
# Advanced Air Mobility Strategy for the Federal Ministry for Digital and Transport

Taking off to a new era in aviation

Federal Ministry
for Digital
and Transport

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*Dear reader,*

Traditional aviation is fast and safe. However, traditional aircraft need immense spaces to take off and land – spaces that are not always readily available. They are also largely reliant on fossil fuels. In contrast, electric vertical take-off and landing aircraft (eVTOL) are quiet, have zero emissions at the point of use and require minimal transport infrastructure.

As a result, these aircraft – which form part of what is known as the advanced air mobility (AAM) segment – have the potential to change human mobility and the transport of goods with lasting effect. They can also make a crucial contribution to combating climate change. I am convinced that they will feature in a wide range of use cases in the future. Whether transporting passengers or medical supplies, in rescue operations, inspecting industrial plants and transport infrastructure, supplying offshore wind farms or for use in environmental protection and nature conservation – the spectrum of potential applications is immense.

AAM is by no means to be an elite project for business travellers, but to benefit society as a whole.

This is particularly true as transport drones and eVTOL will also be deployed in regions that are currently not accessible or difficult to reach using conventional means of transport.

It goes without saying that air safety must be the top priority in this endeavour. For this reason, we will place a special focus on collision-free aviation and seamless interaction of humans, technology and operations. On one hand, this means that the requisite infrastructure and communications networks must be put in place, while on the other, a comprehensive regulatory framework ensuring the safety and freedom of advanced air mobility is required.

Our AAM Strategy lays the groundwork for climate-friendly air mobility. In it, we propose an approach to tackle key issues related to pilot training, ground infrastructure and implementation of the necessary digital services. We also want to offer the best possible framework for AAM implementation via industry-focused research, effective regulation and innovation-friendly administration. At the same time, this will also boost the electrification, digitalization and automation of the aviation sector as a whole.

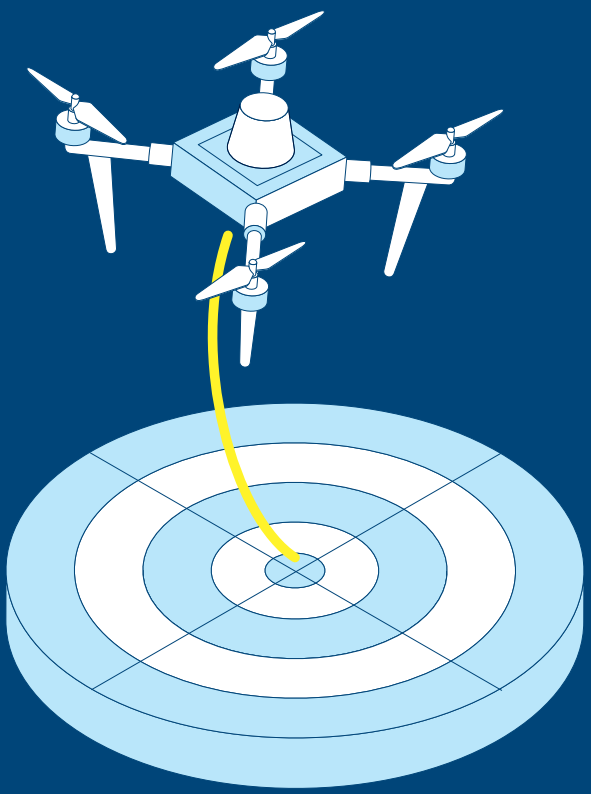
Over 125 years after Otto von Lilienthal's breakthrough, German pioneering spirit is showing its strength again. German companies and higher education institutions are global leaders in the drone and eVTOL development sector. We plan to leverage and extend this lead. Our AAM Strategy will drive the integration of a new and important transport mode, help us to remain trailblazers in advanced air mobility and create new high-tech jobs.

We are doing all of this today to ensure that Germany can compete in the global economy and offer society a new, affordable mobility option in the future.

I hope you enjoy reading the Federal Ministry for Digital and Transport's AAM Strategy!

Yours,
Volker Wissing,
Member of the German Bundestag
Federal Minister for Digital and Transport

# Introduction and objectives



# Introduction

Quiet, affordable and environmentally friendly: advanced air mobility (AAM)[1] offers society immense benefits in the use of unmanned aircraft systems (UAS)[2] and electric vertical take-off and landing aircraft (eVTOL[3]). They bring the third dimension into people's everyday lives, making transport faster by providing direct connections over longer distances. As they require relatively little infrastructure, greater availability can be achieved in both urban and rural areas.

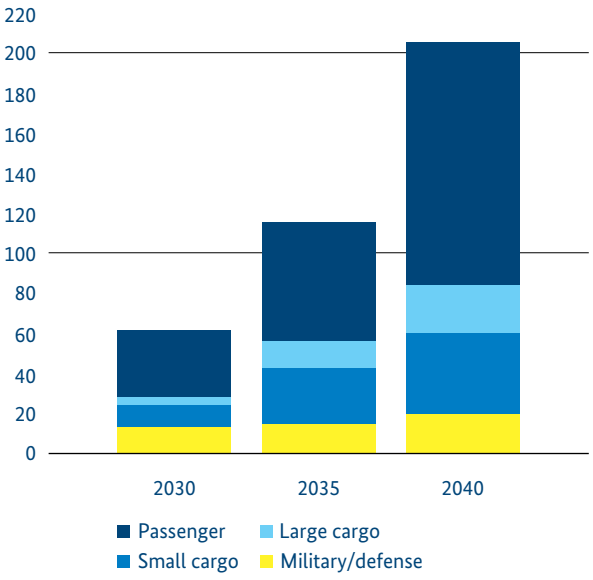
AAM could already become an important sector of the economy in the near future. A study by the German Aerospace Industries Association (BDLI) expects the German drone market to double by 2030, from €955 million to over €1.7 billion.[4]

In the long term, KPMG forecasts that the global market for the entire advanced air mobility sector will total $210 billion in 2040, with the passenger segment accounting for $120 billion.[5]

