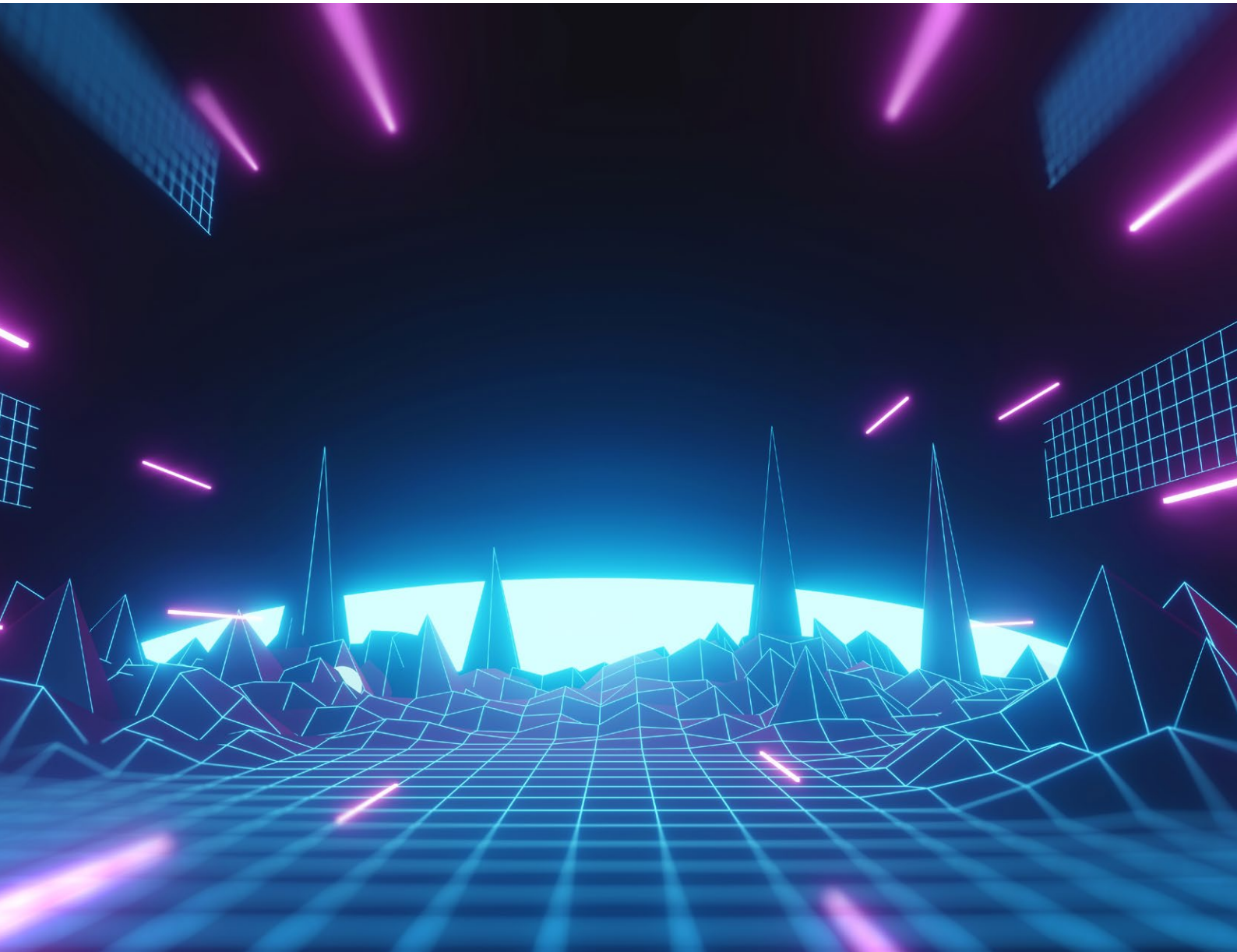
Aviation in the metaverse: Breaking the reality barrier

Aviation has always been an industry of pioneers, so it comes as no surprise that it has been quick to embrace new technology. The endless possibilities offered by the metaverse are being explored at pace, and the advent of electric vertical take-off and landing (eVTOL) aircraft and unmanned aerial equipment like drones marks the arrival of the next generation of urban air mobility vehicles. At Reed Smith, we have been privileged to play a leading role in the introduction of this transformative technology – albeit a small one in comparison to that of the engineers and entrepreneurs.



