



Spanish Cluster  
of Innovative  
Air Mobility



# Vertiports **Whitepaper**

— Executive Summary —

# INDEX



<b>PREAMBLE</b>	4
<b>1 Aircraft with vertical operation capability</b>	6
<b>2 Vision of economic activity</b>	8
<b>3 Integration of IAM into airspace</b>	12
<b>4 The vertiport as infrastructure</b>	14
<b>5 Mobility and urban planning</b>	16
<b>6 Operational modes at vertiports</b>	18
<b>7 Constraints and enablers</b>	20
<b>8 Social acceptance</b>	22
<b>9 Regulatory framework for vertiports</b>	24
<b>10 Challenges and solutions</b>	26

An aerial photograph of a dense urban area, likely Barcelona, with the Sagrada Família church as the central focus. The image is overlaid with a blue gradient and white text.

# PREAMBLE

The path towards integrating Innovative Air Mobility (IAM) is not merely an evolution; **it is a qualitative leap in the way we conceive our cities, connectivity, and technology.**

The roadmap not only points towards clear goals but also drives the sector to transform the future.

**In the short term,** the priority will be creating a functional ecosystem. Specific regulations for vertiports will advance rapidly, enabling initial operations and ensuring that pilot tests serve as practical models of feasibility. These initial implementations will showcase trust and efficiency to authorities and society, demonstrating that air mobility is not a futuristic concept but a useful tool beginning to integrate.

**In the medium term,** the focus will shift towards operational expansion. The consolidation of U-space will allow the integration of manned and autonomous aircraft into a safe and agile system, while cities adopt vertiports as strategic transport nodes. During this period, diversified business models will begin to take shape, with logistical, passenger, and emergency services being deployed across broader routes. It will be a time for strategic alliances: governments, operators, and manufacturers will work in synergy to maximise impact and scalability.

**In the long term,** the sector must lead the full automation of operations and redefine global transport standards. Vertiports will not just be points of connection but intelligent infrastructures capable of dynamically adapting to urban and technological demands. Autonomous aircraft will shape interurban air transport networks, reconfiguring the flow of people and goods, opening up unprecedented opportunities in economy, trade, and accessibility.

More than a roadmap, this is a plan to transform how we live and move. The sector has the opportunity to build not only new mobility but a new way of conceiving the world.

Aircraft with vertical  
operation capability

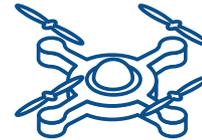
# The city imagined in three dimensions



VTOL-Capable Aircraft mark the beginning of a new era in air mobility, redefining how we move in urban and remote environments. With technologies such as electric propulsion, hydrogen, and hybrid systems, they offer sustainable alternatives that reduce emissions, noise, and congestion.

Their VTOL capability allows them to operate in small spaces, from rooftops to strategically located vertiports, adapting to both urban and rural needs. Moreover, the diversity of designs, from eVTOLs to tiltrotors, positions them as versatile solutions for passenger transport, logistics, and emergencies.

By integrating artificial intelligence and advanced sensors, VTOL-Capable Aircraft ensure operational safety and energy efficiency. These advancements, along with improvements in autonomy and recharge times, **consolidate their potential as a disruptive option in air mobility, transforming not just transportation but also city design and global connectivity.**



**Vision  
of economic activity**

**Moving  
thousands  
of passengers,  
connecting  
millions  
of people**



Vertiports are not merely mobility infrastructures but economic catalysts that drive strategic sectors and foster new business models. Their value chain—spanning strategic, production, service, and consumption stages—integrates economic activities that generate employment, attract investment, and strengthen local and regional industrial networks. They act as key points in an ecosystem connecting sectors such as transport, tourism, and logistics, maximising their impact on sustainable economic development.

