DEVELOPING LOCAL AUTHORITY RESPONSIBILITIES FOR sUAS OPERATIONS AND URBAN AIR MOBILITY

Cities and national aviation regulators need to start working together now to ensure small, unmanned air systems (sUAS) and passenger-carrying vehicles will be able to operate at scale safely and efficiently over people.

A white paper prepared by:

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In most parts of the world[1] for operators planning to fly sUAS (or "drones") above people the issue is simple: the national aviation safety regulator alone is responsible for deciding whether the operator's risk assessment meets the criteria for allowing safe operations. If it does, then the operator is free to fly. The local authority can support the civil aviation regulator with information on go/no go areas, wildlife sancturies, hours of permissable operation etc so this can be passed on to the operator in the form of an aeronautical information alert. But this information, if sought at all, is part of an operational[2] licence/permit, which also merans being compliant with local authority regulations. The regulation of sUAS is currently an operational issue.

For many cities, this state of affairs is unsatisfactory. They want a locally informed, political stake in the new transport systems being developed in the skies above. They want, *inter alia*, a role in deciding the priority of operations (emergency services ahead of pizzas), the ability to prosecute infringements of the public use of the urban airspace and a deciding role where take-off and landing sites are to be built. At the December 2020 Amsterdam drone week event members of the Urban Air Mobility (UAM) Initiative Cities Community (UIC2), presented their 'Manifesto on the Multilevel Governance of the Urban Sky', defining the tasks and responsibilities which local authorities should be responsible for in the management of drone and UAM services, arguing that cities should have the deciding role in the governance of UAM operations in their territories.[3] Most cities control the ground transport network from their own control centres – why should the sky be any different?

Further, as the potential scale for sUAS and air taxis services is properly understood they will need to be integrated into the current ground-based transport networks.

"Drones will not operate in isolation. Rather, they will be integrated into a larger, inter-modal transport system. For example, freight may travel by boat, rail, or truck, and then be transported by airborne drone to its final destination; and passenger drones may transport people to airports or rail stations as just one leg of their journey. In some cases drones may act as a complement to existing modes, helping to fill gaps in the network and making it more viable for people to get around without the need to own a private vehicle. In other cases, drones may act as a substitute, or induce demand for new trips which otherwise would not have been made or that were not previously possible to make.[4]"

Small UAS operations above people have never been an exclusive operator-regulator business. In Europe and North America sUAS operators need permission from landowners to take off and land. Many local authorities and national/local landowner organisations charge fees or in some way restrict sUAS operations from flying above their land – even though this may conflict with national aviation law.

According to Richard Ryan of UK law company Blakiston's Chambers, drone & counter drone law specialists:

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[1] There are exceptions. Hamburg City's airspace is under the responsibility of an air supervisory authority which is responsible for the airspace up to 350 metres above the city (https://wingmag.com/en/urban-air-mobility-how-sUASs-could-relieve-traffic-interview-hamburg-aviation-part-2)

[2] In the UK, CAP722 makes reference to the fact that an operator must be compliant with local authority regulations.

[3] https://www.amsterdamdroneweek.com/press-releases/cities-regions-manifesto/

[4] https://www.itf-oecd.org/sites/default/files/docs/take-off-integrating-drones-transport-system.pdf

"…There are competing interests between state law, as enacted and enforced by a regulator, and the local state seeking to enact a local law for good rule and government. It is apparent that the two are not operating in harmony in the UK and in other jurisdictions."

In the USA these legal uncertainties are magnified as states, as well as cities and land-owning organisations are passing their own laws restricting sUAS operations. Most of these are yet to be litigated, but that is happening. The Federal Aviation Administration (FAA) has a well-established right of pre-emption on aviation matters. The question is how far that extends.

A January 2021 report entitled *Which States are Prepared for the Drone Industry? A 50-State Report Card, Release 2.0*[5] by Mercatus Research at the USA's George Mason University, measured the level of readiness across the US for the sUAS industry and highlighted the disparity between many US states in their sUAS/UAM laws. The report scored and ranked each of the 50 US states based on their laws and sUAS industry data to indicate their preparedness for sUASs and sUAS highways.

"Many states have laws that allow cities to lease the air rights above public roads, vest air rights with property owners, and establish navigation easements," according to the report. *"With these laws, states can facilitate future drone operations in low-altitude airspace while Congress and the Federal Aviation Administration (FAA) develop national drone policies. Creating a clear and coherent framework at the state and local level, such as a system of drone highways, will make parcel delivery faster, improve distribution of medical supplies, and create technology and logistics jobs,"*

In the European Union, a similar study is underway – the Governance for New Mobility Solutions programme.[6]

One of the reasons North Dakota tops the Mercatus ranking is because state law has reduced litigation risk for sUAS operators by clarifying landowner property rights. It also creates a navigation easement that protects sUAS operators from nuisance and trespass laws as long as their sUASs do not disturb people on the ground. Interpretations of nuisance and trespass vary in many jurisdictions, as it does in different US states.

