -11%) on lower and Budapest (56%, +8%) and Milan (55%, +7%) on upper end

Creation of new jobs more important in Barcelona (41%, +9%)

Source: EASA UAM social acceptance survey questions A4. What benefits and opportunities can the development of urban air mobility bring for the EU and EU citizens? Please select up to 3 answers.

4. Top 3 concerns: safety, environment/ noise and security

Concerns regarding delivery drones and air taxis



1. Incident due to technical or human failure 2. Local environmental impact includes air pollution, negative impact on bird life and insects, decreasing biodiversity
3. Global environmental impact covers climate change 4. Covers noise pollution for delivery drones, and noise related to flying aircraft and noise related to vertiports for air taxis 5. Incident due to deliberate harmful action, e.g. by criminal organization or terrorists

Source: EASA UAM social acceptance survey questions B4. What are you most concerned about regarding drone delivery, both for the delivery of day-to-day goods as well as medical supplies? Please consider your own usage of such a service as well as other people using it (e.g. your family or neighbours), which may affect you as well. Please select up to 6 answers. B5. Please sort your main concerns (selected in B4.) from 'most concerning' to 'least concerning'. C5. What are you most concerned about with respect to air taxis? Please consider your own usage of such a service as well as other people using it (e.g. your family or neighbours), which may affect you as well. Please select up to 6 answers. C6. Please sort your main concerns from 'most concerning' to 'least concerning'.

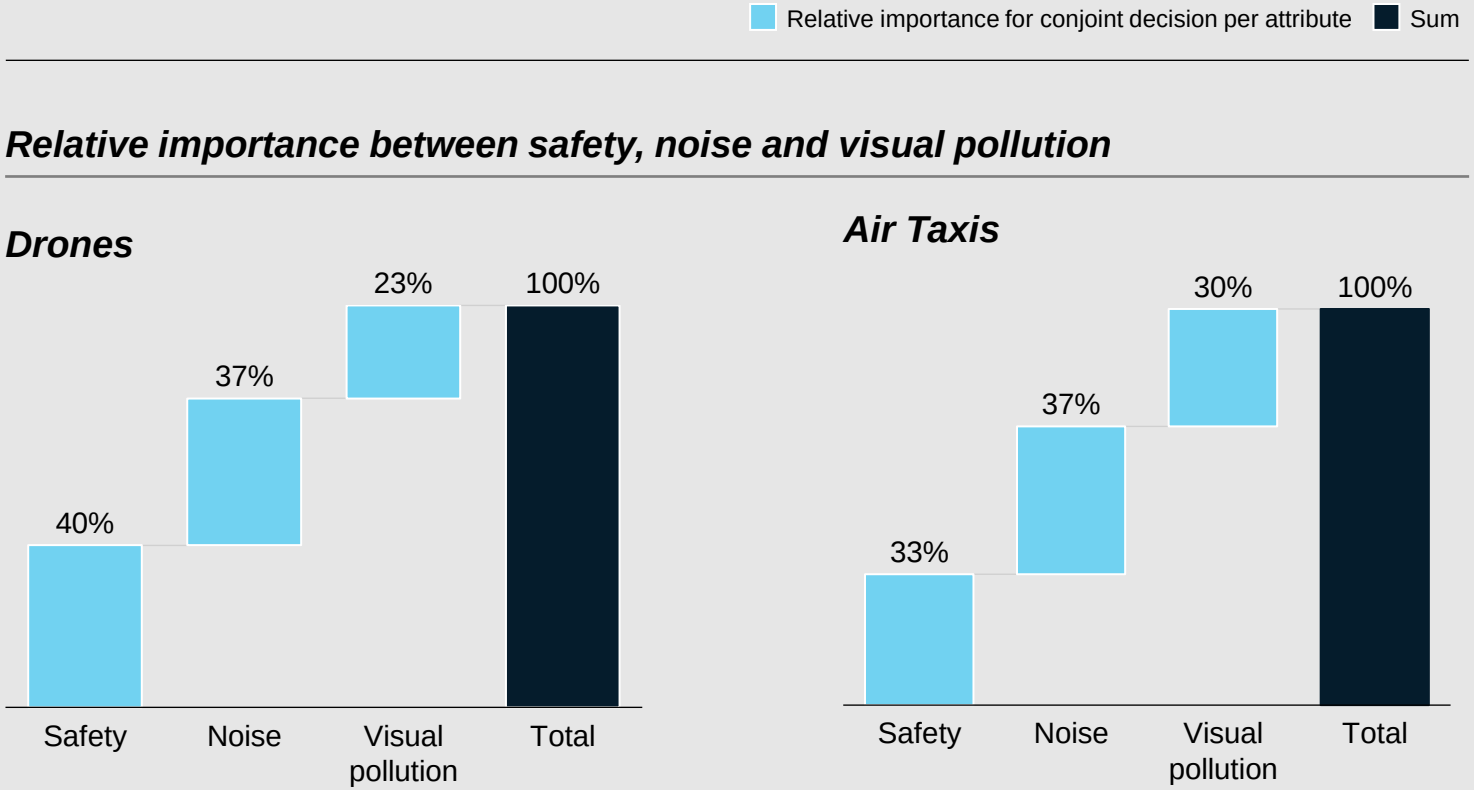
Local and global **environmental concerns** taken together **highly important in both use cases**

