A ROADMAP FOR LOCAL AUTHORITY-MANAGED DRONE AND URBAN AIR MOBILITY (UAM) ECO-SYSTEMS

Each city and region is different, so no two urban drone/UAM eco-systems will be exactly the same - they will need to be developed around the priority services determined by citizens, taking into account the opportunities and risks that will need to be managed.

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During April and May 2021 CIVATAglobal held four webinars bringing together representatives of European local authorities, regulators, governments, the drone/urban air mobility (UAM) industry and city planners (https://www.civataglobal.org/civataglobal-events) to discuss how to develop an appropriate governance structure for developing drone/UAM eco-systems. This whitepaper encapsulates the conclusions of the expert discussions and adds an outline roadmap for drone/UAM implementation for local authorities, to provide a focus for discussion around how drone/UAM eco-systems should sequentially be developed. There was clear consensus that given the complexity and novelty of these systems that a template roadmap for local authorities to refer to in developing their drone/UAM eco-systems is a necessary step.

Urban air mobility (UAM) is very new type of industry. It is currently a "technology push" sector, developing not in response to a particular demand but as the result of technological advances. For it to succeed it will therefore need to evolve into a "community pull" industry, where communities understand both the benefits and the challenges of drone/UAM urban operations and eco-systems are developed around the expressed priorities of community leaders, the travelling public and people who will be overflown by these new aircraft types.

As each city and region is different, no two urban drone/UAM eco-systems will be exactly the same. Some cities will want to move immediately to develop city-centre passenger services unrelated to small drone operations. Others will want to trial suburban drone operations for many years before bringing these missions closer to the city centre. Other may decide that, based on the results of their community engagement, drone/UAM services are not for them. But even these communities will have to contend with the growing challenge of unregulated drone activity in their neighbourhood, requiring intervention from police, security agencies and local authorities (see "risks and benefits" table below).

What sequential steps should a local authority take to develop a drone/UAM eco-system?

Early research[1] suggests that communities are more positive towards drones once they have directly experienced drone flights overhead and the services they offer. This means that the key to unlocking community acceptance is to trial operations and then poll residents and businesses on their preferences and priorities. Once this becomes clear it will be up to the local authority – supported by legal and technical experts - in concert with drone/UAM operator and national regulator to determine the governance framework in which the eco system is built and developed.

In some cities, this process is being led by the drone operator itself with the launch of trial services – but the local authority will need to bear in mind that eventually there will be many different drone/UAM operators working in a limited airspace and that scalability, interoperability and flexibility will have to be integrated into the operational and governance design of the individual eco-system, to take account of future as-yet undetermined technologies, drone/UAM operators types and business models. Interoperability must be a key characteristic. Cities will not be connected if proprietary systems are deployed and adopting international standards is one way to help mitigate this risk.

[1] https://blog.wing.com/2021/04/public-sentiment-drone-delivery.html

Trial operations will need national safety aviation regulator support and approval.

Urban Air Mobility is on an evolutionary path

- The current age, 2021-2024, will see the development of regulations and standards for passenger-based UAM services while the first cargo urban air mobility services – including medical, fast-food and package deliveries – are trialled and commercially tested. Wing, EHang, Zipline are pioneers in this area. This stage will also see the formation of links between local authorities, regulators and UAS service operators which will provide the framework for future passenger operations.

- The first age of UAM, 2025-2035, will see the introduction of piloted eVTOL services, charging premium prices to individual passengers for city-centre to airport landing site routes, inter-city services and airport-to-airport transfers.

- The second age of UAM, 2035 and beyond will be the age of autonomy, quiet flight and mass transport. The route network will have expanded to city-centre to city-centre flights, connecting regions with metropolitan centres. Electrically powered regional aircraft will connect cities via existing suburban airports.

Understanding the risks and benefits

While it is essential to understand the headline risks and benefits (see table below) perhaps the biggest challenge for local authorities is to understand fully the complexities, costs and time-consuming tasks they will have to undertake to prepare themselves for this imminent transport revolution. Urban planning cycles are lengthy and often require more than 10 years to plan, budget and implement major projects that impact core urban services. The technology maturity levels, standards and regulations may not be in place before 2024 to enable passenger carrying operations in electrically-powered air vehicles for most countries. But cities need to start planning now, identifying sites and designing approach and departure routes for these passenger services and cargo-carrying drone operations. When cities start to remodel their rail stations, for example, it is important to make sure UAM is part of their multi-modal future.

Although the first operations will most likely be introduced by a single drone operator, developing a city wide UAM network of landing/take off sites integrated with approach/descent paths and air corridors will involve many entities, down to the level of organisations leasing space in individual buildings, defining areas where drones can and cannot go, what type of vehicles will be allowed and which services should be prioritised. An “end-state” UAM eco-system will comprise multiple sensors and masts for communications and tracking (both cooperative and non-cooperative air vehicles) along with the provision of localised weather data. While many stakeholders will be able to provide hardware and software at no cost to the local authority - generating revenue from operators once the systems are in place - it will be important to understand the business plans of all infrastructure providers and what costs/revenue opportunity implications are for the local authority.

Opportunities
• Possibilities of new revenue earning opportunities • New fast, cheap, environmentally-friendly delivery services of vital supplies and commercial goods • Accessibility to hard-to-reach locations. An air bridge to an island avoids waiting for a twice-daily ferry service to deliver time sensitive items. • Possibilities of longer range affordable regional flights to tourism attractions currently serviced by helicopter operators charging high fees. • Opportunities to improve inspection and mapping services more cheaply and safely, reducing risk to human life • Potential to, eventually, reduce traffic congestion • Improved environmental monitoring • Improved first responder operations, saving lives • Development of new passenger services • The expansion into the third dimension of urban mobility
Threats
• Increased risks to citizens in terms of safety, environmental nuisance and privacy • Potential cost and workload increased in financial, legal and insurance obligations as a result of the above • New potential for criminal and security threats • Increased risks to areas of environmental sensitivity and wildlife preservation • Increased risks of damage to property

A previous CIVATAglobal white paper (*Developing Local Authority Responsibilities for sUAS and UAM)* https://www.civataglobal.org/post/new-white-paper-developing-local-authority-responsibilities-for-suas-and-uam has outlined the challenges to understanding the roles and responsibilities of national aviation and local authority regulators. As this is an entirely new industry the regulatory and governance frameworks needed to underpin the safety and security of this sector have yet to be fully formed. But the following roadmap is an early blueprint, developed to inspire discussion and debate, on how local authorities can begin the task of planning drone/UAM operations from first flights to eventual establishment of an entire eco-system. It is fully understood that what will work for one community will not work for another. That some of the tasks can be done in parallel and not sequentially. But all these milestones will have to be addressed by local authorities and partners; the earlier this process starts the smoother the road will be.

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A potential roadmap for local authorities developing an urban drone/UAM ecosystem