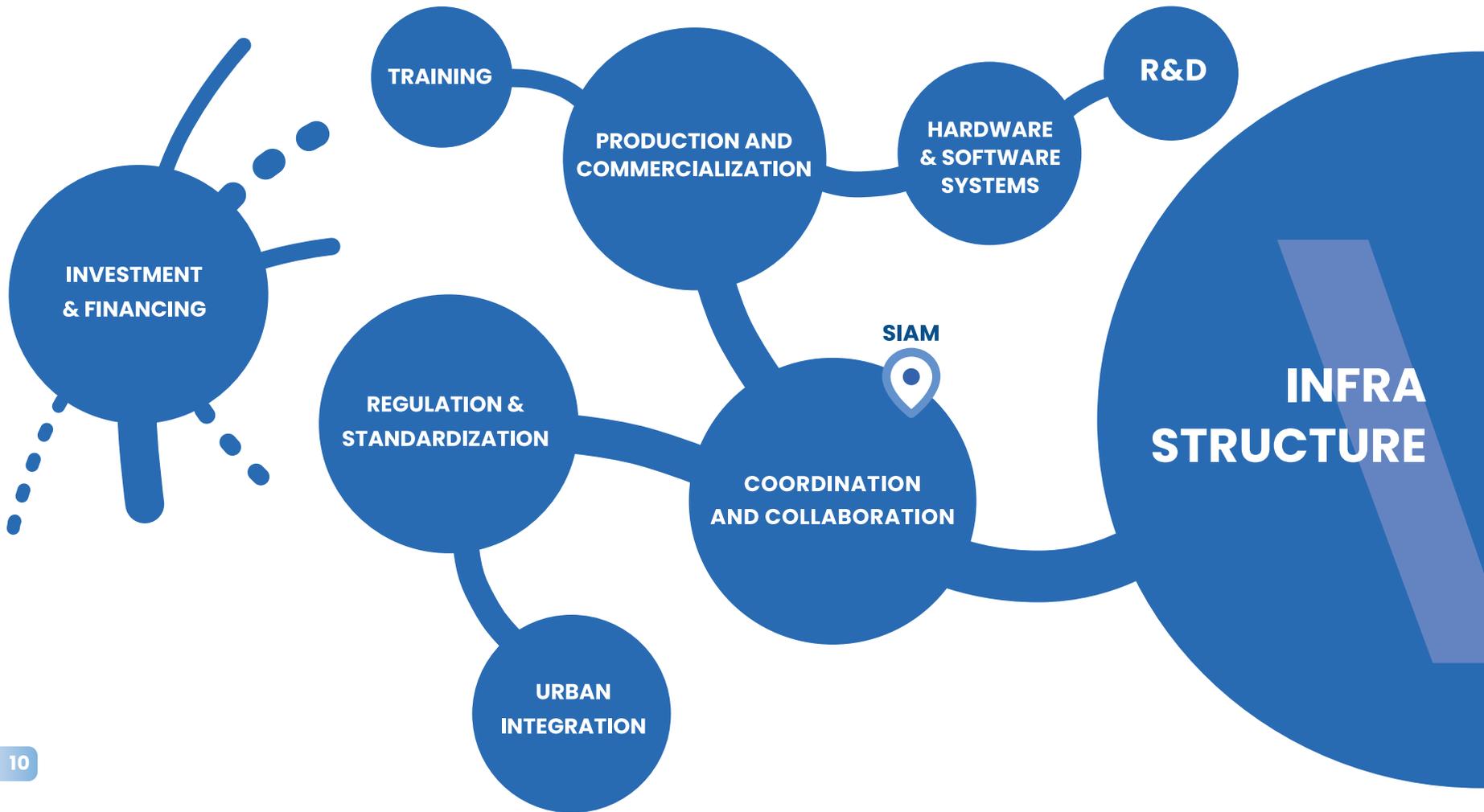
**The potential for investment in vertiports lies in their ability to diversify revenue streams.**