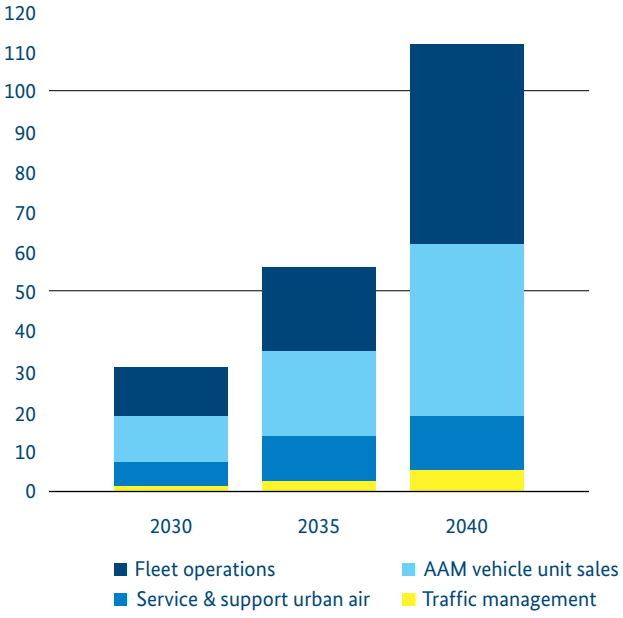
AAM delivers a cost-effective alternative to traditional aviation, with zero emissions at the point of use, and is relatively independent of land-intensive infrastructure compared with ground-bound means of transport. These properties can help to mitigate existing transport problems and create new mobility solutions.

## Global market for advanced air mobility

Global AAM economy (USD bn)




AAM passenger total addressable market (USD bn)



# Objectives

With the Federal Ministry for Digital and Transport's AAM Strategy, we want to show how we can integrate AAM into the existing mobility system to drive technological innovation and maximize the social benefit of this technology.

### 1. Zero-emission mobility for any region

A key objective of our AAM Strategy is to continue to advance zero-emission mobility in Germany. Electric vertical take-off and landing aircraft offer an opportunity to better connect not only urban spaces, but also rural and relatively inaccessible areas. Our aim is for AAM to synergistically complement the existing transport system in Germany by 2030 – with zero emissions and comparatively low infrastructure requirements.

### 2. Innovation leadership in Europe

Germany has the potential to play a key role in developing and implementing AAM within the European Union. Our goal is to continue to build on our innovation leadership in electric aircraft and unmanned aviation technology. This applies not only to the manufacturers, but also to the entire value chain, including aircraft, ground infrastructure, security and safety systems, avionics, drivetrain systems, battery technology, sensors, apps and AI. We intend to achieve this by means of close cooperation with industry, research establishments and international partners.

Germany aims to pioneer the development of standards and regulations for the AAM segment, while we are also focusing on close cooperation with our European and international partners.

### 3. Establishment of a legally certain and flexible regulatory framework

Safely and successfully integrating AAM into the airspace will necessitate amendments to the regulatory framework. The aim is to lay the groundwork for technological advances and establish high safety standards, in cooperation with the International Civil Aviation Organization (ICAO) and the EU. In the years to come, a special focus will be placed on developing solutions for safe airspace integration, collision avoidance and establishing special take-off and landing zones, also known as vertiports. These measures form the foundations of safe and efficient AAM operations. German involvement in the corresponding bodies and committees at EU level is a key instrument for this.

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**1** Appendix 1 presents the Federal Ministry for Digital and Transport's definition of the term 'advanced air mobility'. | **2** The term 'unmanned aircraft systems' (UAS) is used here within the meaning of Art. 2 (1) of Implementing Regulation (EU) 2019/947 on the rules and procedures for the operation of unmanned aircraft. | **3** The AAM Strategy also considers eSTOL, electric aircraft that, although not capable of vertical take-off and landing, need only short runways. For reasons of simplification, the term eVTOL is used throughout this document. | **4** German Aerospace Industries Association, 2023: Analyse des deutschen Drohnen- und Flugtaximarktes zeigt mehr Zuspruch für kommerzielle Drohnennutzung und prognostiziert weiteres Wachstum für das Segment der Flugtaxis (Analysis of the German drone and air taxi market shows growing demand for commercial drone use and forecasts further growth for the air taxi segment [German only]). | **5** KPMG 2022: Passenger use cases in the Advanced Air Mobility revolution

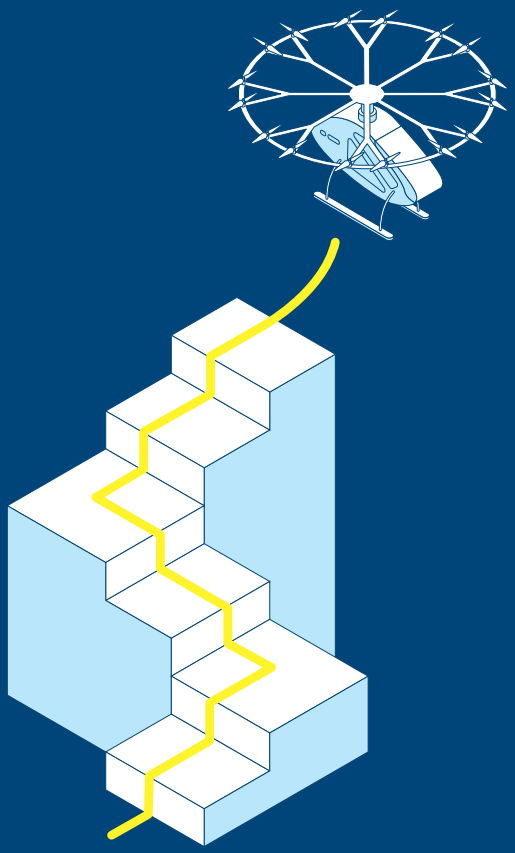
## 4. Societal acceptance and public participation

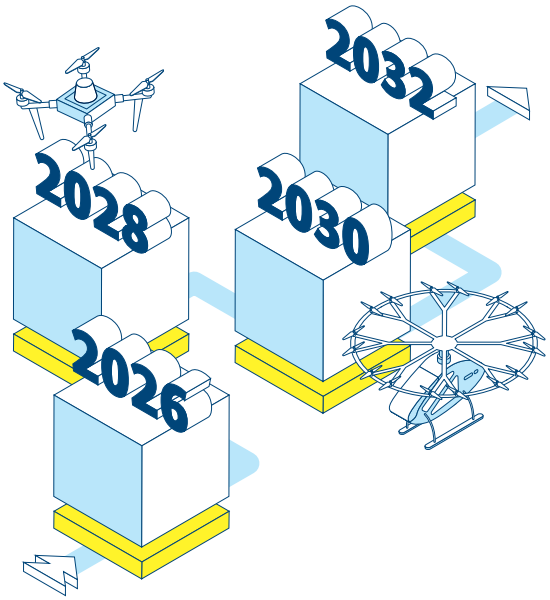
A new technology like AAM can only succeed if it adds value for the general population. As a result, we are setting ourselves the goal of involving citizens in AAM development and operations from the outset. We aim to show the benefits and opportunities of AAM with targeted public relations work and transparent communication, while also creating transparency with regard to potential challenges. In doing so, it is important to foster broad social acceptance based on trust in the technology and its benefits for the environment and mobility. We want to make AAM an everyday reality for everyone.

