Urban Air Mobility (UAM) – Evolving Regulations

Analyst Note

https://en.wikipedia.org/wiki/Passenger_drone#/media/File:Passenger_Drone.jpg

BIS Research
Emerging Technology Market Intelligence

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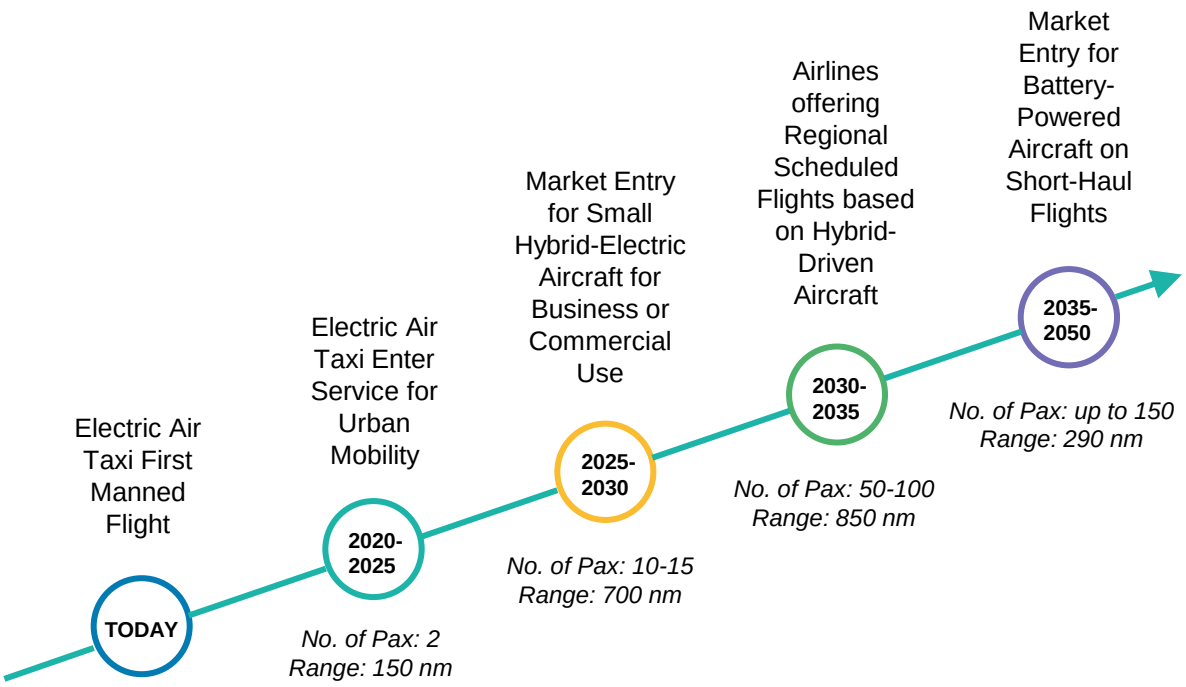
Introduction

Over the last decade (2010 onwards), there have been several activities in the urban air mobility (UAM) industry across the globe. Air transportation systems for urban regions are being developed in response to increased traffic congestions. Aerial vehicles are best suited for megacities for commercial applications compared to highspeed trains or other forms of transportation. The UAM can cater to various applications such as passenger transportation, last-mile cargo delivery, emergency and medical aid transportation, food delivery etc. The UAM requires aerial vehicles such as electric vertical take-off & landing (eVTOL) aircraft and delivery drones that can be manned, remotely piloted and autonomous. Typically, operational range for eVTOL aircraft is upto 500 kms and for delivery drones is less than 20 kms. Additionally, the UAM industry (ecosystem) requires infrastructure such as unmanned traffic management (UTM), vertiports, and charging stations.

Outlook for Electric Propulsion Based Aircrafts



Source: IATA.org

https://en.wikipedia.org/wiki/Workhorse_SureFly#/media/File:SureFly_250_Prototype_(cropped).jpg