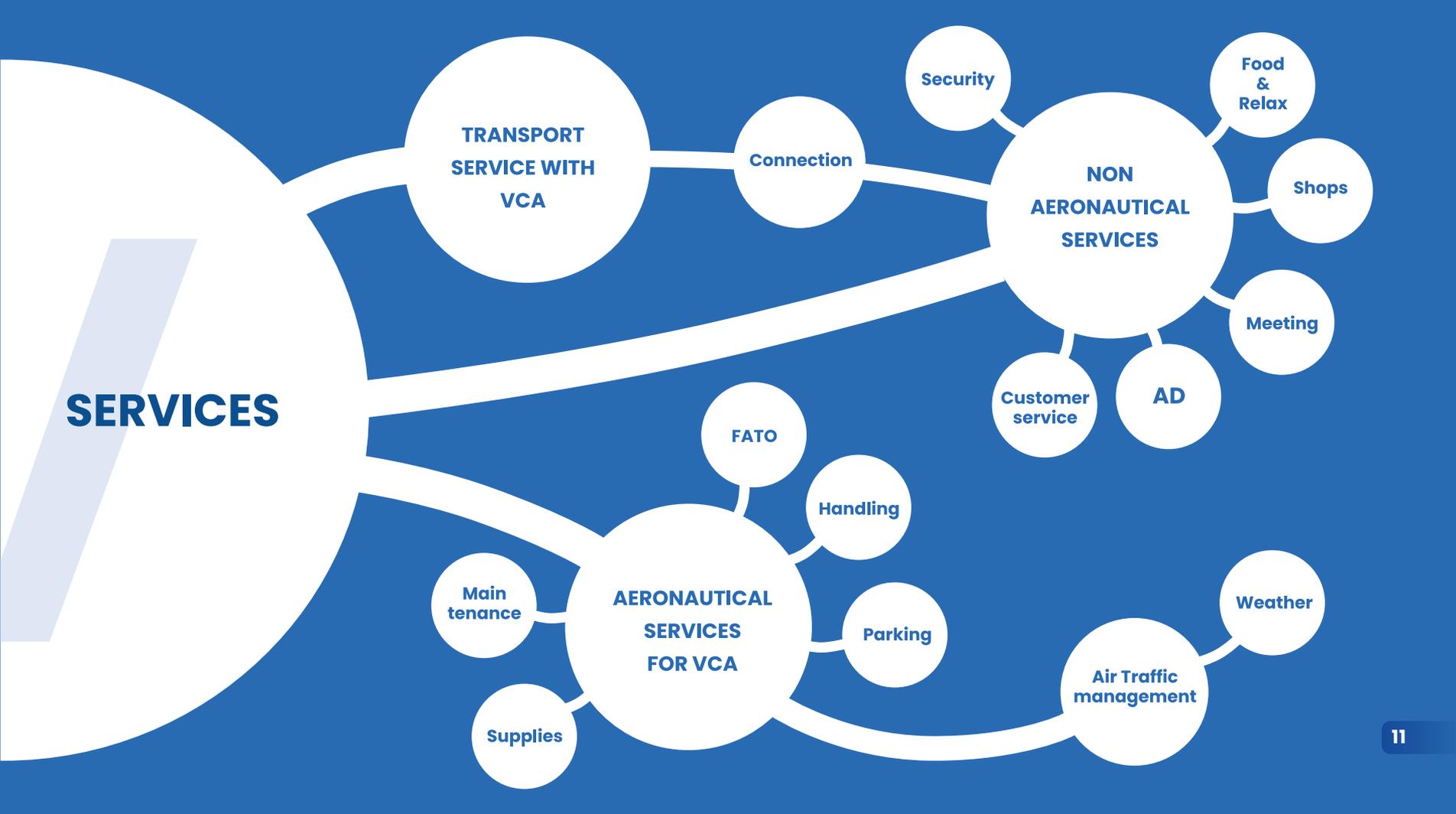
Operational fees, leasing of commercial spaces, and monetising data associated with mobility flows are just some strategies to generate income. Additionally, vertiports encourage technological innovation in areas such as traffic management systems, clean energy, and novel aeronautical infrastructure designs. This approach enables adaptation to dynamic demands and promotes economic competitiveness.

Vertiports aim not only to cover operational costs but to become net generators of economic value, fostering synergies with other sectors and attracting capital to projects aligned with inclusive, resilient, and sustainable growth. Their funding can rely on European public instruments, private investment, and innovative mechanisms such as green bonds and public-private partnerships.



