Tomas Opazo, June 2021

Opportunities for Chile in the coming UAS autonomy revolution

Urban Air Mobility (UAM) and Drone Package Delivery are two well known and powerful visions that are expected to radically change the landscape of aviation in the coming years. It has been highlighted that autonomy, airspace deconfliction, navigation and electrification are the four main challenges lying ahead before the mass transportation of people and goods by Unmanned Aerial Vehicles (UAV) can occur. From a broader point of view there is also a strong need to harmonically integrate tomorrow's aviation into our cities in a way that is clean, sustainable, safe and silent. All of these factors will strongly drive future vehicle designs.

As of June 2021, there are at least four UAM vehicle designs in the process of certification by civil authorities: AgustaWestalnd AW609, Ehang 216, Volocopter 2X, Joby Aviation S. At this pace air taxis should be a reality in the next decade.

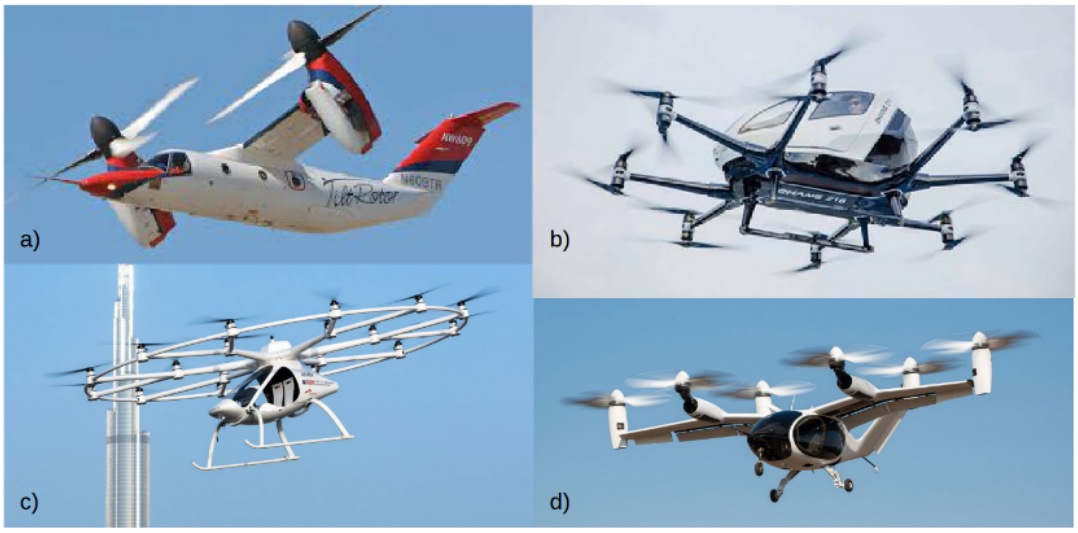

Figure 1.1. Overactuated passenger vehicles: a) AgustaWestalnd AW609, b) Ehang 216, c) Volocopter 2X, d) Joby Aviation S4

A similar story is happening with Unmanned Aerial Vehicles designed for automated delivery of packages.