## 5. Updates to the strategy and evaluation

We see the AAM Strategy as a dynamic document that is continuously updated in line with technological, regulatory and social developments. As a result, another key goal is to evaluate measures and develop updates to the strategy based on this evaluation. This iterative process ensures that we can react flexibly to new challenges and provide optimal conditions for the development of AAM in Germany.

# Measures






# 1. Phasing in AAM

In order to rapidly implement initial AAM operations, while at the same time laying the groundwork for nationwide operation, AAM is to be phased in gradually. The main milestones for the introduction of AAM in Germany are to be achieved in four development phases lasting two years each.

In phase 1, routing based on specific safety criteria will help ensure that the requirements for operations will be low-threshold. This will allow initial applications to be implemented in the short term. These measures must be closely monitored through risk and safety management systems. The complexity of traffic can be increased gradually over the subsequent phases. The aim is to gradually expand the facilities and capacities for AAM operations in Germany. The phase model enables authorities, operators and service providers to contribute their resources optimally and in a targeted manner. A gradual expansion also allows long-term participation of all relevant interest groups, especially citizens. This allows public safety and order to be guaranteed at all times, while also ensuring public acceptance for AAM from the outset.

Throughout all four phases, the guiding vision will be safety first! We want AAM to be at least as safe as traditional aviation. As a result, the goal of zero collisions will be a particular priority. Especially in the later phases that envision operation in airspaces with dense air traffic, it will be particularly important to monitor the respective airspaces. In order to ensure comprehensive visibility of many airspace users in the lowest airspace, new ATM/UTM systems capable of efficiently and safely managing many aircraft operated simultaneously must be developed. The aim is to gradually integrate UTM and ATM with one another, so that all airspace users, i.e. UAS, eVTOL and traditional aircraft, can recognize one another.

**AAM is to be introduced in four phases.**

**1. By 2026:** Introduction of initial AAM test routes

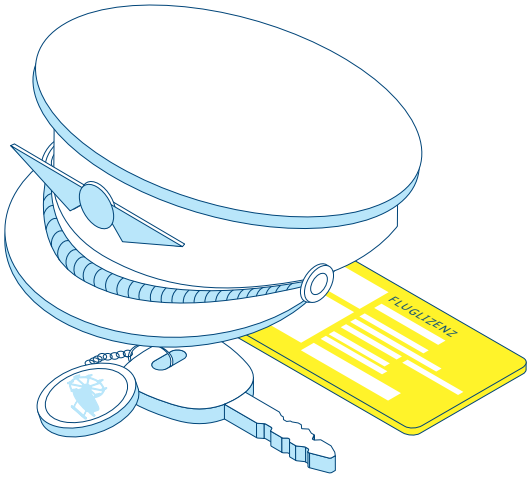
**2. By 2028:** Designation of strictly limited AAM geographical zones in which eVTOL, UAS and other aircraft can be operated simultaneously

**3. By 2030:** Designation of limited AAM geographical zones in which eVTOL, UAS and other aircraft can be operated simultaneously with regional services

**4. By 2032:** Nationwide AAM operation

## 2. Pilot qualification

Even if advanced air mobility has the potential to become highly automated in the future, pilots will be responsible for safety on board eVTOL for the foreseeable future. In this context, we face the challenge that a possible significant demand for flight crew will coincide with the current personnel shortages in the aviation sector. As a result, we want to put the training foundations into place early and efficiently in order to ensure a sufficient supply of qualified pilots for AAM.

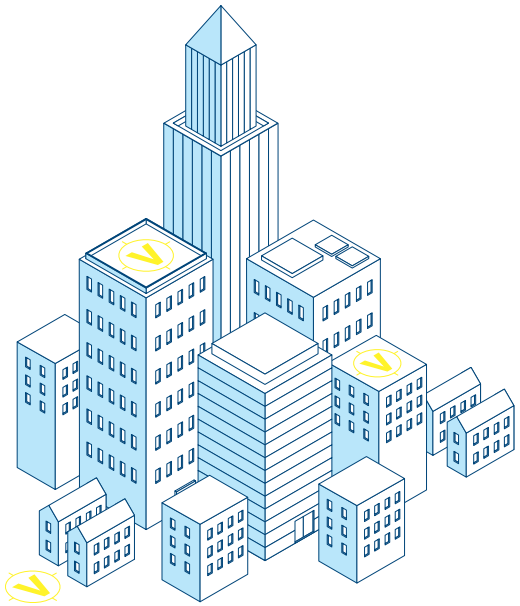



In Implementing Regulation (EU) 2024/1111, the European Commission and the European Union Aviation Safety Agency (EASA) have already provided initial regulations based on which initial qualifications to pilot eVTOL can be attained in the Member States. In the next steps of the process at EU level, we will also be advocating that holders of a CPL(A) or CPL(H) should be able to obtain the rating to pilot the named types after completing relevant differences training.

In the long term, we will advocate at European and international levels that a dedicated licence for professional VTOL[6] pilots, e.g. CPL(V), can be obtained through ab-initio training and that this rating can be maintained by completing courses at regular intervals. The training must be tailored for the distinctive features of eVTOL and meet entirely new requirements due to the specific range of applications.

- Efforts are to be undertaken to enable holders of a CPL(A) or CPL(H) to obtain a type rating for eVTOL unbureaucratically and with a risk-based approach.
- At ICAO and in the European Commission, the establishment of a dedicated professional pilot's licence CPL(V) is to be advocated.

**6** In individual cases, it is possible that other propulsion systems could be used in addition to electric propulsion systems. Given the minor operational differences, it makes sense that a licence of this kind should cover all possible propulsion systems, which is why it should be called VTOL and not eVTOL.



## 3. Establishment of vertiports

Vertiports are the special take-off and landing sites required for safe transport of passengers and goods by UAS and eVTOL. They connect AAM with other means of transport. To harness the full potential of urban air mobility, vertiports need to be easily accessible and well connected to roads, railway stations, bus lines, etc. They can either be at street level or on building roofs.[7] Urban development, environmental, social and noise protection aspects, as well as existing infrastructure must be taken into consideration when establishing vertiports.

