The Challenges to Urban Air Mobility

By Jeffrey J. Immel and Jonathan Alexander Langlinais

Time is money, and time spent in traffic is money wasted. In 2013, the United States, Germany, France, and the United Kingdom lost a combined $200 billion in costs associated with traffic congestion, and that cost is expected to rise to $293 billion by 2030. Annual hours wasted in traffic are expected to rise by six percent over that same time period.[1] According to a white paper published by Uber Elevate in 2016, the average San Francisco resident spent 230 hours commuting between work and home in 2015, which amounts to half a million hours of productivity lost every single day.[2] Meanwhile, Los Angeles residents spend roughly two workweeks each year stuck in traffic commuting to work.[3] Consumers and businesses have powerful incentives to find solutions to this growing problem of wasted productivity.

One concept rapidly gaining traction as a solution is urban air mobility (UAM). Somewhat like the "flying cars" of popular imagination, UAM aircraft would provide on-demand, highly automated, passenger or cargo-carrying air transportation services within and around a metropolitan environment. Rather than take a car and fight crowded interstates and surface roads, UAM would allow an individual to take an aircraft from point A to point B. Typically, UAM proposes using electrically powered, vertical takeoff- and landing-capable (eVTOL) aircraft. Often, the concept involves highly automated aircraft that may come without any human pilot.

Overview

While the technology that underpins UAM is novel, the concept of using aircraft to move around metropolitan areas is not new. For decades, helicopters have been used as a premium means for urban travel, with varying degrees of success. Recently, both United Airlines and Delta Air Lines have attempted some sort of program to ferry passengers willing to pay the extra cost from a helipad in New York City to one of the metropolitan airports.[4] Uber Elevate, a leader in UAM, has recently unveiled a similar program in New York City as the first step toward its future UAM product, Uber Air, whereby individuals can take an Uber from their home to a nearby heliport, hop on a short helicopter flight to JFK, and then grab another Uber trip to their terminal.[5]

Still, it is the technology that makes UAM exciting and may lead to its success where more traditional methods of air transportation have failed. The Boeing Company has estimated that self-piloted electric VTOL configurations could reduce total operating costs per seat mile by 26 percent compared to piston-engine helicopters used today. These savings come from a combination of a) a reduction in fuel and maintenance costs associated with electric propulsion, b) no costs for onboard piloting or equipment to support an onboard pilot, and c) cost reductions enabled from advanced manufacturing processes.[6]

Moreover, eVTOL aircraft will use zero-emission vehicles that operate quietly, unlike traditional helicopters, which have been plagued by concerns about noise and air pollution.

The success of UAM will depend in large part on scalability. For example, Uber's initial plans call for "'mid double-digit thousands' of flights per city per day"[7] and anticipate each vehicle operating at over 2,080 hours per year, as opposed to 300 hours per year for the average commercial helicopter. Uber believes that this scale eventually will help to reduce costs to below those associated with purchasing a car.[8]

Potential Barriers to Success: Local Issues Likely Will Predominate

The bottom line is that, while the technology and business aspects of UAM will be novel and at a scale never before attempted, the federal regulatory model for such operations already exists and can serve as a useful and productive starting point. For example, while there are certain issues related to the certification of eVTOL aircraft, such certification can be accomplished—and is currently being pursued by several companies—within the existing framework with necessary waivers, exemptions, and deviations. While fully or highly autonomous

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vehicles (AVs) will present significant challenges, many UAM companies are planning on beginning operations with piloted aircraft while certification of unmanned aircraft is worked out. Similarly, while the sheer number of aircraft flooding already dense urban airspace will present a challenge to air traffic control, the framework for authorizing such flights already exists, including the establishment of visual flight rules (VFR) corridors, pre-approved routing requiring limited interaction with controllers, and equipage requirements. Such mitigation strategies have been used for years with helicopters, including for aerial tours, and would be available for adaptation to UAM concepts and technological advances, such as dynamically opening, closing, or moving VFR corridors based on demand.[9]

Ultimately, although the federal regulatory landscape will likely need to evolve to meet certain of UAM's unique requirements—think pilot minimum-qualification standards, given the sheer volume of necessary aircrew and highly automated aircraft—it should not prove to be a true barrier for UAM. Instead, the likely pacing factor will be local and state regulations and concerns, as illustrated by the following examples.

Zoning and Construction

Typical UAM concepts have the eVTOL aircraft picking up passengers at a "vertiport" and dropping them off at either an airport or another vertiport. The concepts for vertiports vary from a simple concrete pad to an actual air terminal, but the basic idea is a variation on a traditional heliport. Federal Aviation Administration (FAA) guidance on heliport construction and operation would serve as a useful starting point for vertiport construction and could likely accommodate almost any vertiport design.[10] However, local concerns such as zoning ordinances and construction permits will likely present a much more formidable challenge to UAM operators. Just as importantly, perceived safety, noise, and congestion concerns and not-in-my-backyard campaigns are certainly to be expected, no matter where the vertiport would be located. In fact, local concerns led to the effective banning of rooftop heliports in New York City following a 1976 helicopter crash.