Leaving on a jet plane

Aviation was one of the industries most severely impacted by the COVID-19 pandemic, and it remains under pressure from various macro factors: rising interest rates, staff shortages, the price of fuel, and, of course, the increasing replacement of business travel with virtual meetings. Against that backdrop, airlines and airports are turning to the metaverse to augment their offering.

For example, the airport experience has been digitally enhanced with:

- Virtual queuing: trialed at LAX
- Immersive shopping: London's Heathrow Airport partnered with luxury brands like Chanel and their "beauty spaceship," enabling shopping passengers to try on products virtually
- Virtual replicas: Qatar Airways recently launched QVerse, a virtual reality program that allows passengers to look inside the aircraft from the comfort of their homes

Manufacturers are also pushing boundaries via the metaverse, with Airbus and Boeing looking at ways to streamline production by creating digital replicas of aircraft and using these to run tests and simulations. This means they would be able to gather data and results without needing to accumulate flight hours on a physical trial aircraft, saving costs and mitigating safety risks to the test crew. Airbus and HeroX also held a crowdsourcing competition called "Metaverse and the Future of Flight," seeking innovative ways to use the metaverse to reimagine and elevate the traveler experience.

I can see for miles

If the metaverse can facilitate airport access and airport shopping, it can also make it easier to earn and redeem air miles. Many of us are lured by frequent flyer programs that offer benefits with an airline, and these create huge real-world value for both travelers and airlines in addition to generating customer loyalty. Air miles are very lucrative for those airlines that manage to monetize their loyalty programs, which are often worth considerably more than the airline itself. American Airlines, for example, used its program as collateral to borrow money from the U.S. government.

Taking this a step further, airBaltic, the first airline to accept cryptocurrencies in payment for tickets, also became the first airline to issue non-fungible tokens (NFTs) when it launched "Planies," an NFT collection of tokens that it will be linking to its loyalty program. Emirates will also launch NFTs and experiences in the metaverse, alongside both collectible and utility-based NFTs.

Air mile programs are also closely connected with ticket sales, and this new technology offers novel distribution opportunities. Air Europa, for example, has established a partnership with blockchain distribution company TravelX (the company building the first blockchain-based distribution protocol for the travel industry) to come up with the world's first NFT flight ticket series, or "NFTickets," entitling owners to access a special flight to an event in Miami Beach. This will allow passengers to manage and transact with tickets using their own blockchain wallet, combined with a new kind of collectible art piece. At auction, Air Europa's first NFT sold for $1 million. As another example, Vueling is looking to sell flights in the metaverse that can be used in the real world, providing the airline with a new distribution channel.

Learn to fly

Advanced air mobility marks the next inflection point in aviation's continual evolution, and is described by leading industry figures such as Dómhnal Slattery as "the next big frontier" for aviation. It is a frontier being explored by a combination of entrepreneurs, giants of aerospace, and global logistics companies, like Airbus and Boeing (Aurora), Amazon Prime, DHL, and even an online food ordering and delivery service.

eVTOL aircraft in particular represent (among other things) an evolution in the aviation industry's focus as the need to design modes of transportation with substantially lower greenhouse gas emissions and noise pollution becomes ever more urgent. eVTOLs have a wide variety of use cases in both urban and regional areas, and will be used for passenger service, freight, disaster relief, defense, and final mile logistics.