Urban Air Mobility – Applications / Use Cases

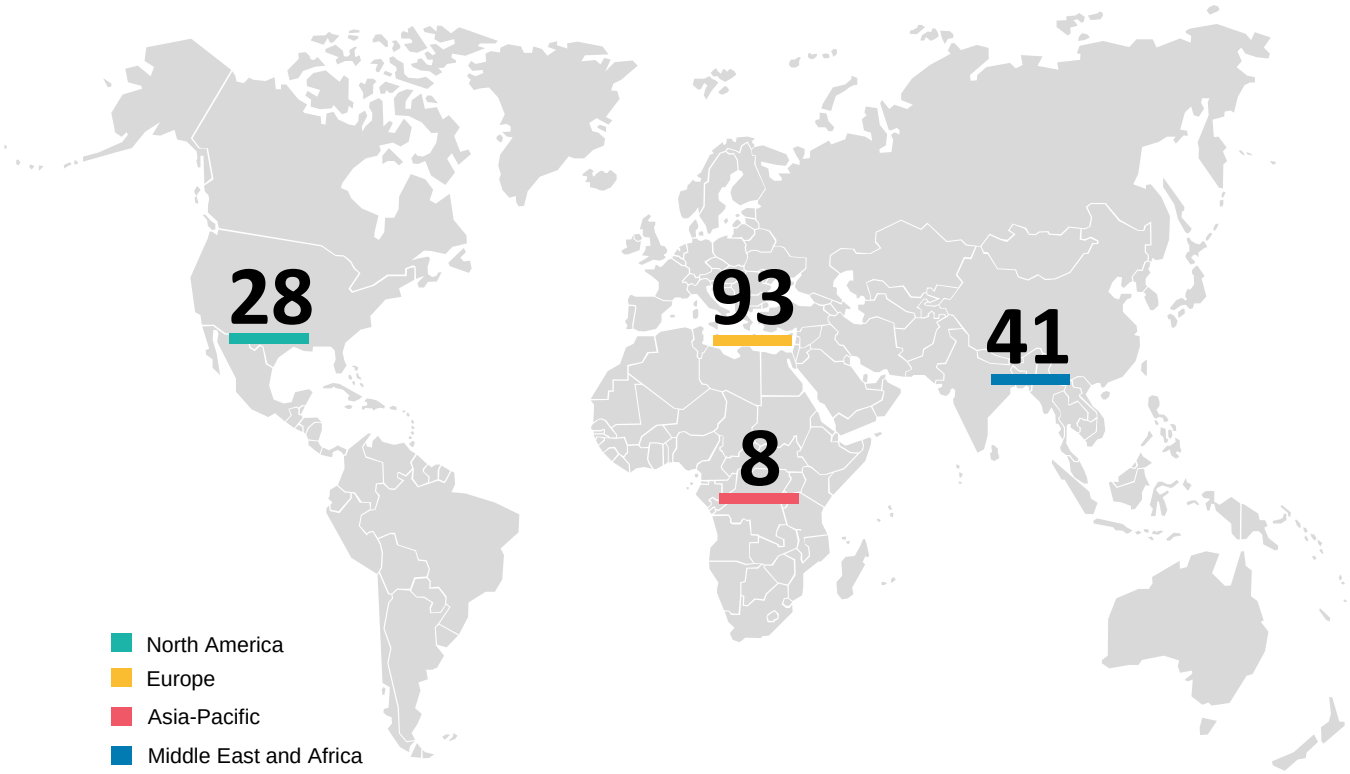
Advancements in ‘electric vertical take-off and landing’ (eVTOL) and ‘short take off and landing’ (STOL) technologies are aiding manufactures to develop aerial vehicles that can cater wider range applications, allowing them to enter in new markets. The following figure illustrates the key application areas for UAM.

UAM: Key Application Areas

Source: BIS Research Analysis

While the UAM industry is currently in its nascent stage, various start-ups & established aerospace companies are trying to enter the market. There has been a significant growth in the number of UAM pilot projects across the globe in past five years involving different industry stakeholders such as UAM associations & consortiums, regulatory & government bodies, and solution providers, among others. As of July 2021, there are more than 170 UAM projects currently in various stages of development across various regions. The following figure illustrates the number of ongoing UAM projects with respect to various regions.

UAM Projects – Regional View



Source: BIS Research Analysis
Note: Data presented in the above figure is as of July 2021