The new airspace opens up an unprecedented in the logistics sector





# SERVICES

TRANSPORT SERVICE WITH VCA

NON AERONAUTICAL SERVICES

AERONAUTICAL SERVICES FOR VCA

Connection

Security

Food & Relax

Shops

Meeting

AD

Customer service

FATO

Handling

Parking

Air Traffic management

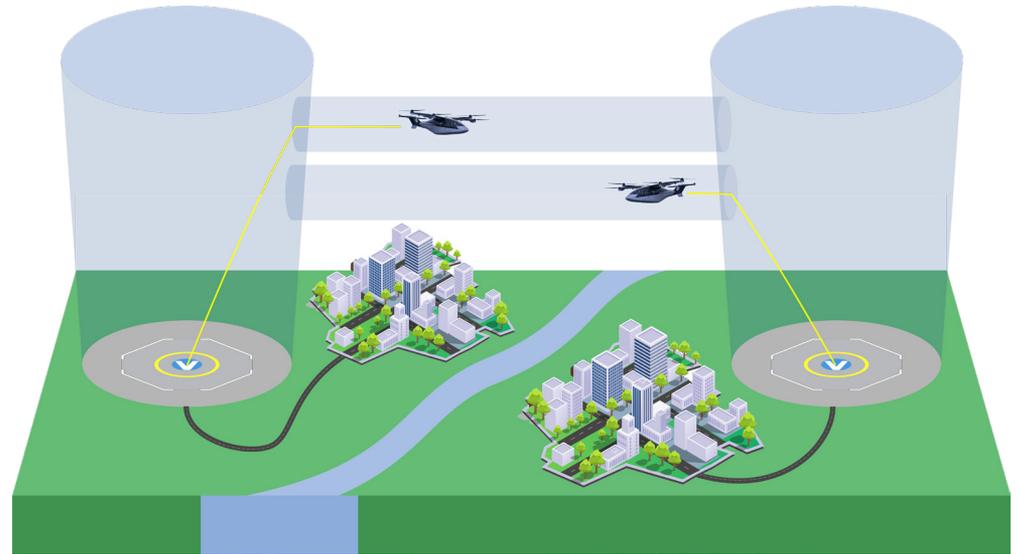
Weather

Supplies

Main tence

Integration  
of IAM into airspace

# Air corridors: the first steps of Innovative Air Mobility (IAM)



Air corridors: the first traces of Innovative Air Mobility (IAM)

An initial step towards this transformation is the implementation of air corridors and airspace stratification, temporary measures facilitating the coexistence of VTOL-Capable Aircraft, drones, and conventional traffic. While necessary in early stages, these structures will evolve into dynamic, adaptive systems with greater freedom as demand grows.

Another significant challenge will be ensuring adequate separation between VTOL-Capable Aircraft, manned aviation, and drones. In the initial phase, the solution will involve conducting VTOL operations with onboard pilots under VFR conditions and establishing corridors to segregate operations.

In more advanced phases, **automated traffic management systems like U-space will be essential, requiring all aircraft to continuously transmit their position during flight to ensure safe separation.**

The development of Innovative Air Mobility (IAM), and particularly Urban Air Mobility, will only be possible through significant changes to some existing traffic rules and airspace structures, enabling regular operations in urban areas below 1,000 feet.

This operational environment will pose challenges to minimise risks to urban populations, requiring urban route designs that prioritise minimising ground risks by avoiding crowded areas and favouring zones with lower building density.

## The vertiport as infrastructure

It doesn't  
add  
possibilities;  
it multiplies  
them



Vertiports are fundamental components of IAM, designed as strategic nodes integrating eVTOL aircraft into advanced transport systems. Their design combines efficiency, safety, and sustainability, addressing both current and future needs. These infrastructures go beyond being origin and destination points, **forming interconnected networks that link urban, suburban, and interurban areas, facilitating passenger and cargo transport.**

Vertiport configurations are diverse, ranging from minimal facilities like vertistops to complex urban and regional hubs. Innovative solutions include

elevated, floating, mobile, or indoor vertiports, adaptable to various contexts and operational demands. Their capacity to evolve and expand ensures alignment with increasing air traffic, while their modularity and flexibility position them as resilient infrastructures.