These aircraft are being developed by a range of companies working in this space, but many (if not most) of the proposed models will have to commence commercial passenger operations with a pilot physically on board. It is expected that piloted models will achieve certification in various jurisdictions several years ahead of autonomous aircraft, which is reflective of the need to develop the technology, the regulatory framework, and the passenger buy-in necessary to make this possible. However, the achievement of autonomous flight without a pilot is critical to the ultimate economic viability of eVTOL flight. Consider, for example, a four-seat model of eVTOL aircraft: with a pilot present, the capacity of the aircraft to generate return for its operator (and that operator's financiers) is reduced by 25 percent.

But what if there is an interim stage between piloted and autonomous flight, where the aircraft could be piloted remotely? If the metaverse can be used to build a digital twin of a physical space, the conditions in an eVTOL operating location could be replicated such that a pilot in any location could operate it safely. It might be possible, for example, to overlay a Google Earth-style functionality on top of the virtual replica of the landscape, including marking safe glide paths for use in the event of a malfunction and the "obstacle-free volume" area to be stipulated for each vertiport. This could be supplemented in real time by each vehicle's cameras and other sensors (to deal with, for example, cranes moving over construction sites) and input from passengers.

Taking the pilot out of the payload offers an immediate uplift in return, enabling the same vehicle to carry an additional paying passenger or more revenue-generating cargo and enabling the industry to reach economic sustainability sooner, even before complete autonomy of flight is achieved. Building this support infrastructure in the metaverse could also help address the global pilot shortage, which could be alleviated if the next generation of pilots of eVTOL aircraft could be trained remotely, certified centrally, and deployed globally.

The legal issues

With such complex and novel technology, the range of legal and regulatory obstacles to be considered and addressed by the fledgling eVTOL industry is vast and growing. It will be critical for industry stakeholders to engage with the following topics in particular:

1. Certification: eVTOLs are difficult to define due to the multitude of designs currently being proposed. This makes the task of creating certification standards challenging. Close collaboration with regulators and aviation authorities is obviously therefore essential.

2. Insurances: Industry thinking on the applicable liability issues, and the laws that may regulate accidents and incidents, remain in progress. Recent lessons learned by the insurance community from developments in the unmanned aerial vehicle/drone market have demonstrated that traditional policy wordings are probably not fit for purpose when it comes to insuring new technology such as eVTOLs. This is especially the case if operational infrastructure is built in the metaverse, and new insurance policy wordings accommodating the new technology will need to be developed.

3. Liability and risk allocation: The liability regimes for the carriage of passengers and cargo on board traditional civil aircraft have developed by international convention since commercial flights began in the 1920s, but questions remain as to whether the existing liability framework is flexible enough to accommodate eVTOL flight. Manufacturers and operators will also need to consider how to apportion liability among themselves, as well as the risks that can be passed on to end users via their contractual ticketing arrangements. A careful balance will need to be struck because overly robust indemnity and liability wording could significantly undermine confidence in the industry and would no doubt be met with resistance from regulators and legislators (if not already fettered by consumer protection legislation). It remains to be seen how liability issues in the metaverse more broadly will be addressed, but a single metaverse with multiple stakeholders having different needs, purposes, and levels of sophistication will require carefully designed interoperability standards. In particular, different aircraft manufacturers and vertiport developers will need to permit interoperability between their platforms.
4. Cybersecurity and physical safety: Security and safety issues may arise because of closer operating proximity to potentially malicious actors and to urban public infrastructure. If vehicles can be operated using the metaverse, there is a risk that they could be interfered with in the same way. In addition, both passenger data and flight ops/aircraft-specific data in the metaverse will be extremely valuable, both to bad actors and to marketeers alike.

Aviation is well placed to maximize the potential of the metaverse, particularly in conjunction with emergent technologies like eVTOL aircraft. As these fields develop and overlap, the legal and regulatory frameworks facilitating this potential must evolve quickly and in close collaboration to ensure that aviation is able to benefit from the wealth of new possibilities.

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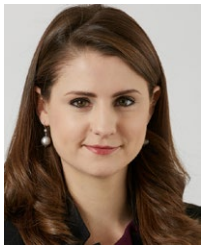

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