Promising UAM Projects

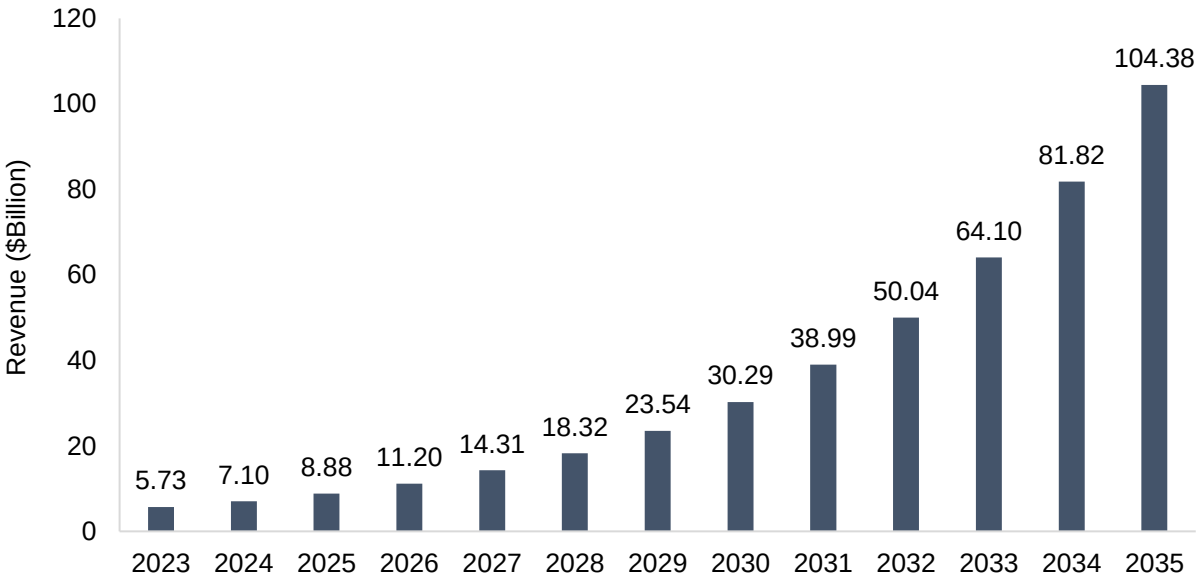
Region	Country	Project	Strategy	Description
North America	U.S.	SOARING	Contract	Kongsberg Geospatial was selected as part of the Sustaining Ohio Aeronautical Readiness and Innovation Next Generation (SOARING) project team from the Ohio Federal Network (OFRN) to lead the development of a contingency management platform (CMP) for beyond visual line-of-sight (BVLOS) drone operations (including last-mile deliveries), as part UAM initiative for city environment.
Europe	Spain	BUBBLES	UAM Testing and Research	The EU-funded Building Basic Blocks for a U-Space Separation (BUBBLES) project aims at defining separation minima and methods to unmanned aircraft flying below 150 meters to improve the overall performance and safety.
Asia-Pacific	Australia	UberAIR (now acquired by Joby Aviation)	Passenger Transport	The autonomous air taxis (piloted by humans in the early versions) will operate vertical takeoffs and landings from dedicated rooftop “skyports” and at an affordable cost to the general public.
Middle East and Africa	U.A.E.	Autonomous Air Taxi	Passenger Transport	A self-flying taxi service is planned to be introduced in Dubai, accessible with an integrated mobility app.

Source: BIS Research Analysis
Note: Data presented in the above figure is as of July 2021

UAM market is however estimated to gain significant traction from 2023, by when several of the current prototypes will be in their operational phase.

The following figure depicts the estimated market values for the forecast period 2023-2035, by when the global urban air mobility market is estimated to reach $104.38 billion, from $5.73 billion in 2023. This global market includes both, manufacturers and service providers.

Global Urban Air Mobility Market, $Billion, 2023-2035

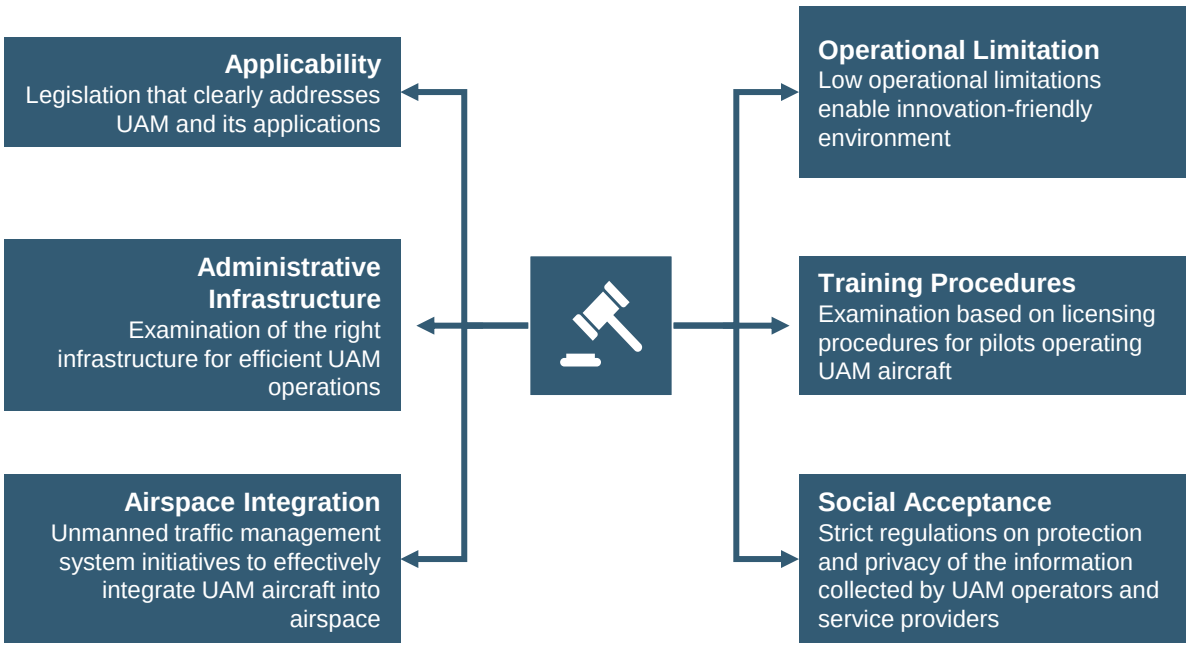


Source: BIS Research Analysis

How Regulations Affect UAM Operations

Numerous regulatory bodies & government agencies across the globe have identified lack of proper regulations as one of the key factors for the slower penetration of aerial vehicles into BVLOS environment. Ensuring efficient UAM operations will require the stakeholders to focus on five major areas such as aircraft certifications, airspace, operations, infrastructure, and social acceptance to draft regulations for UAM industry. The following figure illustrates the laws applicable for UAM environment.