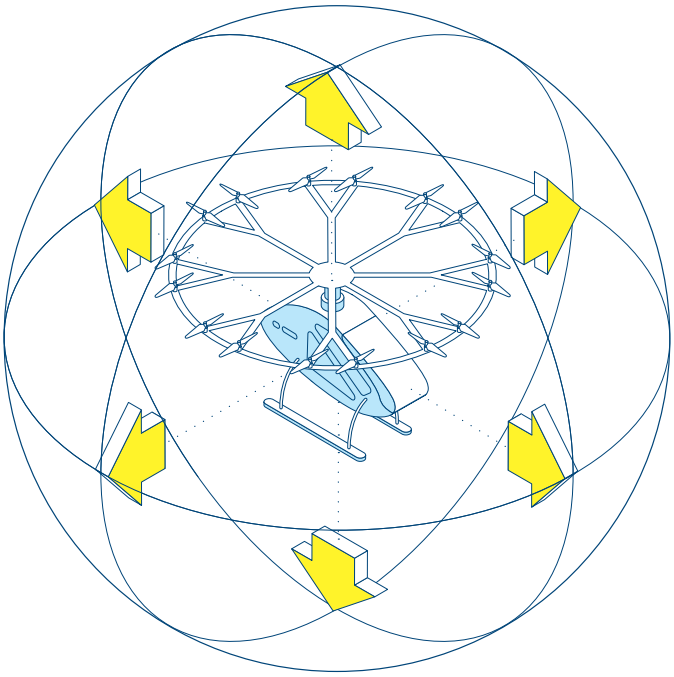
Establishing vertiports at regional airports could also allow attractive new markets to be tapped using new regional routes. For this reason, we will approach operators of suitable aerodromes and discuss opportunities to establish vertiports. Ensuring public safety and order is of particular importance in this context. In connection with the EU regulations[8] that have already been developed, we will implement effective measures to ensure operational safety as well as noise and environmental protection.

Public acceptance is particularly important for the successful introduction of AAM. In a study conducted in 2022,[9] the Unmanned Aviation Association (VUL) found that acceptance is highly dependent on the planned use cases for AAM and how well the public was informed of the plans in advance. In order to take the legitimate interests of affected citizens into account, we will conduct a public participation process at an early stage for sensitive projects.

We will help the German Aerospace Center (DLR) to set up a flexibly scalable prototype vertiport at the National Experimental Test Center for Unmanned Aircraft Systems. It is to serve as a reference and test subject and be made accessible to all stakeholders in the AAM sector.

- **An assessment is to be conducted to identify regional airports where vertiports would add particular value.**
- **An emphasis is to be placed on early public participation.**
- **The German Aerospace Center is to be supported in establishing a flexibly scalable prototype vertiport at the National Experimental Test Center for Unmanned Aircraft Systems.**

**7** EASA 2022: Vertiports – Prototype Technical Specifications for the Design of VFR Vertiports for Operation with Manned VTOL-Capable Aircraft Certified in the Enhanced Category (PTS-VPT-DSN).
**8** Prototype Technical Specifications for the Design of VFR Vertiports for Operation with Manned VTOL-Capable Aircraft in the Enhanced Category (PTS-VPT-DSN) | **9** VUL 2022: Was denken die Deutschen über Advanced Air Mobility? (What do Germans think about advanced air mobility?)



## 4. Defining flight routes

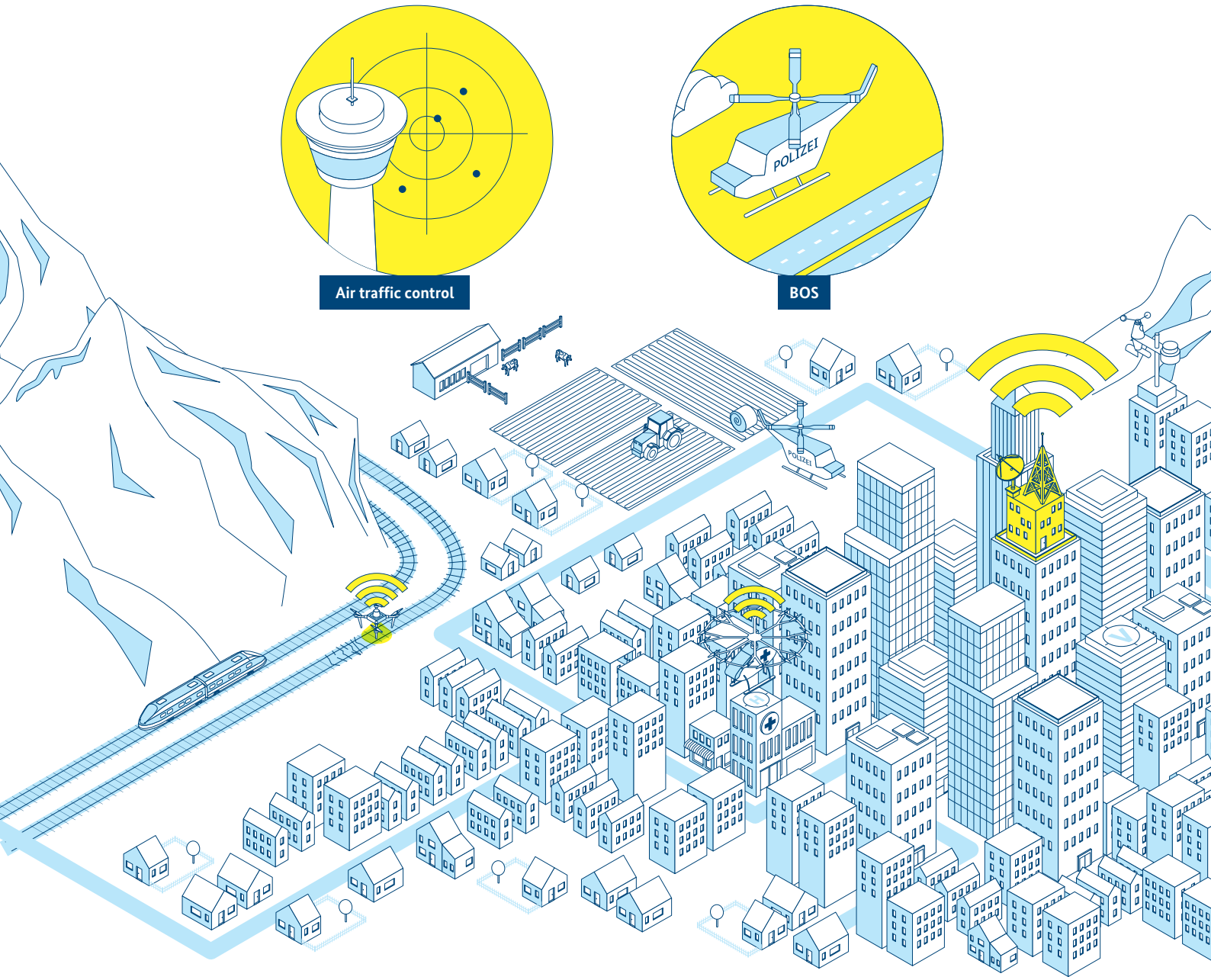
To enable the first AAM test routes to commence operation in early 2026, we want to lay the groundwork for the use of the first flight routes in 2025. As a general rule, aircraft may be operated over cities, other densely populated areas and gatherings of people only at altitudes that would permit them to make an emergency landing without undue endangerment of persons or property on the ground. Under visual flight rules, this altitude may not be less than 300 m above the highest obstacle within a 600 m radius around the aircraft when flying over cities, other densely populated areas and gatherings of people outdoors.