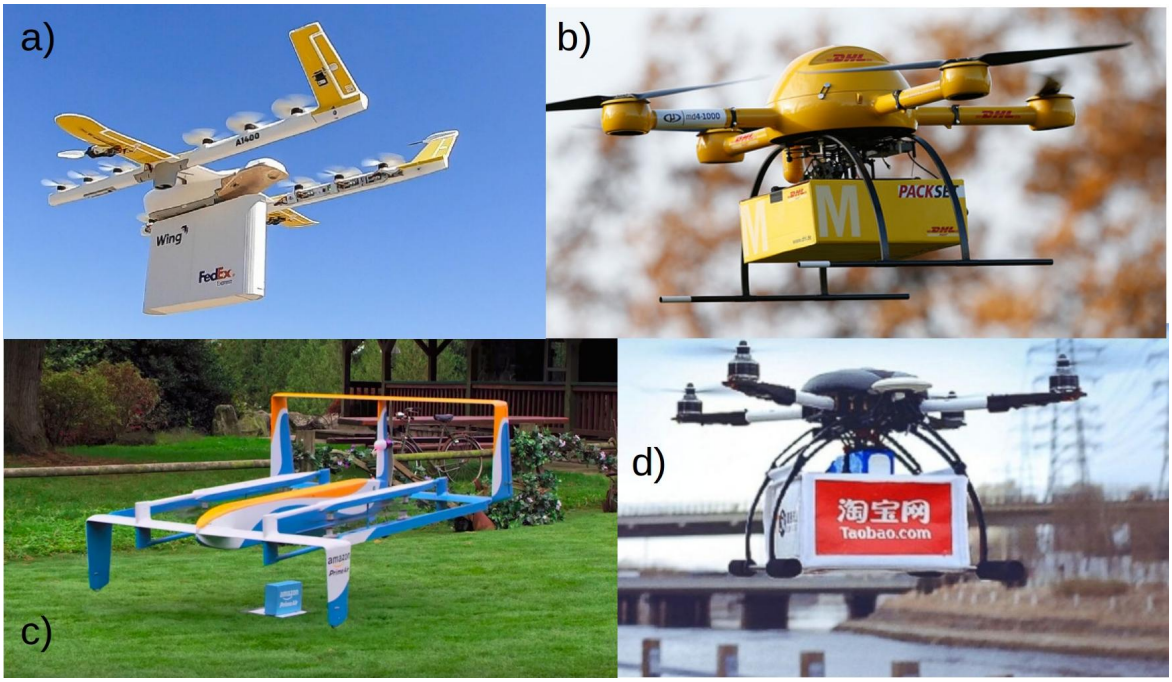

Figure: Examples UAV for delivery: a) Google/FedEx b) DHL c) Amazon d) Alibaba

Recommendation 1: Incorporate a safe haven for innovation

As of today, the UAS technology is not yet mature to allow for commercial operations, but it is nearing certification at a rapid pace. The race is still on, and precisely because of that it is necessary to start working in an environment that will not kill innovation but do the opposite. From the point of view of researchers and entrepreneurs there is a natural apprehension on regulations being too strict on UAS operations. It would be wise to reserve airspace for experimental and innovative UAS solutions within the future regulatory body. A clear path for exceptions and waivers should be established from the onset.

As of June 2021, Chile's DGAC regulates UAS commercial operations under two documents

- DAN 151 regulating the activities of RPAS (Remotely-piloted aircraft system) above populated areas
- DAN 91 regulating the governing rules for manned aircraft and RPAS in non-populated areas
- DAN 119 established the procedure required to obtain a Certificado de Operador Aéreo (AOC). This is required for the operation of private companies

There is however no mention about autonomous unmanned aerial vehicles and how they can be incorporated into the national airspace. It is important to keep this window open, as it enables innovation and research on upcoming technologies related to autonomous flight. In the same way there is little mention to the certification process of vehicles manufactured or modified in Chile. It is therefore necessary to distinguish between regulation that will foster safety from regulation that only increases operational cost and does little else.

There is fortunately a nice example on the radio frequency spectrum regulation. The International Telecommunication Union was established in 1865 (over 150 years ago !!). It is the international global agency that reserves, coordinates and protects the amatuer radio bands. These are special frequencies where almost anyone can easily exchange messages, perform experimentation, self-training, private recreation, radiosport, and emergency communications. This reserved spectrum has allowed for countless innovations to be field tested in a smooth and easy way before being deployed in restricted frequencies. A similar approach would be highly beneficial for present and future UAS technology development done by industry and researchers.

Recommendation 2: More than aircrafts, it is about the ecosystem

Most companies behind Urban Air Mobility vehicles are funded through venture capital (see press release from ehang and jobyaviation). This should come as no surprise. It takes a lot of money and expertise to design, manufacture, test and validate an aircraft certified for carrying humans on board. It is likely that the few existing capital-intensive and expertise-intensive companies will be rewarded with the UAM market.
On the other hand, unmanned aerial vehicles are designed on the less stringent premise of making no harm to people on the ground. This typically results in smaller, lighter, cheaper vehicles. But companies compete by designing vehicles many times faster than manned aircraft. The prime actor here is DJI, a Chinese company based in Shenzhen that accounts for about 70% of the worldwide market of Drones. It sits at the forefront of UAS innovation for camera-based technologies (cinema, photography, surveillance, photogrammetry, etc).

But beside the vehicles themselves there is a mountain of work to incorporate piloted and autonomous vehicles into urban environments. The first problem comes from the sheer number of actors involved: UAS pilots and their companies, clients, aviation authorities and airspace managers (control towers, property owners, etc), local authorities (city mayors, governors, etc) and communities, insurance companies among many others. UTM stands for UAS Traffic Management (UTM), and is a yet-to-be-realized platform to interconnect these different actors. Its aim is to ease the chain of permission with a specific aerial vehicle flying on a specific area or route. There are currently many companies working on this area are: AirMap in the US https://www.airmap.com/, Aloft in the US https://www.aloft.ai,Altitude Angel in the UK https://www.altitudeangel.com/, and Astrum UTM in Dubai (UAE) https://astrautm.com/. As well as similar initiatives like InterUSS https://interussplatform.org/.

But beyond UTM there will soon be a need to coordinate and foster the broader ecosystem surrounding piloted and autonomous vehicles in the airspace between a few meters and controlled airspace for civil aviation. This intermediate layer is where a lot of businesses are already exploding in Chile: photogrammetry, infrastructure inspection, security surveillance, photography and filming, etc. This might become analogous to the dawn of e-comerce in the late 1990s. It is thus worth remembering the case of Amazon and MercadoLibre: they were both founded at about the same time (circa 1998), and they have both seen tremendous growth over the last decade. But even though Amazon has become a giant on a global scale MercadoLibre still fights head to head in the LatinAmerican market (mercadolibre-vs-amazon).