Types of Laws Applicable for UAM Environment



Source: BIS Research Analysis

In countries with high population density, the infrastructure is not robust enough to run UAM operations. These countries need to upgrade their infrastructure to support unmanned operations. They need to integrate new technologies such as wireless charging, automated ground control stations, and smart safety measures to the current infrastructure to mitigate threats posed by the UAM operations. Hence, countries need to invest a significant amount of their resources in enhancing the infrastructure to facilitate UAM operations.

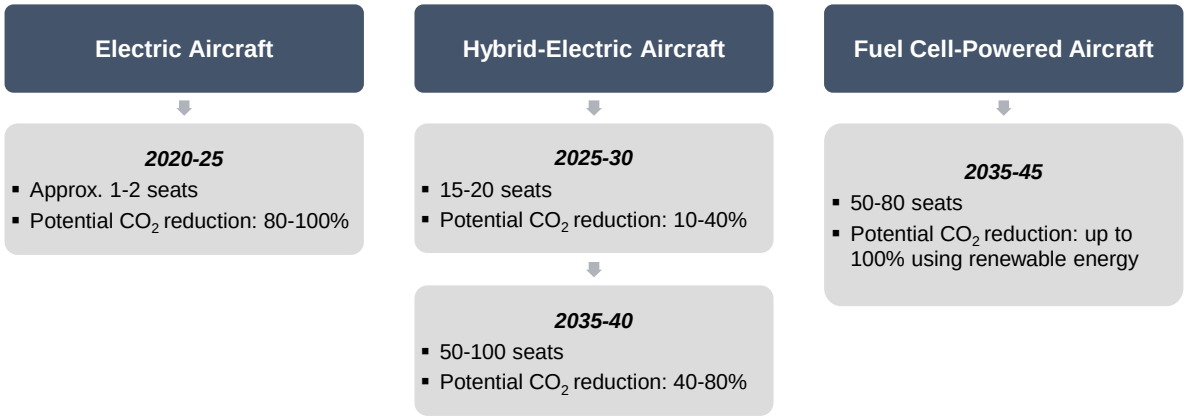
Among the major challenges associated with UAM, security concern is self-evident. There are several different ways an eVTOL aircraft or a delivery drone can be hijacked, and the safety of passengers or cargo can be compromised. For instance, GPS spoofing can feed these aircraft with false GPS coordinates and deviate it from the original flight pattern to a different location. Hence, the (cyber) security aspect should be given high priority by the manufacturers.

Moreover, these aircraft pose a physical safety threats to civilians as well. In the event of a technical failure during flight, an eVTOL or a delivery drone can crash into a civilian space leading to a catastrophe. Such incidents have been observed in delivery drone operations and serve as a use case for UAM operations as drone delivery will be first to commercialized compared to eVTOL aircraft operations that will commercialize in next few years. For instance, in July 2019, the delivery drone operated by Matternet, Inc., as a part of the partnership with the Swiss Post, experienced a technical failure during the initial test phase, and the drone parachute system failed to deploy, which led to the drone crashing into the ground from 150 feet near kindergarteners. However, Matternet, Inc. successfully resolved the technical issue by enhancing its safety system to improve the drone's reliability as showcased in the recent demonstrations. Hence, such incidents have raised concerns in the society for the mass adoption of unmanned aerial systems, especially for UAM operations where passengers are at stake.

Exploring Evolving Regulatory Environment

Regulatory framework for UAM industry is expected to witness frequent updates to ensure safe and efficient operations. For instance, for obtaining airworthiness certifications, initial phases for UAM operations is likely to be manually piloted equipped with fully electric propulsion system. The upcoming phases will have aircraft that can be operated semi-autonomously or autonomously with hybrid-electric or fuel cell powered propulsion systems.

Step-by-Step Approach in the Penetration of Electrically-Powered Aircraft into the Market



Source: IATA.org

> "Currently, civilian airspace is highly regulated and cannot be overly crowded for the safety of people and property. Liability will be very expensive, and in some cases, hard to procure. Hence, the operator needs to install compact safety systems to reduce the risk factor associated with drone operations."
>
> Last Mile Service Provider – FedEx Corporation

The key decision-making players with respect to aircraft regulations are Federal Aviation Administration (FAA) and European Union Aviation Safety Agency (EASA). They control the most advanced airspaces in the market and have the resources to change the dynamics of the market through their regulations on drones and aircraft. The regulatory and legal barriers on the use cases of the urban air mobility market for the manually piloted, remotely piloted and autonomous aerial vehicles include:

- Operation Above Street and People
- Training for Pilots and Operators
- Airworthiness Certification
- Autonomous Aircraft Certification
- Beyond Visual Line-of-Sight (BVLOS)
- Commercial Cargo Delivery Vehicles
- Air Ambulances with VLOS and BVLOS

Federal Aviation Administration (FAA)

The Federal Aviation Administration (FAA) is the civil aviation authority in the U.S. The FAA develops and modifies the regulations that support UAM operations. In FAA, the flow of information sharing, and exchange is achieved through layers, which are operator-to-operator, vehicle-to-vehicle, and FAA-to-operator to conduct safe operations. All the information and communication between the operator, FAA, and other stakeholders has to travel through highly automated distributed network systems. On December 28th, 2020, FAA announced the final rules for drones that require remote identification (Remote ID) and allowed small drone operators to fly over people at night under certain conditions.