It is, perhaps, surprising there should be such an apparent difference between US states on their willingness to welcome or oppose sUAS and UAM operations, given the predominance of federal regulatory bodies in the aviation domain. The NASA 2018 Urban Air Mobility Study identified ten states where state-wide laws had been passed which in some way contain sUAS operations from prohibiting (in Florida) "*a person, a state agency, or a political subdivision from using a drone to capture an image of privately owned real property or of the owner, tenant, occupant, invitee, or licensee of such property with the intent to conduct surveillance without his or her written consent if a reasonable expectation of privacy exists"* to prohibiting (in Texas) "*UAS operation over correctional and detention facilities. It also prohibits operation over a sports venue except in certain instances."*[7]

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[5] https://www.mercatus.org/publications/technology-and-innovation/which-states-are-prepared-sUAS-industry-0

[6] http://h2020-gecko.eu/

[7] https://escholarship.org/content/qt0fz0x1s2/qt0fz0x1s2.pdf

The FAA's new approach to community engagement in airspace management

The US Federal Aviation Administration has in recent years started to accommodate the concept of local authorities playing an increasingly cooperative role in the management of low-level airspace[8]. For example:

- The 2018 FAA Reauthorization Act included in the provisions for UAS Integration Pilot Program (IPP) the ability of states and localities to establish time, manner, and place restrictions on sUAS operations. "Instead of a dictate from Washington, this program takes another approach. It allows interested communities to test sUASs in ways they are comfortable with," said Secretary of Transportation Elaine Chao introducing the first IPP programs.

- The FAA's UTM Concept of Operations version 1.0, has included in its framework the provision for UAS service suppliers (USS), to work "with states, municipalities, and other entities as required ensuring local airspace access restrictions, or pre-emptions, are incorporated into, and maintained in, the USS Network and Operation Volumes are de-conflicted from these areas during the intent sharing processes."

There are still many issues to be resolved in different jurisdictions around the current legal status of sUAS operations before the wider issues of how and whether sUAS/UAM traffic management responsibilities can be devolved to municipal authorities; aside from addressing the issue of 'capability' within municipal authorities that can deal with such matters. However, in NASA's latest UAM concept of operations it references the possibility of local authorities assuming this role.

"NASA's ConOps carries over another concept from the FAA's version: providers of services to UAM (PSUs). Qualified PSUs may be either public (e.g. provided by a local government) or private (a third-party service provider). They provide highly automated flight planning support and air traffic management services within the UAM operating environment (UOE), leaving ATC free to focus on its traditional responsibilities. (January 2021).[9]"

With so few sUAS operations meeting the risk assessment criteria for flights over people – and even fewer for flights over people beyond visual line of sight (BVLOS) – this has not yet become an existential issue for sUAS and (soon) UAM operators. However, it is likely that by the end of 2023, many of the regulations, standards and technical maturity levels will exist for sUAS and UAM operators to start detailed, imminent plans for autonomous BVLOS flights over people in Europe and the USA. This will somewhat be aided by the European Aviation Safety Agency's (EASA) regulations that pertain to the certification of sUAS, which enables a risk transfer from operator to manufacturer.

The challenge facing cities and national aviation safety regulators is to start deciding now where the responsibilities will start and end for civil aviation regulators, local authorities, operators and other stakeholders; providing a regulatory and operational framework so sUAS and UAM operators can begin to safely scale up autonomous operations within the

[8] The Air & Space Lawyer, 2018. Article by William Goodwin and Tyler Finn of AirMap
[9] https://evtol.com/features/nasa-conops-urban-air-mobility/

city. Defining a key set of detailed airspace management rules based on sUAS capabilities – maximum range, altitude and speed, for example – will probably be needed before identifying which organisation should take ultimate responsibly for managing the airspace. This will be a highly complicated business because the 3D airspace map above the city which will be used to define areas of permissible operation will depend not just on sUAS performance but the location and ownership of buildings and land. A single building or plot may have several owners or rental inhabitants, some of whom will be relaxed about drones flying nearby but others (such as government security agencies) will not.

"For us, one of the first fundamental questions is where is the map that describes the urban UTM area with the entry and exit points going to be published – via current aviation channels or somewhere else?" asked Richard Parker, Chief Executive Officer of UAS traffic management company Altitude Angel at a recent CIVATAglobal webinar, *Scaling up from drones to air taxis*[10]. *"This will involve many entities, down to the level of individual buildings, defining areas where drones can and cannot go, what type of vehicles will be allowed and what the approach path might be. We don't yet have a centralised system anywhere capable of taking that fidelity of information and distributing it."*

For a sUAS/UAM ecosystem to function fully at a local level it will need a stable framework with clear lines of authority and competence to operate between national regulators, state and municipal laws which cover more than just aviation matters.