We will adhere to this principle when defining flight routes for eVTOL. Exemptions to this are only to be granted where required for the respective purpose and provided the safety is guaranteed and noise is mitigated appropriately. Routes are to be evaluated using a risk-based procedure, for example the Specific Operational Risk Assessment (SORA).

With regard to the currently still restricted range of eVTOL, alternative landing sites must be planned at appropriate intervals, irrespective of the aircraft's range. We will work with the aviation authorities of the federal states to identify appropriate alternative landing sites for potential flight routes.

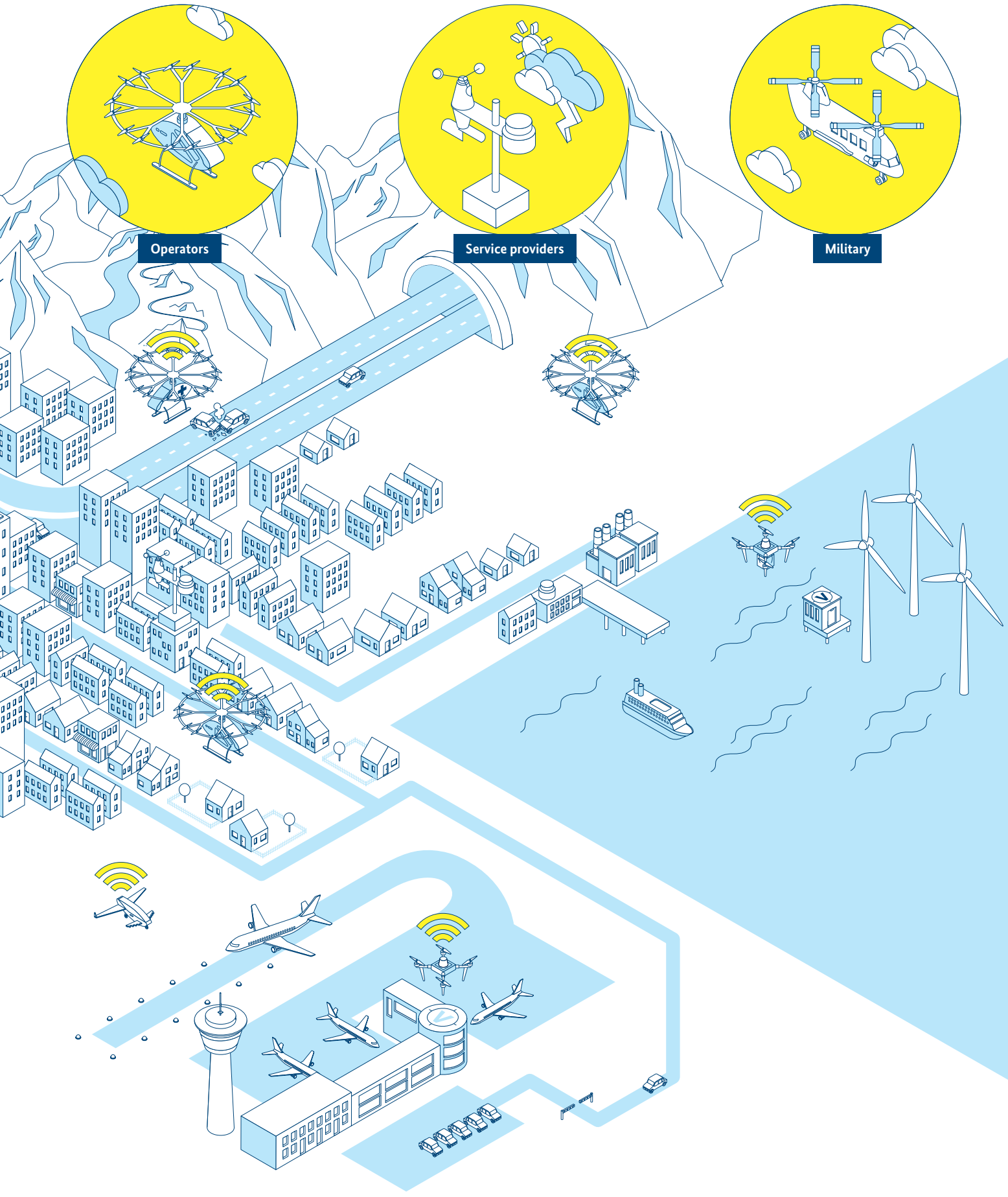
- The principle of compliance with minimum altitudes is to be maintained.
- The risk of first flight routes is to be assessed using a risk-based approach.
- Potential alternative landing sites are to be identified in cooperation with the federal states.

**Simplified overview of communication in the AAM**




## 5. Safety via airspace integration

When introducing initial eVTOL routes with pilots on board, the traditional communication structures for manned aviation are to be maintained. However, as soon as eVTOL and UAS are to be remotely piloted or fly automatically, additional digital infrastructures will be used to ensure monitoring and communication. To ensure that the lowest airspace remains a safe and reliable environment for the aviation of tomorrow, communication between the airspace users must be ensured and an integrative ATM/UTM system must be established. A system of this kind is to facilitate safe operation of manned and unmanned aviation in shared airspaces by mitigating


Operators
Service providers
Military

sources of error and friction losses and avoiding misunderstandings by providing a standardized air situation picture. A central data hub can collect the data of all airspace users and integrate it into the air situation picture. All airspace users currently within or inbound into the vicinity of the eVTOL routes should have direct or indirect access to it. This single source of truth avoids misunderstandings between airspace users.

The mobile communications network can be used to scale the communication between the different stakeholders. In the future, we will focus in particular on technical parameters such as range, latency, bandwidth and reliability to ensure seamless and error-free provision of the necessary communication services.