Noise related concerns (simply noise pollution for delivery drones; noise related to flying aircraft & noise related to vertiports for air taxis) emerge as **much more important with regard to air taxis**

Safety top ranked concern in both use

Security more important in drone delivery than in air taxi use case

5. Safety: existing aviation safety levels are the benchmark



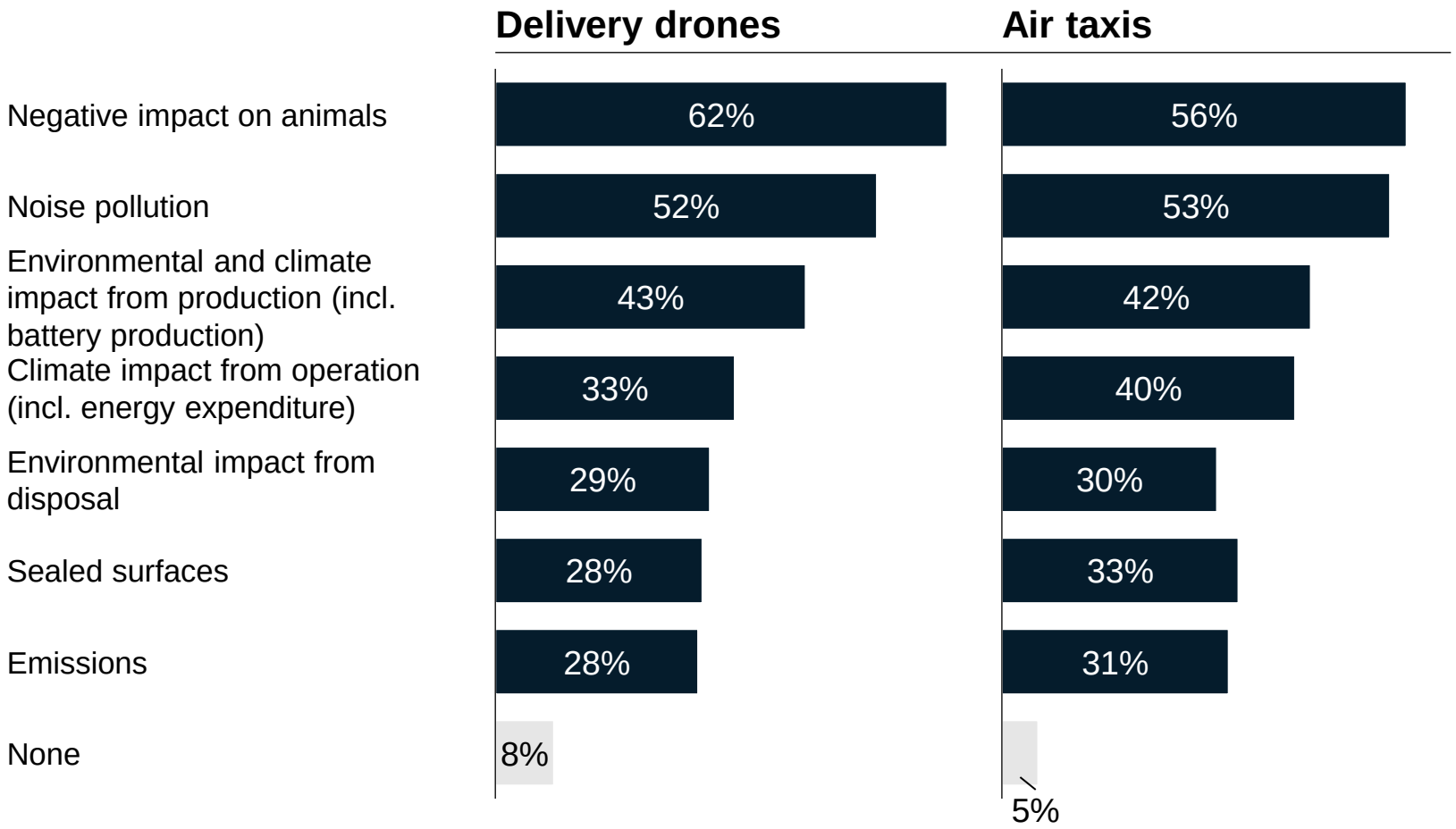
Interviews have shown that **importance of safety tends to be under-represented** in survey as people **'take it for granted**', and are thus less concerned about it – **especially for Air Taxis** as people associated them with current aviation vehicles