Nuisance and Trespass

Nuisance and trespass laws can also be expected to cause issues for UAM operators. *Aerial trespass*, as currently defined in the *Restatement (Second) of Torts*, is "[f]light by an aircraft in the air space above the land of another . . . if, but only if, (1) it enters into the immediate reaches of the air space next to the land, and (2) it interferes substantially with the other's use and enjoyment of the land."[11] The term *immediate reaches* was first used by the Supreme Court in 1946 in *United States v. Causby*, a case that held that the repeated approach of military heavy bombers at a height of 83 feet over an individual's house could constitute an unconstitutional taking under the Fifth Amendment.[12] However, the Court declined to define precisely what the limits of the immediate reaches were, holding only that "[f]lights over private land are not a taking, unless they are so low and so frequent as to be a direct and immediate interference with the enjoyment and use of the land."[13] While it is unclear whether the reasoning of *Causby* would extend beyond the Fifth Amendment to state tort laws, repeated flights on the order of thousands per *day* may nonetheless give rise to a claim that the operations are "substantially" interfering with the landowner's enjoyment of his property. The number of flights may also give rise to a traditional nuisance claim.

Additionally, consideration is being given to redrafting tort and nuisance laws to specifically address whether novel aircraft and uses such as package delivery by drones and UAM even fit within the existing legal landscape. Frameworks suggested recently include those that redefine *aerial trespass* to remove the interference requirement and to more closely align with the no-harm standard of trespass on land or those that impose a "bright line" in the sky below which operations would constitute per se trespass and nuisance.[14] However, none of these have been implemented without at least significant exemptions that would permit FAA- and Department of Transportation–approved operations.

Regulation at Airports

One area in which local and federal regulatory authorities and interests will come into conflict is the regulation of UAM, UAM-related operations, and multimodal transportation at airports. In fact, airports are now an active hub for the testing and development of AV technologies. Today, airports around the world are exploring ways to integrate autonomous technology into their operations. Several international airports have explored using AVs to shuttle employees and cargo across runways and incorporating AVs into their surface transportation options.[15] Beyond the transportation space, other airports have experimented with the use of drones to improve airfield inspections and bird control.[16] In short, the world's airports are likely to be a locus of innovation and experimentation in the development of AV technologies, including UAM.

Airport authorities and local governments with jurisdiction over airports are also likely to be major players in the regulation of UAM, at least in the near term. This is unsurprising. For now, despite the plans for vertiports—and perhaps because of the local issues with developing them—airports are one of the few places in metropolitan areas that currently have both the space and infrastructure needed to support a significant number of passenger and cargo aircraft. They are also a natural destination and point of departure for UAM customers, including business customers shipping cargo to and from airports and individuals

looking to avoid congested highways on their way to and from their flights.

Although the FAA has jurisdiction over the safety and flight of aircraft, local airport authorities typically have broad powers over the operation and management of airport facilities, subject to federal grant assurances and other FAA regulations and rules.[17] Airport authorities also generally have the power to set rules and collect fees on certain commercial operations at airports, including for services such as taxis and ridesharing. Like any other mobility companies serving customers at airports, companies involved with UAM services will likely fall within the jurisdiction of airport authorities for at least some of their operations. So the regulations and fees adopted by airport authorities, as well as applicable state or local taxes, will be important factors for these companies to consider as they develop their UAM lines of business and make decisions about where to deploy aircraft.

As autonomous transportation options grow and become more commonplace in metropolitan areas, airport authorities will likely retain some significant autonomy of their own to regulate UAM. The way that states have chosen to treat the relationship between AVs and airports is instructive. Many states have adopted legislation that expressly preempts local regulation and taxation of AVs. However, some of these states have expressly carved out airport authorities from this general rule. For instance, Nevada's AV statute makes clear that its preemption of local regulation does not prohibit an airport or airport authority from imposing permit requirements, charging fees, or complying with "any other requirement to operate at the airport."[18] Likewise, Florida's statute broadly preempts local regulation and taxation of AVs. But it allows airports to charge "reasonable fees consistent with any fees charged to companies that provide similar services at that airport" and to set rules for staging, pickup, and similar operations.[19]

Other states that preempt local regulation of AVs might still allow airport authorities to regulate AVs insofar as they are picking up and dropping off passengers as part of a ridesharing or "transportation network company" (TNC) business. TNC is generally defined as a company that allows passengers to prearrange rides with drivers using a digital network.[20] States often give airport authorities express powers to regulate TNC operations at airports. For example, the Texas Transportation Code provides that no political subdivision may "impose a franchise or other regulation" related to the operation of AVs,[21] and the Texas Occupations Code also broadly preempts local regulation and taxation of TNCs.[22] Yet the Occupations Code also provides that airports "may impose regulations, including a reasonable fee, on a transportation network company that provides digitally prearranged rides to or from the airport."[23] This could in theory be taken as authority to regulate AVs to the extent that they are operating as part of a TNC.