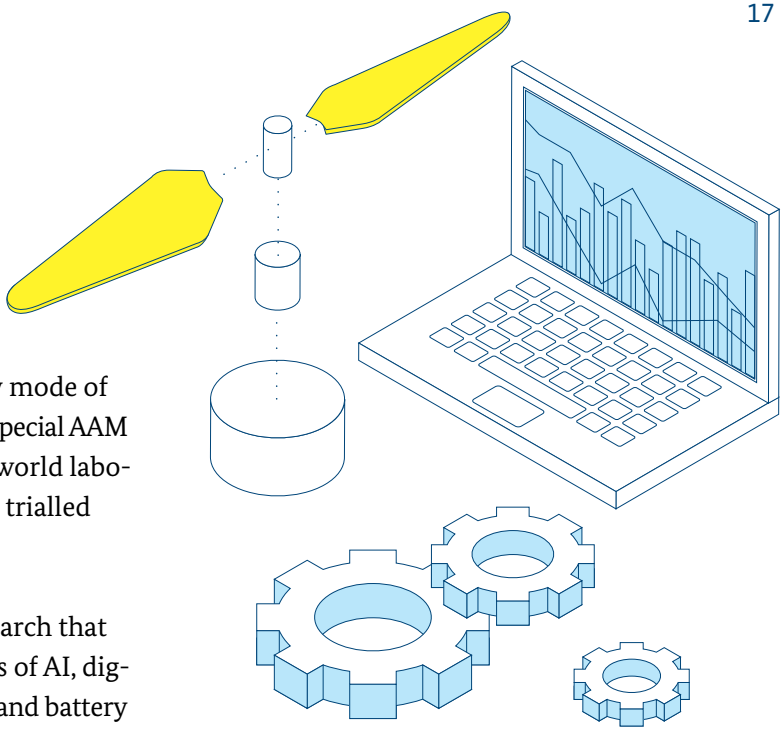
The greater the air traffic density, the more prominent the role AI systems can play. When laying the relevant groundwork, e.g. for intelligent trajectory planning and highly automated (emergency) landings in unfamiliar terrain, we will base our work on the EASA AI roadmap.[10]

As the traffic density increases, electronic conspicuity and automated collision avoidance will also become increasingly important. A series of upgrades and concepts for remote detection systems is already available to transfer existing solutions from traditional aviation, e.g. transponders, to AAM. With regard to the limited payload capacities, in particular of smaller UAS, small and lightweight alternatives for collision avoidance must be established. At international level, we will provide fresh impetus and develop standards for e-conspicuity, which combines ADS-B, ADS-L, satellite and mobile communications, among others. This will facilitate safe operation of traditional aircraft, UAS and eVTOL in a shared airspace.

- A safe and inclusive ATM/UTM system is to be implemented.
- Mobile communications-based solutions are to be used increasingly to enable electronic conspicuity of all airspace users.
- Appropriate and effective standards for electronic conspicuity and automated collision avoidance of all airspace users are to be established.

**10** EASA: Artificial Intelligence Roadmap 2.0

# 6. Research and development



Research is essential to establish a new mode of transport. As a result, we want to create special AAM research programmes and set up real-world laboratories where AAM operations can be trialled specifically.

This will call for industry-focused research that takes particular account of the subjects of AI, digitalization, automation, new drivetrain and battery technologies, economic efficiency, mass production, scalability, electrification, data protection, protection of privacy and cyber security.

To this end, we will focus existing and new research programmes of the Federal Ministry for Digital and Transport specifically on AAM, prioritizing the following areas:

- Safe integration of eVTOL and UAS into existing transport infrastructure
- Creation of the necessary infrastructure for eVTOL operations
- Development of integrated ATM/UTM systems
- Setting up the communications and digital infrastructures required for AAM
- Innovative technologies for reduction of noise and environmentally harmful emissions
- Optimal use of a safety management system
- Enhancing energy efficiency
- Evolving highly automated control systems

By early 2025, we want to commission a research project which develops key components for the establishment of vertiports in German cities.

By setting up real-world laboratories, we are allowing technologies to mature, facilitating flight tests, provision of proofs for certification, development of safety procedures and trialling of initial airport workflows. With a risk-based reduction of permit requirements and the reduction of barriers to entry, test areas are to be created where the rate of innovation can be increased. We are setting ourselves the goal of launching the first real-world laboratories specifically for AAM as early as 2025.

- **Support for AAM as part of the mFUND programme is to increase.**
- **In the short term, vertiport research is to receive targeted support.**
- **The first real-world laboratories for AAM are to be set up in 2025.**

# 7. Regulatory framework conditions and effective management

The EU has had comprehensive regulations[11] for UAS operations since 2021, which have earned worldwide recognition. The requirements for manned eVTOL operations are already at an advanced stage[12] – the EU is also a leader in this field. With our 2020 Drone Action Plan, the 2021 National Drone Act, the implementation of the Digital Platform for Unmanned Aviation (dipul) in 2022 and the U-Space Strategy in 2023, we have already made key strategic and regulatory preparations. This year, we were able to implement no fewer than three measures that make us pioneers in regulating unmanned aviation: the EU-wide establishment of geographical zones for fawn rescue, with special regulations for UAS operations in the control zones (also a first for the EU) and digitalization of administrative acts in the Federal Aviation Office (LBA).

We now want to continue this success story with eVTOL operations. To this end, we will increase our involvement at all levels – internationally, within the EU and nationally.

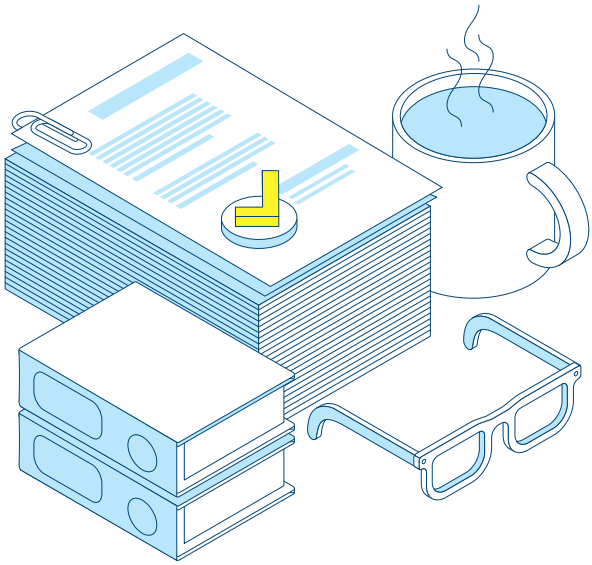
In the international context, the primary aim is to achieve long-term goals. For example, it will take highly sophisticated automation systems to enable eVTOL operations without a pilot on board. These systems must be able to react to unforeseen situations and interact with the physical and digital infrastructure. Before highly automated operations can start, internationally harmonized standards can help eVTOL companies to incorporate them in the design of aircraft and the operating conditions. With influential cooperation in two working groups[13] of the International Civil Aviation Organisation (ICAO), we want to tackle these and other challenges and better represent German interests.