In June 2020, FAA developed and released the UAM Concept of Operations (ConOps) Version 1.0, which is in the initial stage of development and would continue to mature with the help of ongoing collaborations between government and industry stakeholders.

In 2018, FAA ruled out certain regulations for drones near airports and certain airspace restrictions, which need to be strictly followed. These rules and regulations ought to be followed by all the drone operators flying at low altitudes. FAA's responsibility is to establish a regulatory framework, developing rules to ensure accountability.

European Union Aviation Safety Agency (EASA)

Established in 2002, EASA initiates the regulations for the drone operators in Europe and is committed to ensuring the highest level of safety standards for commercial transportation of passengers and goods over cities while promoting the technology for developing prototypes. The certification objectives for the vehicles completely depend on the operation of the aircraft, and the agency is currently engaging with international partners to achieve common standards for better products. In July 2020, EASA released a document titled, ‘Special Condition for VTOL and Means of Compliance’ for proposed means of compliance for vertical take-off and landing vehicles. EASA releases regulations for airworthiness, aircraft, airspace usage requirements, and aerodromes.

Potential UAM Regulation Across the Globe, 2021

Regulatory authorities across the world are working towards developing rules and regulations for implementing successful urban air mobility (UAM) operations. However, as the majority of UAM providers are in R&D or prototyping stages, the regulations of UAM are not clearly defined. Regulatory requirements will broadly fall under aircraft airworthiness, aircraft operations, airspace integration and infrastructure. Moreover, UAM applications will also play an important role in defining the regulatory requirements for urban and sub-urban operations. The following table mentions the potential urban air mobility (UAM) regulatory requirements for different applications.

Urban Air Mobility Regulatory Requirements

Application	Potential Regulatory Requirement
Air Taxi	Beyond Visual Line-of-Sight (BVLOS) Unmanned Traffic Management (UTM) Airworthiness Certification for Autonomous and Piloted Aircraft Operators and Pilots Certification Weight and Altitude Restriction Environmental Restriction
Last-Mile Delivery	Unmanned Traffic Management (UTM) Airworthiness Certification Beyond Visual Line of Sight (BVLOS) Flight Above People Altitude Restriction Environmental Restriction
Air Ambulance	Airworthiness Certification for Autonomous and Piloted Aircraft Operators and Pilots Certification Beyond Visual Line-of-Sight (BVLOS) Weight and Altitude Restriction Environmental Restriction Unmanned Traffic Management (UTM) Operation Over People and Streets
Air Metro	Beyond Visual Line-of-Sight (BVLOS) Airworthiness Certification for Autonomous and Piloted Aircraft Operators and Pilots Certification Weight and Altitude Restriction Environmental and Identification Restriction Unmanned Traffic Management (UTM) Flight Above People
Airport Shuttle	Airworthiness Certification for Autonomous and Piloted Aircraft Operators and Pilots Certification Beyond Visual Line-of-Sight (BVLOS) Weight and Altitude Restriction Environmental Restriction Unmanned Traffic Management (UTM) Operation Over People and Streets

Source: BIS Research Analysis

Recent Market Development

Date	Development	Description
July 2021	Agreement	The German Federal Ministry of Transport and Digital Infrastructure (BMVI) has signed an agreement on cooperation with German urban air mobility regions of Aachen, Ingolstadt, Hamburg, and North Hesse.
June 2021	Design Verification Certificate	Volocopter was awarded the first design verification certificate for its VC200-2 by the European Union Aviation Safety Agency (EASA).
June 2021	Partnership	Embraer's Eve Urban Air Mobility and Skyports entered a partnership to develop urban air mobility (UAM) solutions with a focus on developing vehicle-vertiport operations in Asia and the Americas.
June 2021	Collaboration	ANRA Technologies collaborated with Hyundai Urban Air Mobility Division to start developing an operating environment for advanced air mobility (AAM).
June 2021	Collaboration	Varon Vehicles and GE Digital collaborated to develop solutions for airspace efficiency, safety, and predictive maintenance to facilitate better routing operations in Latin America.