Respondents unanimously agree that no trade-off should be allowed for safety as safety is paramount

6. Environment: priority is protection of wildlife

Environmental concerns

Ranking of environmental concerns (% ranked among top 3)



Source: EASA UAM social acceptance survey questions B9. What are your greatest concerns when it comes to the possible environmental consequences of drone delivery? Please sort the following answers from 1 being 'most concerning' to 7 being 'least concerning' or select 'none of these'. C9. What are your greatest concerns when it comes to the possible environmental consequences of air taxis? Please sort the following answers from 1 being 'most concerning' to 7 being 'least concerning' or select 'none of these'.

(absolute %, +/- diff to avg % for delivery drones, absolute %, +/- diff to avg % for air taxis)

In both use cases, top 3 concerns are

- **(1) Negative impact on animals** (62%, 56%)
- **(2) Noise pollution** (52%, 53%)
- **(3) Environmental & climate impact from production (incl. batteries)** (43%, 42%)

(1) Negative impact on animals even more important for old age group 65-75 (+7%, +5%); quotes in open text field include

- "Technology in the air that disturbs birds and makes noise."
- "The more of them flying around, the more disturbing it becomes... for animals, insects and humans."
- "Leads to reduction of birds in cities"

(2) Noise pollution less concerning for young age group 18-24 (-8%, -10%)