At European level, EASA has pioneered not only UAS operations, but also eVTOL. For example, in 2022 it published draft rules for the operation of eVTOL in cities – the first comprehensive proposal for such regulations.[14] The document covers the technical areas of airworthiness, flight operations, licensing of the flight crew and air traffic rules. However, there is still legal uncertainty for operators of UAS and eVTOL in the Standardised European Rules of the Air (SERA). The SERA provisions published in 2012 do not adequately represent AAM. As a result, we will advocate in the EASA and European Commission working groups[15] a revision of SERA that takes account of AAM. The talks will be based on our General Administrative Act of October 2024,[16] in which we proposed a national solution for the problem, making us the first EU Member State to do so.

In terms of our national activities, the SERA exemption is one of a number of successful German domestic exemptions in the unmanned aviation sector. Working with the federal states, we have already created several effective sub-legislative arrangements in the form of general administrative acts and joint principles. We plan to apply this risk-based approach for the use of eVTOL, too, so that we can react flexibly to the upcoming challenges. Safety management will also play a key role in this.

Across all these levels, there must be transparency and clear guidelines to allow a successful market for AAM to form: There is still much to do when it comes to harmonizing regulations and standards. We will systematically work to break down the market barriers caused by unclear or inconsistent regulations and standards. To this end, we will drive forward harmonization at all levels and eliminate any remaining uncertainties with a targeted approach. By doing so, we are putting in place ideal conditions for manufacturers and operators.

This process requires ministerial steering to coordinate the performance of all of these tasks. We will therefore establish a dedicated division responsible for unmanned aviation and advanced air mobility in the Aviation Directorate-General of the Federal Ministry for Digital and Transport, and entrust it with the technical supervision of the Federal Aviation Office (LBA) division responsible for unmanned aviation and the UTM activities in the Federal Supervisory Authority for Air Navigation Services (BAF).



- At international level: Involvement in the ICAO Study Group on Advanced Air Mobility and in the ICAO RPAS Panel is to increase, with better representation of German interests.
- In the EU: A reform of SERA is to be initiated to equitably integrate AAM and create legal certainty for all airspace users.
- At national level: Working with the federal states, short-term simplified administrative procedures are to be introduced to ensure effective implementation of AAM.
- At all levels: The harmonization of regulations and standards is to be driven forward to break down market barriers.
- For ministerial steering of all AAM-related activities, Division LF 19 – Unmanned Aviation and Advanced Air Mobility is to be established at the Federal Ministry for Digital and Transport.

**11** Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft
**12** For example, Special Condition for VTOL and Means of Compliance | **13** ICAO RPAS Panel and ICAO AAM Study Group | **14** EASA 2022: Opinion 03-2023 | **15** At EU level, the committee formed in accordance with Article 127 of Regulation (EU) 2018/1139 plays a key role. | **16** General Administrative Act of the Federal Ministry for Digital and Transport – exemptions from SERA for unmanned aircraft of the 'specific' category, valid from 21 October 2024 to 20 June 2025

## 8. Investment environment

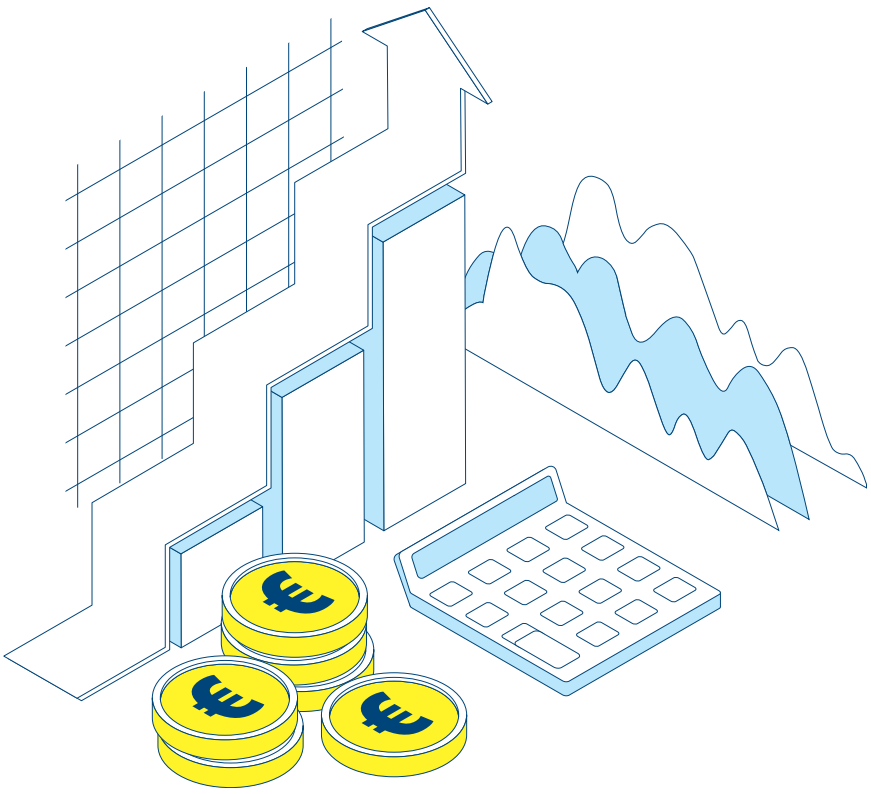
It is not easy for young, generally technology-focused companies to access risk capital. The current phase of high interest rates makes it difficult to attract venture capital, even for market leaders in a given technology.

In the USA and Asia, promising eVTOL manufacturers receive funding through government support activities.

We will vigorously champion the creation of incentives for private investment. To this end, we will coordinate with the relevant stakeholders to find out what is still causing uncertainty among investors and then develop potential solutions. One result of this activity will be a Q&A document, which we will publish on dipul.

As part of an investor conference under the patronage of the Federal Ministry for Digital and Transport, we will bring together relevant stakeholders with the finance sector for a strategic dialogue. Our goal is clearly defined. We want to mobilize capital for investment in the German AAM sector.

