When Science Fiction Becomes Reality

How Urban Air Mobility Will Finally Give Us the Flying Cars We've Been Waiting For

By Nate Bohlander



Korben Dallas deftly evaded chasing police after Leeloo fell fortuitously into his cab in "The Fifth Element." Rick Deckard navigated mammoth illuminated advertisements on his way to run the Turing Test on Rachel at Tyrell Corporation in "Blade Runner." Anakin Skywalker embraced his rage on the way to the Jedi Temple to execute Order 66 in "Star Wars." The common thread that binds each of these urban journeys is the element of flight. After all, how anticlimactic would repelling the Great Evil, retiring Replicants, or appeasing Palpatine be if the audience had to watch these protagonists wait in traffic while listening to NPR?

The science fiction genre is notorious for predicting the widespread adoption of technological advancements, and flying through dense urban landscapes will likely be its next soothsaying achievement. Humans have long traveled on land and, with the advent of subways, have moved underground in order to avoid congestion in cities. So logically, as the environment which has not yet been explored in this capacity is the skies, companies worldwide have made urban air mobility a priority. Airborne commuting may be a reality sooner than we may think.

Congestion Concerns

By any method of measurement, there is a rapid move from rural areas to urban ones. In 1950, about three in ten people lived in cities. That figure is just over five in ten at present, and is expected to rise to seven out of ten by 2050. North America is even more urbanized, with 85 percent of its current population residing in metropolitan environments. The more people, of course, the harder it is to get around. It has become particularly difficult just to get to and from one's place of employment, especially during rush hour. The average commuter in the United States spent 97 hours in traffic in 2018, costing each and every one of them an estimated $1,348 in lost income. In the aggregate, Americans lost $87 billion, or the entire GDP of Sri Lanka, just from sitting in traffic last year. And citizens of other countries are far worse off. Mexico City, Bogota, Moscow, London, and Rome are just some of the cities whose residents spent *over 200 hours each* commuting annually.

This overcrowding in many metropolitan areas is somewhat alleviated by robust subway systems. For instance, in London, almost one-and-a-half billion people ride the roughly 250 miles of Underground rails each year. However, the prospect of expanding these systems is fraught with both safety concerns and high costs. Performing construction beneath a city inherently carries with it the chance of structural destabilization, and machinery reshaping the ground beneath our feet is much more expensive than work performed on the surface. Put plainly, the skyward trajectory of urban population figures renders the current modes of transportation available to commuters unsustainable.

Take to the Sky

If ground transport is approaching critical mass, and expanding subterranean movement is fundamentally problematic, then the only place to look for solutions is . . . up. Enter Urban Air Mobility (UAM): either manned or unmanned (autonomous) airborne transportation in metropolitan environments. The typical aircraft can transport one to five passengers to destinations of five to 50 miles away. They do not contribute to pollution, as they are electrically powered. And, crucially, UAMs employ vertical take-off and landing (VTOL) capability, meaning that only a small, flat surface, akin to a helipad, is necessary to enable their operation, rather than a space-eating runway. Additionally, VTOL is far cheaper than transportation expansion alternatives. As Andreas Thellmann, Project Executive at the UAM department of Airbus, points out, for every "one kilometer of an underground tunnel [costing one billion euros], you get financed an entire VTOL program" citywide.

The private sector is racing, full bore, to develop UAM prototypes. A bevy of startups are joined by established aerospace stalwarts such as Boeing and Airbus, automotive companies like Audi and Toyota, and technology leaders Google and Intel, in pursuit to capture as much of this rapidly emerging market as possible. Kitty Hawk Corporation's Cora air taxi prototype has undergone rigorous testing in New Zealand for over a year. UberAir plans to unveil a flying ridesharing service in Los Angeles and Dallas by 2020, partnering with a real estate developer to place skyport

rooftop terminals on top of buildings. German drone firm Volocopter launched its maiden test run of an airborne taxi in Dubai as part of a royal ceremony in 2017. And Airbus' Voom currently operates an air taxi service in Sao Paulo and has plans to expand its fleet to 500 aircraft in the next few years. There is substantial money to be made, and the private sector doesn't plan to leave anything on the table.

Public Sector Recognition



The federal government, while predictably slow-moving and skeptical about UAM, is now tacitly acknowledging the fact that the future of urban travel is through the air. The Department of Transportation (DOT), Federal Aviation Administration (FAA), and National Aeronautics and Space Administration (NASA) each requested FY2020 funding specifically for UAM development and integration. And the White House seems to be listening to their pleas. The President's own budget request for FY2020 appropriates $202.6 million for a variety of fresh UAM initiatives, such as creation of the FAA's Unmanned Air Traffic Management System and Office of Innovation, as well as NASA's Advanced Air Mobility project. Many of the monies in the proposal are earmarked specifically for public-private partnerships, which allow for input and direction from those at the forefront of UAM technology: the private sector.