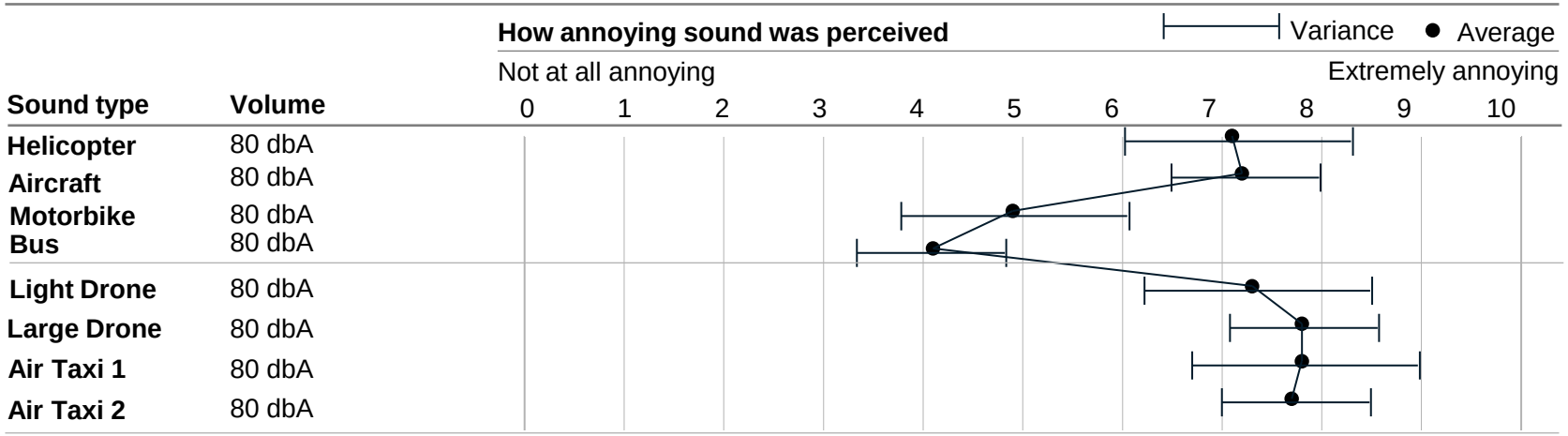
(3) Environmental concern from production (incl. batteries) significantly **higher** than **climate impact from operation** (33%) in **drone delivery** use case, but almost **equal** (40%) in **air taxi** use case

Especially **young age group more concerned** about environmental impact from production (+1%, +7%), disposal (+1%, +7%) and emissions (+12%, +11%)

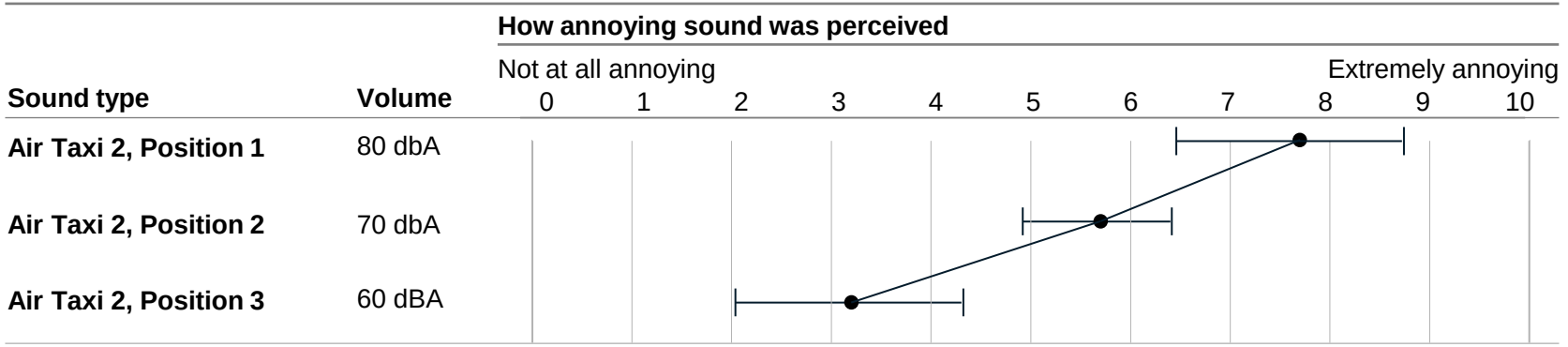
7. Noise: acceptable at level of familiar city sounds

Sample size n=20

1. UAM noise is more annoying at same noise level…



2. Annoyance levels significantly decline with noise levels



It can be seen that **UAM vehicles are ranked more annoying** at the **same noise level** compared to other sounds that participants were exposed to

There could be three possible interpretations for this:

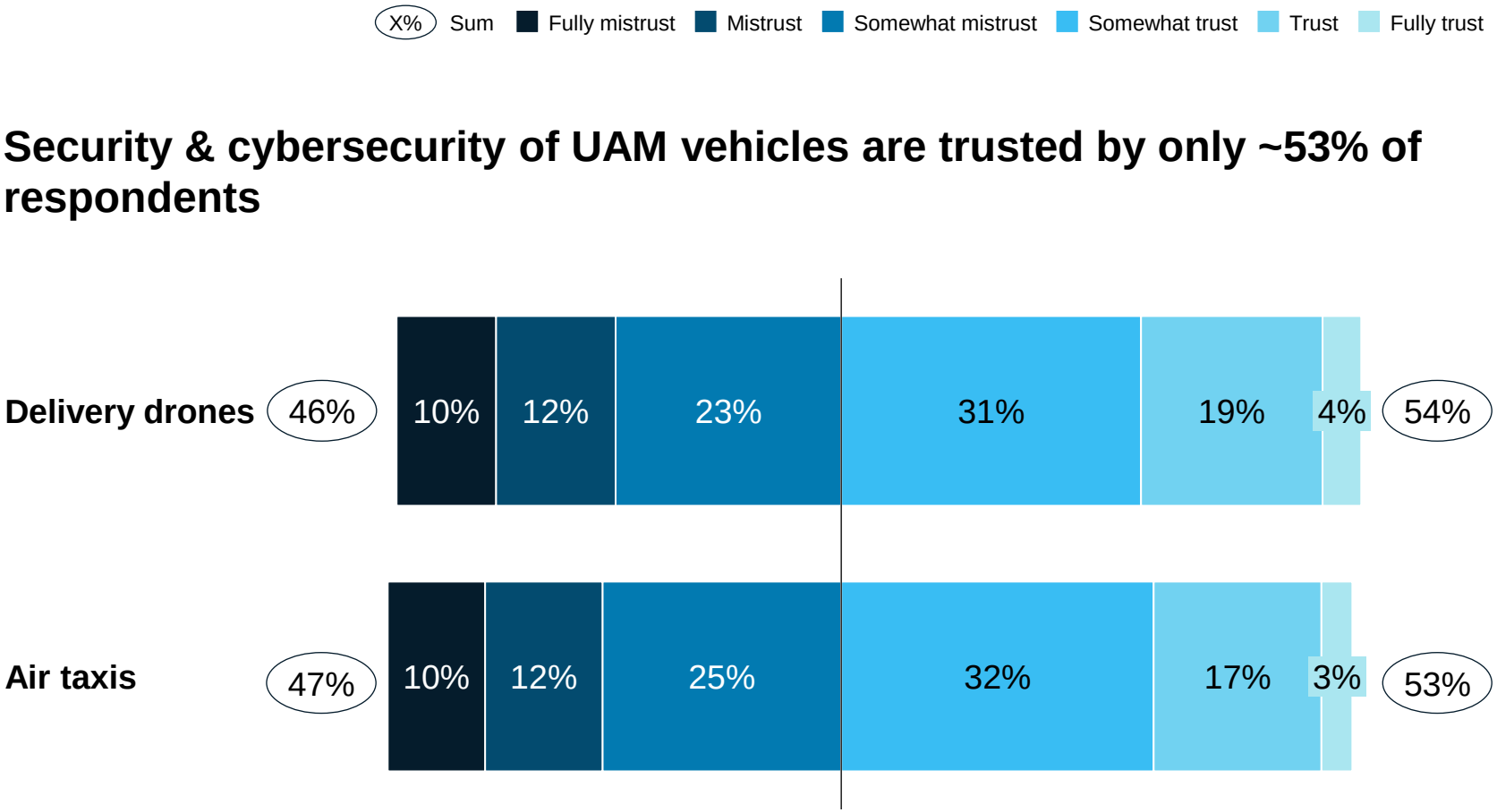
- People **perceive familiar sounds as less annoying** (this was frequently stated in comments)
- The **noise characteristics** could have an **impact on annoyance**
- The **integrated noise level over time** could have an impact (i.e. speed of pass over)

When looking at different distances, realized through different noise pressure levels **from 80dBA to 60dbA.**