The movement area, featuring elements such as FATO, TLOF, and taxiways, will be designed to ensure safe and efficient manoeuvres. Meanwhile, terminal buildings will offer optimised services for passengers and logistics, standing out for their technological integration and adaptability.

Additionally, auxiliary zones for loading, energy supply, and maintenance will reinforce the functionality of these infrastructures. The planning and design of vertiports will incorporate advanced tools like digital twins, helping optimise operations and anticipate future needs.



Connecting points that transform cities into more dynamic transport networks

Mobility  
and urban planning

# The missing connections in the network

A futuristic Aerotaxi drone is shown in flight against a sunset cityscape. The drone is a sleek, white, four-rotor vehicle with a large, curved canopy. Two people are visible inside the canopy, one in the driver's seat and another passenger. The drone is flying towards the right side of the frame. The background is a blurred cityscape with warm, golden light from the setting sun, creating a bokeh effect with city lights.

Aerotaxis: door-to-door  
by air in ten minutes



Innovative Air Mobility promises to revolutionise transport systems, integrating vertiports as essential nodes within intermodal networks that are better connected, more sustainable, and more efficient. These vertiports will not only facilitate the take-off of eVTOL aircraft but **will redefine the transport paradigm by precisely integrating aerial and terrestrial nodes into a coherent and seamless system.**

In urban areas, vertiports are envisioned as pivotal points for fast and efficient connections. They promote a mobility system that will significantly reduce travel times and offer sustainable alternatives to the saturation of traditional infrastructures such as airports, train stations, and bus terminals.

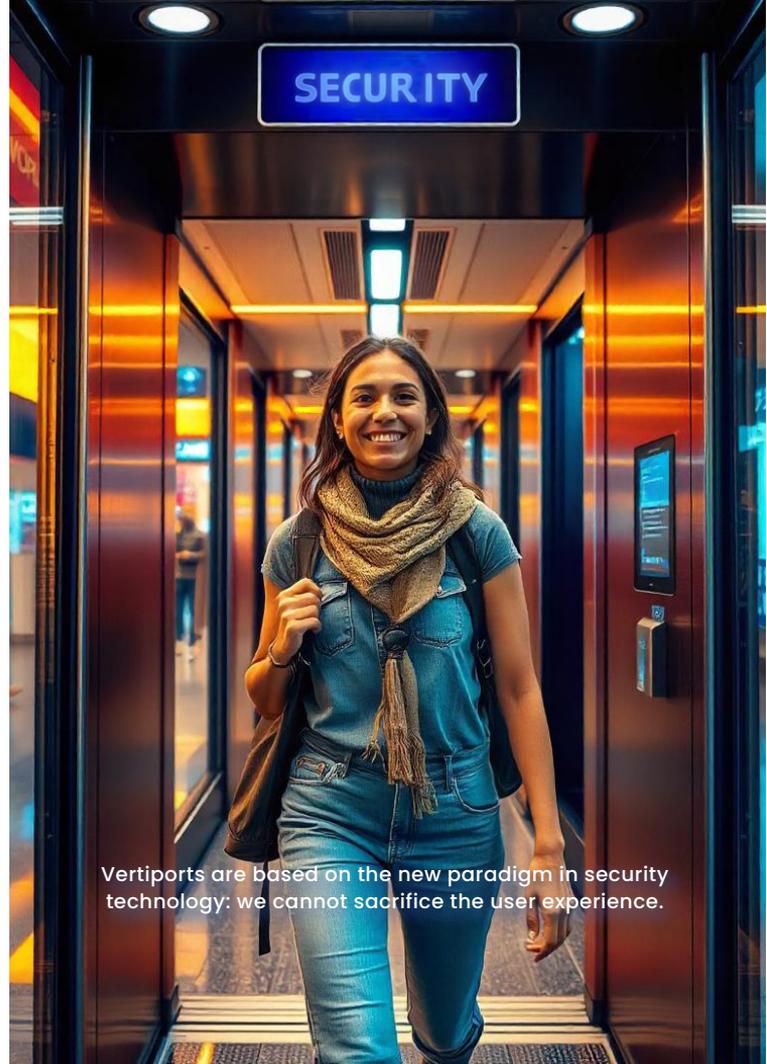
Their strategic design and location, alongside these transport nodes, will be crucial for harmonious integration that maximises operational efficiency while minimising environmental impact.