Source: BIS Research Analysis

https://en.wikipedia.org/wiki/EVTOL#/media/File:Volocopter,IAA_2017,_Frankfurt_(1Y7A1911).jpg

Expert Insight on Urban Air Mobility Market

Felipe Varon
Founder and CEO
Varon Vehicles Corporation

Analyst: The UAM market is an emerging market that is anticipated to grow exponentially in the next few years. Can you please tell us about your role and your organization's role in bringing UAM to reality?

Felipe: I am the founder and CEO of Varon Vehicles Corporation, a U.S.-based company. I have been working on the idea of eVTOLs for about 22 years, and I am recognized as one of the early inventors of drones because of my work with this new idea back in 1999 as an electrical engineering student. The role of our company is to provide novel transportation services. We need to figure out the value of urban air mobility, and we see this value in looking at UAM as a new form of mobility infrastructure. We have chosen Latin America for our implementation as there is a huge void of proper mobility infrastructure in the region in general that we can fill by providing this new form of mobility infrastructure, and it may be potentially disruptive when compared to traditional mobility infrastructures that are physical such as roads, train systems, metro systems, and cable cars. All these forms of mobility infrastructure have a cost-per-mile; you need to build bridges, make roads, dig tunnels, build tracks between point A and point B. For us, to generate a connection between point A and point B, we don’t need to build anything in between. That is the legacy that we have brought from aviation into the city, into the suburbs, and the regions, into the microworld. We produce this new form of mobility infrastructure and contribute to social and economic development by generating a new form of connectivity.

Analyst: There are several regulatory bodies for civil aviation across the world, but when it comes to eVTOLs and drones, the rules are still unclear in many countries. What are your thoughts on this? What is the timeframe that you are looking for to get a global set of rules and regulations?

Felipe: We need to separate drones from UAM. Drones are unmanned, and urban air mobility is about manned aircraft. Regardless of where the operators are (on-board or on the ground, such as remotely piloted), urban air mobility will have people onboard the aircraft, so by definition, UAM does not use drones. That also means that the regulations for those aircraft are different from those for drones. Drones are more mature; drones have existed for a longer time and are a thriving industry. Urban air mobility has been recently invented and we are still working on it. The way we are approaching the UAM nascent industry is by working with the regulators. We are working very closely with the Colombian Civil Aviation Authority, we are also part of the NASA's Advanced Air Mobility workgroups, in which the FAA is involved too, and we have more than three dozen collaborations with companies, aerospace corporations, universities, and others, with whom we work on how to implement our concept of operations and airspace use. We have come up with our own airspace architecture for the Latin American region. Together with the Colombian Civil Aviation Authority (CAA), we have devised a very simple way to initiate first operations. These first operations call for segregated blocks of airspaces that are low altitude and in which we can initiate our first operations with very specific characteristics. The characteristics include:

1. These are low-altitude airspaces that are currently not being used.
2. These operations will not share airspace with other aircraft; hence, we are not mixing our operations with existing helicopters and airplanes.
3. We are not burdening any of the traditional aviation assets; we are not communicating with air traffic control (ATC), and we are not using any traditional aviation assets such as radars.

UAM will use segregated airspaces that are labeled as airspaces for urban air mobility operations; these are not airspaces for general aviation or military aviation or even recreational aviation. This is a new label, a new type of airspace. We are currently working with the aviation authorities and regulatory bodies to differentiate these airspaces for urban air mobility operations. Inside these airspaces, we are developing permanently pre-determined and fixed virtual lanes with the necessary buffer zone separations to connect our Varon Vehicles vertiports. These virtual lanes will be used by our eVTOLs to service

between our vertiports, and we will orchestrate our traffic of UAM aircraft, so that the ATC is not burdened at all. And of course, we are taking all the safety measures of not only designing an architecture that is well thought out, with proper safety measures and operational capabilities but also with all of the off-nominal situation management capabilities.

Analyst: There have been multiple eVTOL demonstrations by companies, such as Volocopter, EHang, and Lillium, in countries such as Singapore, the U.S., China, the U.A.E., and Australia; are there any certifications or compliance needed to be met by the companies to demonstrate the products in countries?

Felipe: Yes, certification processes are required. Aircraft must come with airworthiness certification from origin. There has to be some sort of airworthiness demonstration from the OEM. The aircraft is one of many components of an entire ecosystem, such as air navigation components, airspace architecture components, traffic monitoring components, and vertiport ground systems. The entire operation has to be certified; even the pilots/operators, whether on-board or remotely piloting the aircraft, have to be certified to operate the aircraft.

Analyst: We have seen that the FAA and EASA have been inclined toward having an operator/pilot on-board for passenger transportation rather than autonomous systems. Is there any specific reason for this, and do you think this is going to change in the future?