It can be observed that the perceived annoyance from the **UAM vehicle at ~65dBA** reaches a **similar level as a bus at 80dBA**

8. Security: need to build confidence and trust in citizens

Trust levels in UAM aircraft systems incl. security and cybersecurity



Security & cybersecurity of UAM vehicles are trusted by only ~53% of respondents

(absolute %, +/- difference to avg % in total)

Only **slightly more than half** of respondents with **trust in UAM aircraft systems**

Very similar results for drones and air taxis (~53%)

Trust levels are higher for men than for women and decrease with age

- More trusted by **men** (~+7%)
- Less trusted by **age group 65-75** (~-8%) and **women** (~-7%)

Defined subgroups against introduction of UAM with very low trust levels

- Delivery drone usage rejecters, air taxi usage rejecters, UAM usage rejecters, digital laggards with -14% to -28% less trust

Source: EASA UAM social acceptance survey question D2. To what extent do you trust that advanced aircraft flying in an urban environment will be technologically secure and armed against threats from hackers (such as criminal organisations, hacktivists or terrorists) in the following cases? Please select one answer per row.

9. Ground infrastructure: must be integrated well

Interviews have shown that **integration into local transport ecosystem is of key importance to citizens**

Many are concerned about **space availability** for **vertiports** and integration into **cityscape**

The **cultural heritage** and **cityscape** should not be **harmed or impacted**

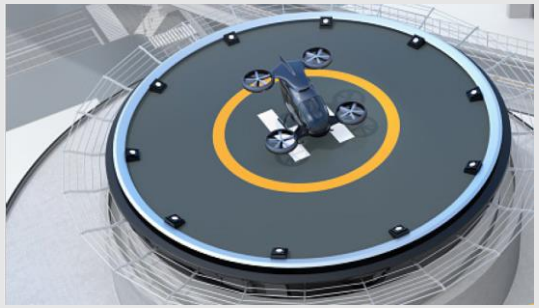
Drone delivery

Level of comfort highest for options

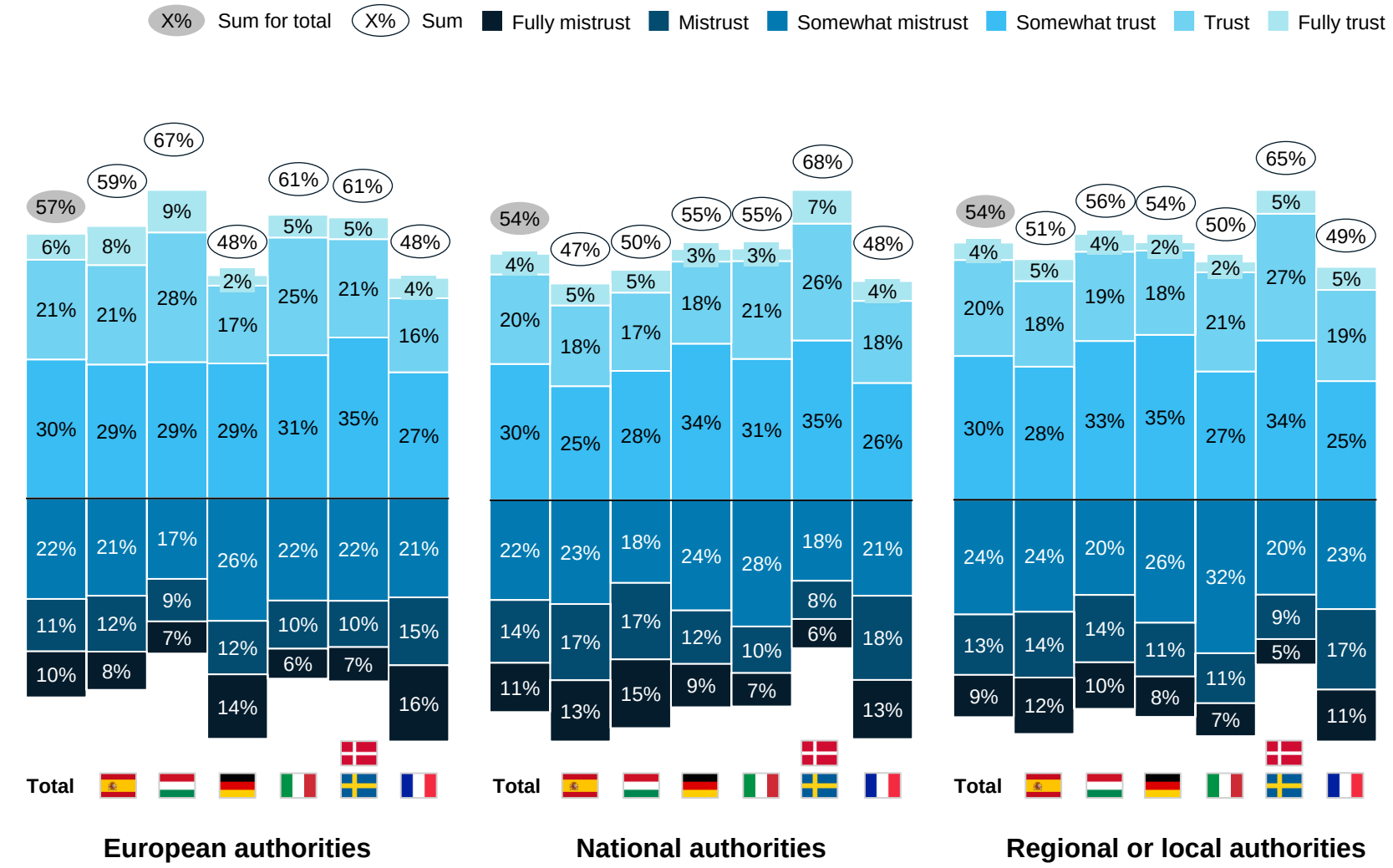
- **Garden / private area**
- **Delivery station** in neighborhood similar to nowadays delivery locations (mailbox, post office)