Technology will play a decisive role in this advancement. Mobility as a Service (MaaS) will enable real-time planning of multimodal journeys, intuitively integrating air and ground transport options into a unified experience. Additionally, vertiports will consolidate their position as key elements in logistics chains, transforming last-mile delivery into a more agile process that adapts to the demands of e-commerce.

This transformation requires more than planning; it demands vision, determination, and strategic coordination combining urban planning, technological innovation, and flexible regulations. Only through a shared commitment can vertiports become catalysts for a new era of sustainable, interconnected mobility oriented towards the future.

Operational modes  
at vertiports

As safe  
as an airplane,  
as simple  
as a bus



Vertiports are based on the new paradigm in security technology: we cannot sacrifice the user experience.

Vertiports are the foundation of new air mobility, with operational modes designed to deliver a seamless, safe, and efficient experience. From managing take-offs and landings to passenger and cargo services, every procedure will be optimised to meet the highest standards while adapting to diverse environments and use cases.

Operational **agility will be a fundamental value in this process, supported by new technologies and methods, such as biometric systems enabling faster boarding, automated cargo management, and intelligent assistance technologies.** Flexibility, on the other hand, will be essential to conceive vertiports that operate within both permanent and temporary networks, adjusting operational responses to demand.

Safety will be non-negotiable. Specific protocols for emergencies, such as battery fires or weather contingencies, will be complemented by advanced protection measures against intentional and unintentional risks. Tools like surveillance drones and digital twins will establish vertiports as resilient nodes capable of responding to any scenario.

Efficient operation will not merely be a commitment but a standard, maximising the performance of each vertiport while integrating it into the global transport ecosystem. Vertiports will become gateways to a new era where air mobility is synonymous with dynamism, innovation, and operational excellence.



## Constraints and enablers

Being useful  
is not enough;  
it must be able  
to grow

The success of vertiports goes beyond infrastructure and technological advancements. Key factors such as strategic location, safety, user experience, and operational efficiency will determine their relevance in mobility ecosystems as well as their long-term profitability.