Felipe: I am a very strong advocate of having the operator on board the aircraft. Existing multi-rotor eVTOLs that have the capability to hover in the air and don't necessarily require a conventional pilot; anyone with proper training instructions can operate this type of aircraft due to their simplistic nature. The two main factors that decide whether an operator should present on-board are public acceptance and safety perception. The public acceptance has several branches that includes general public, communities, non-users of the systems, and decision makers (such as politicians, zoning officers). We have to convince a lot of people not only about the safety of the aircraft and the operation but also about the value that they bring for socio-economic development. In doing so, we have to

consider the human factor and safety perception. The reality of the situation in the Latin American region that we realized through our surveys is that nearly half of the customers may not be willing to board an aircraft if there is no onboard pilot. Having said that, the aircraft that are being developed and are in production today (multi-rotor eVTOLs as I indicate above) are doing very well in demonstrating that you can have one or two occupant aircraft operated from the ground, and that is a huge game-changer because we still have at least five years of operations with those remotely operated aircraft. Due to this, public acceptance of remotely operated aircraft might increase in the near future. However, as of now, having an operator on board is something that we and most of our collaborators and partners are considering as the right way to move forward.

Analyst: The altitudes for UAM vehicles will be very low compared to commercial aviation; is there a need to specify routes or highways and altitude ranges by regulatory bodies for the vehicles to operate?

Felipe: Like any other industry, the opportunities for urban air mobility depend on the region where it is being implemented. We cannot copy a business model that was successful in the U.S. and replicate it in Latin America or Europe and expect it to work. There are fundamental differences among the regions. Differences in urban structure, culture, and economics, from one region to another, affect the needs of the UAM industry. Hence, the implementation of UAM has to be planned out for specific regions. North America and Europe are developed regions, and Latin America and Asia-Pacific regions are developing regions. In the developed regions, cities and governments lead the way, entities such as NASA and FAA propose the latest technologies and create numerous projects. For instance, in Germany, Airbus is working closely with the government for its smart city initiative. However, this is not the case for Latin America; we see that the private sector leads the way, and governments will follow it when they are convinced that this is a viable solution and there is value in the industry. It is then that government agencies come forward to regulate operations. So, there are indeed multiple opportunities for companies to expand operations in other parts of the world; they just have to take these differences into account.

Analyst: We see that the initiatives such as European Innovation Partnership in Smart Cities and Communities (EIP-SCC) in Europe have led to several UAM projects in the region. Are there any such business opportunities for the companies to expand their operations in other parts of the world?

Felipe: Yes. UAM is not about "flying cars" going everywhere all over the place; we moved away from the "flying car" concept because it implies two things that urban air mobility is not about:

1. Point-to-Point Transportation
2. Private Ownership

UAM is about mobility-as-a-service (MaaS) and it has to be very well organized, confined, and safe. It has to go along with the new values in the society in terms of mobility and in terms of environmental impact, the carbon footprint when we use mobility. That is what we need to cover when we design these new forms of mobility infrastructure, which include our vertiports, airspace architecture, and fleet of aircraft. Our airspace architecture has a structure and well labeled virtual lanes along with buffer zones in order for our aircraft to operate safely. We want them not to be involved with traditional aviation at all. Without a well-defined airspace architecture, the fleets of aircraft are completely useless, and you cannot fly them in real scenarios to provide transportation services for real customers. That's why our airspace architecture is so important.

Analyst: What role will UTM play for traffic management for UAM?

Felipe: UTM is a very important type of service that will probably be used in order to define these virtual structures in the airspace architecture. UTM systems are service providers that have the capability to define these virtual structures in the air. Unlike roads and other forms of physical mobility infrastructure, urban air mobility is virtual; we cannot see any lanes or pathways for the aircraft in the air. With the help of UTM and other air navigation technologies, we will be able to define the paths using precise coordinates and altitudes.

Analyst: Due to the huge growth in opportunities and revenue generation streams, several companies such as Hyundai, Airbus, Bell, Uber, along with numerous small and medium manufacturers, have entered the market recently and started their own business models and product portfolios that suits their target audience. What do you think about this competition between established aviation companies and emerging players?

Felipe: Urban air mobility is a completely new industry, such as the automotive industry was a century ago. It is not so much about aviation; UAM uses aviation as a tool to achieve its mission, but our mission is not in aviation; it is on the urban side of things. That is where the value of urban air mobility is, in the city, suburb, and region. There are different players and different stakeholders in every industry. In UAM, we will have aircraft manufacturers; we will have fleet operators; we will have technology providers. Today, each company is trying to find its place within the industry. There is a reason why Boeing and Airbus don't deal with the passengers; there is a reason why they don't own any airlines; there is a reason why they don't own and operate airports. Designing and manufacturing real aircraft, certifying them, and then maintaining them is a very complex task. It is a very capital-intensive endeavor as well. I think we will eventually come to understand where we all fit in this new industry.

Analyst: There are companies such as Skyports and Varon Vehicles Corporation that are developing infrastructures such as vertiports and landing pads. Apart from these, what are the other forms of infrastructure that are required by UAM, and how are they going to tap business opportunities?