Potential Hurdles

Both the public and private sectors recognize the potential for UAM, in terms of market (an estimated $500 billion-to-$2 trillion industry worldwide right out of the gate), as well as logistical scope (an estimated 100,000 commercial UAM aircraft will be ready to fly in the next several years). However, serious concerns remain with respect to whether the world will be ready to accept such an influx of urban transport all at once, and a host of potential pitfalls remain.

Infrastructure

The issue at the forefront of most UAM industry leaders' minds is that of infrastructure. Similar to the challenges facing widespread adoption of electric cars, the dearth of landing areas, charging stations, and customer access points will prove a major hindrance to UAM. As cities continue to grow skyward, and more residents are crammed into tighter spaces, at no time in history has urban space been scarcer. If air taxis cannot pick up passengers or recharge their batteries, then the system itself is fairly valueless. Similar to subway stations, landing areas need to be both plentiful and strategically placed to transport passengers efficiently. Similarly, battery capacity is the primary aircraft-related concern. Presently, VTOLs require recharging after each flight. However, to avoid safety risks, as well as meet market demands, aircraft development must include battery improvements to allow for multiple flights between charging. The costs associated with operating just one flight per battery charge would price the majority of potential customers out of the market.

Regulation

Despite the aforementioned public sector acknowledgment of UAM possibilities, regulatory agencies in Europe and the United States have been much more cautious than those in Asia and the Middle East. The European Aviation Safety Agency (EASA) issued airworthiness standards last year, but unmanned aircraft regulations have not yet been established. Similarly on this side of the Atlantic, the FAA routinely uses ambiguous language, such as "exploring possibilities," without putting pen to paper to codify UAM rules. The FAA's apprehension is only likely to increase following the number of drone "near misses" with major aircraft over the last few years. Needless to say, UAM developers expect reems of bureaucratic red tape, including rounds upon rounds of safety testing, to envelop the industry in the near future. It will be up to these public agencies to balance regulation with the private sector's freedom to develop in this new space.

Cybersecurity

The pinnacle of UAM development is the autonomous, unmanned aircraft. UAM manufacturers save costs associated with either hiring and paying pilots to operate them,

or sharing revenues with drivers, similar to a ride-sharing arrangement. However, inherent in the autonomy of the UAM infrastructure, including the interconnectivity of the system, is the risk of a cybersecurity breach, which could have devastating results. The average new car contains over 100 million lines of software code, a figure which a UAM aircraft would likely dwarf by comparison. Most obviously, a hacker either in the aircraft itself or in a remote location, could take control and pilot it into a host of targets which, in an urban environment, are more likely to cause injury or death. Additionally, hackers could also target data, accessing individuals' payment records, origins and destinations of travel, and other personal information. As technology giants Facebook and Google face both public scrutiny and Congressional hearings over their information gathering and sharing policies, Americans are ever more protective of their personal data. UAM developers who ignore cybersecurity as a vital cog in their integrated systems do so at their own peril.



Societal

For all UAM developers and manufacturers, the fact remains that, regardless of their ability to navigate the aforementioned hurdles, their products will fail to gain any traction in the marketplace if they are not accepted by the public. To gauge public acceptance of UAM, Airbus recently conducted a broad survey in four worldwide locations. Perhaps unsurprisingly, UAM was received far more favorably by individuals residing in the two more congested urban environments (Mexico City and Los Angeles) than the two less crowded ones (Switzerland and New Zealand). And, like most technological advancements, UAM was also more readily accepted by a younger population than an older one: more than 55 percent of 25-34-years-olds were "very likely" to use UAM, compared to less than 15 percent of those aged 75-to-84-years-old. Unsurprisingly, safety was the number one fear of respondents. However, those in the UAM industry must consider respondents' next several concerns, which were, in order, the type, volume, and timing of the sound generated by UAM aircraft. While one may conclude that urban dwellers implicitly accept a wide variety of noises based upon the mere fact that they live in cities, there may be a breaking point after which UAM will face backlash in the precise areas for which it is being developed. Those in the UAM space would be wise to heed these survey results and focus additional developmental efforts on reducing noise pollution.

Ready or Not, It's Coming

The more significant the problem, the more an innovative, perhaps imaginative, solution grasps society's imagination. This is especially true if we've seen the same solution on the big screen for decades. Generations of minds have been captured by flying cars, which may very well be the solution to urban overcrowding and congestion. As we are already witnessing, when the public demand exists, the private sector is all-to-happy to oblige. Quite frankly, the scope of the potential industry is too tempting to sit on the sidelines. Like it or not, and ready or not, urban air mobility is coming to your city. We would be far better served preparing for it than resisting or fearing it.

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