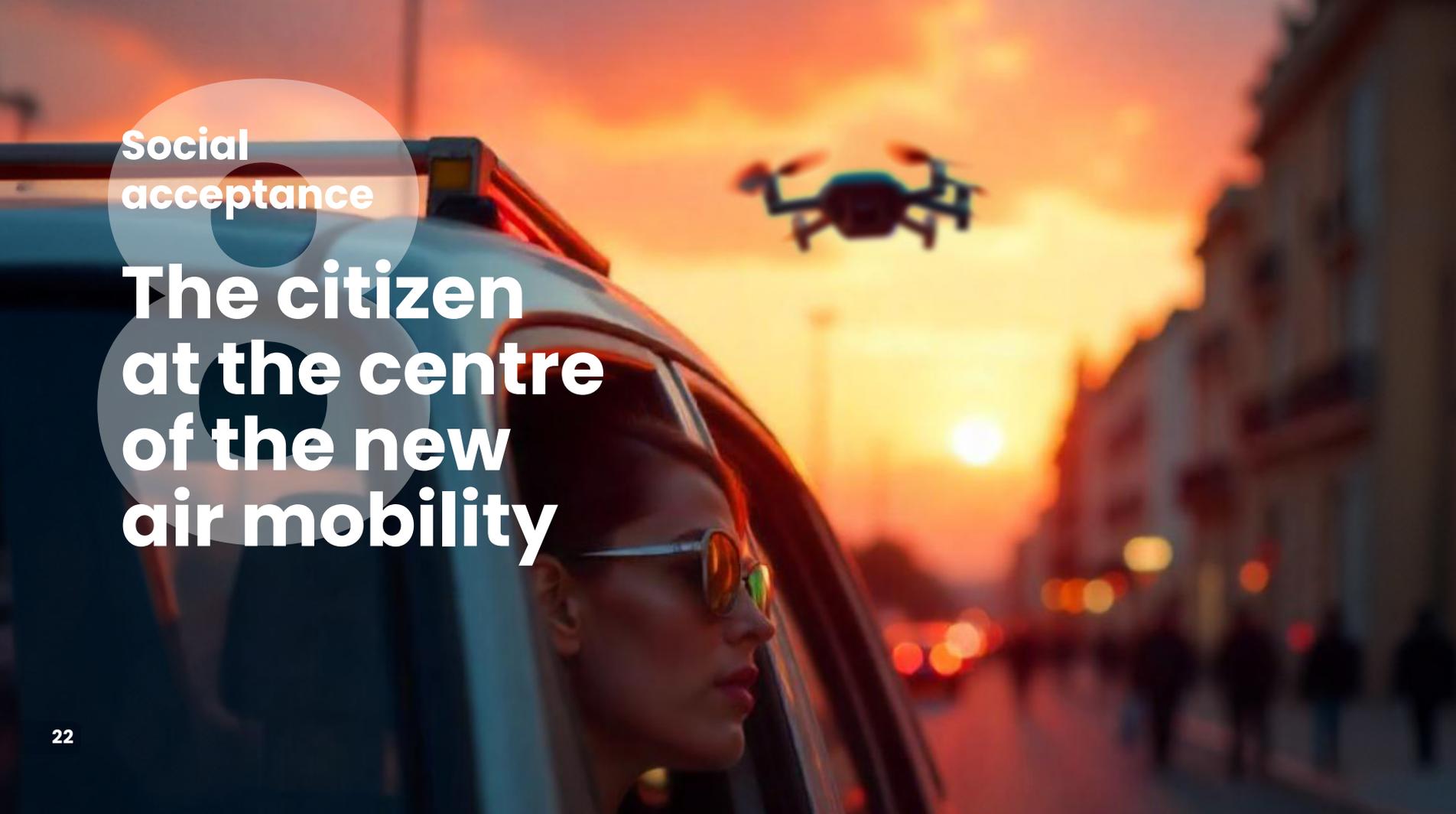
Location is not merely a matter of accessibility but a critical pillar for business model viability. **Choosing sites with high demand density and proximity to strategic hubs like airports or logistics zones maximises utilisation and ensures a steady income flow.** Simultaneously, assessing future development potential and synergies with existing infrastructures can make the difference between a functional vertiport and a driver of

sustainable profitability. The choice must balance factors such as local competition, implementation costs, and regulatory constraints, ensuring maximum agility in deployment.

Technology will be an essential engine. Advanced air traffic management systems, automated operations, and monitoring tools will enhance operational efficiency and guarantee rigorous safety standards. Innovations will bolster confidence among users and investors alike, ensuring that vertiports are perceived as fundamental nodes in the future mobility network.

Safety is a non-negotiable constraint in vertiport operations. To protect users, employees, critical infrastructures, and sensitive data, rigorous risk management protocols, incident response plans, and robust cybersecurity systems will be required. Coordination with regulatory bodies and the adoption of advanced surveillance and encryption technologies will ensure secure, resilient operations aligned with the highest international standards.

Lastly, vertiports must adapt to the specific conditions of the urban environments in which they will operate. From the initial design stages, considerations such as the urban microclimate—affected by buildings generating turbulence and wind variability—must be addressed. Managing these challenges with precision will not only guarantee safety but also optimise operations, transforming vertiports into resilient and versatile assets for the cities of the future.

A woman with sunglasses is looking out of a car window. In the background, a drone is flying in the sky during a sunset. The scene is set on a city street with buildings and blurred lights.

**Social  
acceptance**

# **The citizen at the centre of the new air mobility**



Innovative Air Mobility is not just a technological advancement but an opportunity to transform society in terms of connectivity, efficiency, and quality of life. Vertiports and eVTOL aircraft emerge as catalysts for faster and more diverse transportation, freeing cities from ground congestion and providing quick and reliable alternatives for both people and goods.