Airport authorities in several states retain at least some power to regulate AVs and impose fees on their operations, and we expect that airport authorities will have similar powers in the future to regulate the operations of UAM as these modes of transportation continue to grow. That should be somewhat unsurprising as a policy matter, given the special logistical challenges associated with having autonomous aircraft taking off and landing in active airspaces at and around airports. Indeed, bringing UAM to airports will add a fair bit of complexity to the airport ecosystem—and arguably more so than the introduction of autonomous surface vehicles, which promise to one day merge into the existing stream of human-driven cars and buses traveling into and out of airport pickup and drop-off lanes. For these reasons, we do not expect airports and airport authorities to have any less authority to regulate UAM than they currently have to regulate AVs. Companies developing their own UAM lines of business will therefore want to take an active role in monitoring the development of rules and regulations governing airport facilities.

Conclusion

Ultimately, UAM has captured the aviation industry's imagination and generated enormous interest because of the novel technologies and the potential to redefine urban travel. However, from a regulatory perspective, air travel in metropolitan areas is not necessarily novel, and legal and regulatory frameworks exist to address most, if not all, of the perceived hurdles to gaining regulatory approval to operate from an aviation perspective. It is much more likely that the difficulty in implementation will lie not with technological development or federal aviation regulatory bodies but with state and local authorities and policies. Solving state and local issues will be the major challenge to opening the skies to UAM.

Endnotes

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2. Uber Elevate, Fast-Forwarding to a Future of On-Demand Urban Air Transportation 2 (Oct. 27, 2016), https://www.uber.com/elevate.pdf.

3. *Id.*

4. *See, e.g.*, Brendan Dorsey, *Delta Partners with Blade for Helicopter Transfers at JFK*, Points Guy (Apr. 25, 2017), https://thepointsguy.com/2017/04/delta-blade-helicopter-jfk/; Katherine LaGrave, *United Will Now Fly You by Helicopter to Newark Airport*, Condé Nast Traveler (June 12, 2018), https://www.cntraveler.com/story/

united-will-now-fly-you-by-helicopter-to-newark-airport. [The Bluebook no longer requires "available at".]

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6. Lascara et al., *supra* note 1, at 6.

7. *See, e.g.,* Sean Captain, *How Uber Plans to Get Flying Taxis off the Ground*, Fast Co. (May 2, 2018) (quoting Eric Allison, head of Uber Elevate), https://www.fastcompany.com/40522758/how-uber-plans-to-get-flying-taxis-off-the-ground.

8. Uber Elevate, *supra* note 2, at 88, 95.

9. *See, e.g.*, Brock Lascara et al., Mitre Corp., Urban Air Mobility Airspace Integration Concepts: Operational Concepts and Exploration Approaches (June 2019), https://www.mitre.org/sites/default/files/publications/pr-19-00667-9-urban-air-mobility-airspace-integration.pdf.

10. *See* Fed. Aviation Admin., FAA Advisory Circular 150/5390-2C: Heliport Design (Apr. 24, 2012).

11. Restatement (Second) of Torts § 159(2).

12. United States v. Causby, 328 U.S. 256 (1946).

13. *Id.* at 266.

14. *See, e.g.*, A.B.A. House of Delegates Resolution 111 (Feb. 17, 2020) (urging federal, state, local, territorial, and tribal governments, and their respective agencies and departments, to protect real property interests, including common law trespass and privacy rights, with respect to any statute, ordinance, regulation, administrative rule, order, or guidance pertaining to the development and usage of unmanned aircraft systems over private property).

15. Angela Gittens, *How Airports Can Prepare for the Rise of Autonomous Vehicles*, Int'l Airport Rev. (Nov. 27, 2019), https://www.internationalairportreview.com/article/107722/automation-av-aci-world-aviation.

16. Frances Marcellin, *Good Drones: The UAVs Changing Airport Operations for the Better*, Airport Tech. (Feb. 27, 2020), https://www.airport-technology.com/features/positive-uses-of-drones-in-aviation.

17. *See, e.g.*, Cal. Pub. Util. Code § 22555 (providing that airport district boards shall "make all rules governing the use of airports and spaceports, landing places for aerial traffic, and other aerial facilities of the district that the board determines to be necessary"); Tex. Transp. Code Ann. § 22.014(a) (counties and municipalities "may adopt ordinances, resolutions, rules, and orders necessary to manage, govern, and use an airport or air navigation facility under its control or an airport hazard area relating to the airport").

18. Nev. Rev. Stat. Ann. § 706B.290(2)(b).

19. Fla. Stat. Ann. § 316.85.

20. *See, e.g.*, Tex. Occ. Code Ann. § 2402.001(5).

21. Tex. Transp. Code Ann. § 545.452.

22. Tex. Occ. Code Ann. § 2402.003.

23. *Id.* § 2402.003(b).