According to the US Community Air Mobility Initiative:

"Federal laws and regulations generally pre-empt state and local legal authorities that purport to regulate aviation. However, laws traditionally related to state and local police power, including land use, zoning, privacy, trespass, and law enforcement operations - which indirectly impact the use of airspace - are generally not subject to federal regulation."[11]

It will not be possible for the FAA, EASA or national aviation authorities to manage urban air traffic management systems in each city where they are required, so the most likely scenario is for regulators to determine the high-level aviation rules, including the risk assessment procedure, but then delegate to individual sUAS/UAM ecosystem operators the day-to-day management of operations. Precedents of a kind exist for this in the form of the outsourcing of operations of airport traffic control towers in both the US and Europe – but these, of course, do not cover issues of managing operations which take into account local authority derived by-laws as by-laws are traditionally focused on restrictions that relate to the ground and not the air.

But low-level crop-dusting and helicopter emergency services (HEMS) in the USA do have to take account of local rules, which for HEMS operators includes guidance on where they can take off or land for routine operations.

"We need to consider whether there should be a framework in place for the civil aviation regulator to delegate the governance of airspace management to the local authority,"

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[10] https://www.civataglobal.org/civataglobal-events

[11]https://static1.squarespace.com/static/5d27bb3e330ac30001dc14fd/t/5eab9daacef345241a6ee03c/1588305330126/LegalConsiderations_P1_CAMI.pdf

according Emma Warner-Reed, of UK law firm Davitt Jones Bould, one of the speakers at the recent CIVATAglobal webinar "Responsibilities, risks and opportunities," (https://www.civataglobal.org/civataglobal-events), "*and local authorities should be part of the process of shaping national regulatory processes for sUAS use."*

The delegated sUAS/UAM ecosystem management would most probably be led by the local authority in partnership with an aviation expert company to carry out day-to-day operational tasks, including introducing more automation in line with national programmes. A number of operating models would be available. The exact shape and incorporation of that entity is a matter for local law and regulation.

According to the Canadian Advanced Air Mobility Consortium:

"There are various concepts of how the airspace could be managed. One is having a single authority for managing the urban airspace on a daily basis, with the UTM entity opening and closing routes, granting flight authorizations, and executing a single, integrated flow management plan. It would collect, analyze, and exchange airspace and flight information to support safe operations. When an emergency or off-nominal situation arises during flight, the UTM entity would have human operators communicate with pilots and fleet operators to guide aircraft to safety. Other concepts allow for the coexistence of multiple UTMs that collaborate under a set of prescribed requirements. A mix of beacon (cooperative surveillance) and radar sensor (non-cooperative surveillance) systems will monitor traffic and the location of aircraft in areas of the UTM entity airspace most likely to exhibit high traffic volumes. These surveillance systems will also interact with counter-UAS (C-UAS) systems to detect any unauthorized flights that may pose a threat to traffic[12]"

This final sentence is important because it hints at some of institutional complexities which will complicate the creation of these sUAS/UAM eco-system management companies. Ensuring the airspace above a city is secure from rogue sUAS operations will involve both detection and mitigation elements – with the detection of non-compliant sUASs and UAM vehicles probably within the authority of the municipal traffic management officer but the mitigation element definitely not. This poses a number of urgent questions which need addressing:

Would securing municipal airspace be seen as an issue of national security – in which case it will need to be addressed by national security agencies – or a matter for the local police?

What would the sUAS/UAM eco-system management company's relationship be with the national air navigation service provider?

Would the sUAS/UAM eco-system management company become integrated within the national airspace management eco-system or would it be a separate entity with its own global association?

How much variance will there be in the structure and range of responsibilities of sUAS/UAM eco-system management companies around the world?

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[12] https://c6y.c34.myftpupload.com/wp-content/uploads/2020/12/AAM-White-Paper-Master-Draft-V15.pdf

Given the current difficulties of agreeing where jurisdiction may lie when relatively simple sUAS operations take place it is clear that work needs to begin now - in the first part of the crawl, walk, run cycle of UAM development – to bring together national aviation regulators and municipalities planning UAM operations to discuss how sUAS/UAM eco-system management can take account of all stakeholder interests. The earliest sUAS/UAM ecosystems are likely to be formed within City States – such as Dubai and Singapore – or within non-municipal environments – such as ports and airports. While these may provide valuable signposts to the technical and operational requirements of such an eco-system they cannot demonstrate how a single city within a State should develop its own sUAS/UAM operational management organisation. This needs to be urgently addressed.

CIVATAglobal

March 2021

With thanks to:

Adam Cohen, University of Berkley,

André Freitas, TISPT - CONSULTORES EM TRANSPORTES, INOVAÇÃO E SISTEMAS, S.A.

Richard Ryan, Blakistons