This sector has the potential to foster a freer and more dynamic society, offering citizens mobility options tailored to their needs, removing barriers, and connecting communities that were previously isolated. Additionally, vertiports can become economic engines, generating jobs, attracting investment, and promoting new business opportunities in the areas where they are integrated.

Beyond technology, it is about building a future where cities are better connected, and people have more tools to decide how, when, and where to move. **The key to achieving this goal lies in clearly communicating the benefits of this new mobility: time saved, better access to services, and unprecedented flexibility in transportation.**

IAM does not seek to impose change but to offer a new horizon that enables societies to evolve towards a more efficient, competitive, and connected model, where citizens are the primary beneficiaries of this transformation.



**Regulatory framework  
for vertiports**

**A legislation  
that unlocks  
a prosperous  
future**



The regulatory framework for vertiports, a cornerstone of new air mobility, is advancing to enable practical and safe operations in a sector with immense potential. While current regulations, such as Regulation (EU) 139/2014 and Royal Decree 862/2009, were designed for conventional aerodromes and heliports, the evolution towards a specific framework will unlock new possibilities for vertiports, particularly for autonomous and urban operations.

The initial classification into categories such as public, restricted, or occasional use provides a solid foundation to begin operations, but the future demands flexibility and precision. For example, vertiports will host operations ranging from urban aerotaxi services to logistical services in rural areas, always ensuring safety and efficiency.

On a global scale, technical standardisation is crucial. Organisations like ICAO, EASA, and others are working on guidelines that, beyond harmonising regulations, will enhance competitiveness and reduce barriers for manufacturers and operators. This effort will allow eVTOL aircraft to operate across borders, supporting agile sector growth.

Moreover, integration with urban and rural environments is not just a regulatory requirement but an opportunity for vertiports to lead sustainable development. Designs adapted to the landscape, noise reduction solutions, the use of existing building rooftops, and modern urban planning strategies ensure not only technical feasibility but also public acceptance.

**The success of the regulatory framework does not lie in merely meeting imposed requirements but in leading an innovative and pragmatic approach.** A well-designed regulation will pave the way for vertiports to become a functional, efficient, and transformative reality in the future of air mobility.

A white quadcopter drone is shown from a top-down perspective, flying over a dense forest. The trees are a mix of green evergreens and deciduous trees with vibrant autumn foliage in shades of orange, yellow, and red. The drone is centered in the upper half of the frame, with its four propellers visible. The background is a soft-focus view of the forest canopy.

Challenges  
and solutions

This time,  
we'll do  
it better

The development of vertiports is not limited to overcoming obstacles; **it is about leveraging each challenge as a catalyst for innovation.** These nodes of innovative air mobility are poised to redefine not just transportation but also how we design and live in our cities. Challenges are the driving force behind visionary solutions, opening new horizons.

### **Vertical urbanism and total connectivity**

Integration into dense urban environments is not just a matter of space but an invitation to think vertically. Rooftop or floating vertiports not only free up land but also offer a model of agile, sustainable, and connected mobility. With advanced simulation technology and digital planning, a seamless experience for passengers and goods can be ensured, breaking down barriers between land and sky.

### **Regulations that drive innovation**

Traditional regulatory frameworks are evolving into modular regulations that embrace the uniqueness of vertiports and eVTOL aircraft. Solutions such as interoperability between air and ground traffic systems or the regulation of autonomous operations ensure not only feasibility but also an operational model that anticipates the future.

### **Sustainability as a standard**

Environmental challenges should inspire designs that prioritise energy efficiency and respect for the environment. From optimised flight routes that minimise noise to infrastructures integrating renewable energy sources, vertiports must not only meet but exceed sustainability standards.

### **Safety in all dimensions**

The concept of safety evolves with tools that go beyond physical protection. Advanced cybersecurity systems, supervised autonomous operations, and intelligent emergency protocols will ensure that these environments are secure and reliable.



This book is printed  
on 100% recycled paper