- A Q&A document for AAM businesses and potential investors is to be compiled in 2025 and published on dipul.
- An AAM investor conference is to be launched under the patronage of the Federal Ministry for Digital and Transport.



# Monitoring

The AAM Strategy is monitored at State Secretary level in the Federal Ministry for Digital and Transport, with preparation at technical level by the Aviation Directorate-General. The Advisory Council on Advanced Air Mobility is to be launched in spring 2025 to support the Federal Ministry for Digital and Transport. The Advisory Council will comprise members from the private sector, the scientific community and civil society. It will meet with representatives of the Federal and federal-state administrations at regular intervals.

The time component is particularly important for monitoring. On one hand, the aim is to implement short-term measures with an immediate impact in order to maintain our lead in advanced air mobility. On the other, we plan to take long-term policy decisions in order to pave the way for the future.

We aim to cultivate a culture of error and learning that allows continuous development of structures in the AAM sector. This will focus on a forward-looking approach to learn from errors and achieve lasting improvements as we advance towards optimal results.

With the measures documented in the AAM Strategy, the Federal Ministry for Digital and Transport undertakes to continuously drive the development of advanced air mobility. The measures are to be initiated and implemented as soon as possible.

We will analyse the strategy's impact at regular intervals. dipul is also to be used to transparently present the progress made in implementing the AAM Strategy to the interested public.

Appendix 1

# What does advanced air mobility mean?

Advanced air mobility (AAM) refers to the use of new aviation technologies – in particular eVTOL – and their integration into existing airspace structures. The international term for this is advanced air mobility (AAM), while at European level innovative air mobility (IAM) is often used with the same meaning. The present strategy uses the term advanced air mobility (AAM).

Based on the definitions discussed in the international organizations, AAM is defined for the purposes of the present strategy as:

**Safe, orderly, seamless, sustainable and highly automated aviation and relevant systems protected against intentional harm, primarily taking place in the lowest airspace and between urban and rural areas and used to transport goods and passengers and for other aviation purposes, such as inspection and rescue operations. The technologies used in AAM are new aircraft, automated air traffic management systems, digital ecosystems and communication systems, which permit the integration of the new transport technologies into the multimodal transport system.**

AAM can be construed as a combination of regional air mobility (RAM)[17] within the framework of the ICAO airspace structure and urban air mobility (UAM),[18] combined with UTM (also referred to as U-space[19] in the EU), though the boundaries between UAM and RAM are blurred. AAM has specific characteristics that are not fully encompassed by any of the three fields. A holistic concept is required. An artificial distinction between urban and rural UAS and eVTOL transport operations is not always appropriate. Accordingly, an integrative system encompassing both urban and rural areas is to be put in place. The aircraft to be developed are designed for short and medium distances and highly automated. eVTOL that can serve both the UAM and the RAM segment require defined, approved take-off and landing areas (vertiports) and appropriate operating procedures.

In contrast to unmanned aviation in which image capture is particularly important, AAM prioritizes mobility, i.e. transporting persons and (larger) goods. The table at right categorizes the various aircraft classes from the perspective of AAM.

**17** RAM = air transport within a range of between 100 km and 300 km
**18** UAM = air transport in urban areas within a range of under 100 km
**19** U-space = geographical zones in which UAS operations may only be conducted using the U-space services

| Aircraft type | Operation | Technical and operational framework required |
|---|---|---|
| **Manned civil aviation** | Pilot on board | • Rules of manned aviation |
| **UAS** | Open category | • Remote identification (except C4 and privately built) |
| | Specific category | • Operating licence within the meaning of Art. 3 or Art. 16 of Imp. Reg. (EU) 2019/947<br>• Remote identification<br>• Use of an ATM/UTM provider |
| | Certified category | • Operating licence within the meaning of Art. 3 or Art. 16 of Imp. Reg. (EU) 2019/947<br>• Remote identification<br>• Use of an ATM/UTM provider |
| **eVTOL/eSTOL** | Piloted | • Rules of manned aviation<br>• Use of an ATM provider |
| | Remotely piloted | • Rules of the certified category<br>• Use of an ATM/UTM provider |
| | Automated | • Rules of the certified category<br>• Use of an ATM/UTM provider |
| **Aircraft of authorities and organizations with security and safety tasks (BOS) and the military** | Manned, piloted aircraft | • Exempted under Art. 2(3)(a) of Reg. (EU) 2018/1139, but must be operated safely<br>• If the intended purpose allows, use of own ATM or an ATM provider |
| | UAS | • Exempted under Art. 2(3)(a) of Reg. (EU) 2018/1139 (with opt-in), but must be operated safely<br>• Remote identification if the intended purpose allows<br>• Use of a UTM provider if the intended purpose allows |

## Appendix 2

# Abbreviations

| | |
|---|---|
| **AAM** | Advanced air mobility |
| **ADS-B** | Automatic dependent surveillance – broadcast |
| **ADS-L** | Automatic dependent surveillance – light |
| **ATM** | Air traffic management |
| **BAF** | German Federal Supervisory Authority for Air Navigation Services |
| **BMDV** | German Federal Ministry for Digital and Transport |
| **BOS** | Authorities and organizations with security and safety tasks |
| **CPL** | Commercial Pilot Licence |
| **CPL(A)** | Commercial Pilot Licence Aeroplane |
| **CPL(H)** | Commercial Pilot Licence Helicopter |
| **CPL(V)** | Commercial Pilot Licence VTOL |
| **dipul** | Digital Platform for Unmanned Aviation |
| **DLR** | German Aerospace Center |
| **Imp. Reg.** | Implementing Regulation (EU law) |
| **EASA** | European Aviation Safety Agency |
| **EU** | European Union |
| **eVTOL** | Electric vertical take-off and landing aircraft |
| **IAM** | Innovative air mobility |
| **ICAO** | International Civil Aviation Organization |

| | |
|---|---|
| **JARUS** | Joint Authorities for Rulemaking on Unmanned Systems |
| **KI** | Artificial intelligence |
| **LBA** | Federal Aviation Office |
| **PTS-VPT-DSN** | Prototype technical specifications for the design of VFR vertiports for operation with manned VTOL-capable aircraft certified in the enhanced category |
| **RAM** | Regional air mobility |
| **SERA** | Standardised European Rules of the Air |
| **SORA** | Specific Operations Risk Assessment |
| **UAM** | Urban air mobility |
| **UAS** | Unmanned aircraft system |
| **UTM** | UAS traffic management system |
| **Reg.** | Regulation |
| **VFR** | Visual Flight Rules |
| **VTOL** | Vertical take-off and landing (aircraft) |
| **VUL** | Association of Unmanned Aviation |

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