Air Taxis

Related to Vertiports citizens are most concerned about noise (48%) and safety (41%)



10. Regulatory authorities: must work together at all levels



(+/- difference to avg % in total)

Small differentiation in trust levels for European regulation authority between cities

- Higher trust levels: Budapest (+10%)
- Lower trust levels: Hamburg (-9%), Paris (-9%)

Trust levels **for national and regional / local authorities** almost always with **similar results**

- Öresund significantly higher for national (+14%) and regional / local authorities (+11%)
- Barcelona lower trust level in national authority (-7%), slightly lower for regional / local authority
- Paris lower trust levels for both national and regional / local authorities (~-5%)

Source: EASA UAM social acceptance survey question D1. To what extent do you trust the following authorities to handle the risks and adopt regulations needed to manage urban air mobility (including safety, noise control, environmental protection, security, cybersecurity, etc.)? Please select one answer per row.

Conclusion

- **Safety should be addressed primarily**, with a safety level equivalent to that of current aviation operations
- **Environmental risks should be mitigated,** including impact on animals and environmental footprint from production and operation of UAM vehicles
- **Noise should be limited** to a level equivalent to that of current familiar noises in a city
- **Security risks should be prevented**, mostly for drones in a first stage
- European, national and local **authorities should work together**
- **Local authorities need detailed information and guidance**, as well as involvement in the decision-making
- **Public acceptance should be secured** by different levers, e.g. by:
  - ensuring UAM is **affordable** to all and used in the **public interest**
  - well **integrated** in the local mobility system
  - supported by **timely, sufficient and transparent information** to citizens and local stakeholder groups
  - **pilot projects** demonstrating that UAM is functioning and safe
- **Use cases with highest benefit for general public to be introduced first** (transport of medical goods with manned eVTOLs (e.g. with a pilot onboard)), use cases by cargo like last mile delivery could follow
- Aviation safety needs to be taken care by competent authorities through appropriate regulations and design assessment of vehicles, systems and infrastructure. The UAM traffic should be safely integrated in the airspace with conventional aircraft.

Thank you for your attention!