Felipe: In the aviation industry, we refer to the brick-and-mortar side of things as infrastructure, and this includes airports, heliports, and jet fuel management aspects. However, we feel that urban air mobility is not about aviation. Take yourself outside of that box and place yourself in the city, in the urban environment, or in the suburbs. See its problems that arise from the lack of mobility infrastructure, or proper connectivity such as lack of trains, lack of proper roads, or lack of metro systems, place yourself there and ask yourself this question. We see the entire urban air mobility operation as a new form of

mobility infrastructure. That is a big change in perspective. There are three components for our mobility infrastructure, namely, our vertiports, our airspace architecture, and our fleet of aircraft. We do not manufacture the aircraft or develop the technologies; we're integrating everything to operate our fleets between our vertiports. We will be providing transportation services, seeking socio-economic development with positive environmental impact via our new form of mobility infrastructure. To do that, we cannot do it from a helicopter perspective; we cannot do it from the aviation industry perspective. We need to do it from a city perspective. We think urban air mobility is about addressing the city's problems.

With our mobility infrastructure, we will address the lack of proper mobility infrastructure that leads to traffic congestion, loss of time, public health problems, inaccessibility of many parts of cities, etc. We will be able to come to governments and show them that we can generate a connection in a much more agile and cost-efficient way, without any cost-per-mile. There is an operational cost, but we don't need to build anything in between, and this is a revolution for mobility infrastructure.

To answer that question, we need three components to tap into the opportunities, which are vertiports, airspace architecture, and a fleet of aircraft. There are many technologies involved in each one of those three components. Vertiports need a lot of development in design and technology. Airspace architecture requires a lot of air navigation, air monitoring, situational awareness, surveillance, and data links technologies. Additionally, the aircraft require a lot of technologies for navigation, onboard systems, and safety features. This is all we're integrating into one single form of mobility infrastructure.

Analyst: What are your final thoughts on the opportunities driving from air taxi operations, and what are the other opportunities that will be benefited from UAM operations?

Felipe: For air taxi operations, we will have to collaborate with ride-hailing companies. We have to integrate the three components of our mobility infrastructure (fleet of aircraft, airspace architecture, and vertiports) with the platforms of ride-hailing partners. Imagine taking a passenger from their origin to their destination. If a passenger chooses to fly as part of the trip, we will have to pick up and take that passenger to the nearest vertiport, have the

https://en.wikipedia.org/wiki/EVTOL#/media/File:Wingcopter_Vaccine-delivery-Vanuatu_Closeup.png

aircraft ready and orchestrate the demand of many passengers. The person reaches the destination vertiport and then is picked up by a vehicle and taken to the final destination. All of this has to be done in an efficient way for it to make sense. In addition to this, we need to operate UAM in densely populated urban centers. Think about the level of complexity in this process. We are still very, very far away from seeing this happen in reality. There are several other markets that UAM can address much simpler and faster than air taxis.

Urban air mobility will not happen overnight, and it will not begin inside the cities. That is a misconception and a wrong perspective fueled by the media. Urban air mobility will happen from the outside in. We will start in the regions, in the unpopulated areas. Then we will start in the suburbs, and eventually, over the years, as all this matures, we will eventually come into cities with operations inside the existing urban structures.

So eventually we will reach the air taxi market. This cannot be done by urban air mobility operators alone. It must be done together with ride-hailing companies. They already have the customer base, they deal with the Business-to-Consumer (B2C) side of the business, and they have the platforms.

I want to convey this to you so that we can separate the idea of flying taxis as one potential market from the nature of urban air mobility, which is way broader. There are seven other big markets that we have identified. We can start tackling several of those markets that don’t have the level of complexity and tremendously huge challenges of the air taxi market. For example, tourism and logistics markets are relatively easier to penetrate. These are initial urban air mobility operations that we see that might take off early. We reserve the right to be wrong, of course. There were things before that we were confident about but that we might be wrong about because of the changing nature of our nascent UAM industry.

Strategic Recommendations

Focus on Collaborating with Industry Players for the Right Business Model

Industry players across the verticals are developing strategic partnerships and collaborating to leverage their expertise to develop the UAM environment. Companies such as Varon Vehicles, Hyundai, Hana, and Honeywell are entering the UAM market.

Increase Investments to Develop Suitable Infrastructure for UAM Operations

Technological advancement, coupled with increasing investment to accelerate the development of vertiports, charging stations, and docking stations in urban areas, is needed for initiating UAM operations.

Conduct Several Programs to Eliminate Social Barriers

Programs and trials are needed to be conducted on a larger scale to educate and eliminate the fear of unmanned operations for large-scale adoption of UAM operations in urban areas.

Source: BIS Research Analysis

Some of BIS Research reports on the Drone/UAV sector are:

- Global Urban Air Mobility (UAM) Market
- Global Remote Drone Identification System Market
- Global Electric VTOL (eVTOL) Aircraft Market
- Global UAS Traffic Management (UTM) System Market
- Global Drone Delivery Market
- Global Cellular-Connected Drone Market
- Global Unmanned Aerial Vehicle (UAV) Market
- Global Autonomous BVLOS Drone Market
- Global Autonomous Drone Wireless Charging and Infrastructure Market
- Global UAV Propulsion System Market

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