

PATRICK DE CASTELBAJAC

Head of Airbus Strategy and International

Jim HOAGLAND

Our next speaker has a lot of experience in dealing with governments and safety regulations, and the culture safety. He is Patrick de Castelbajac, who is the Head of Strategy at Airbus.

Patrick de CASTELBAJAC

First, I must say that my kids are a little bit younger, so I think they dream of flying cars. I am afraid that we are going to talk a bit about this, because not so long ago, three or four years back, I thought that this was something my children might see. However, it is happening, and I would like to talk about urban air mobility, which we discussed this morning and we said we needed to understand where we were coming from. What we are talking about is vehicles flying people vertically in cities, for example, downtown from an airport or from point to point. You asked me where this is coming from, and I think it comes from different things.

First, it simply comes from a need. Urbanisation is a major phenomenon, with more than half of the population now living in urban areas. Over the past ten years, roughly 200 000 people moved from rural to urban areas every single day in average. Cities are growing bigger, but so are traffic, congestion, and traffic jams. We tried to measure the impact on economies, and last year in the US, people started to figure out and account for all the direct costs, the time lost, fuel, but also the indirect costs. They came up with a bill of \$300 billion per year in the US alone, last year. It is humongous, and when you talk about that sort of money, people start to think about solutions.

This is not only the case in the US; we have megacities in China, for example, and everywhere else. If you go to Sao Paulo, Jakarta, Delhi, you spend hours and hours in traffic jams and you want a solution. This has a cost in terms of time, as well as for the environment. We know that cities are responsible for roughly 70% of global greenhouse gas emissions, so we need to take that number down.

Obviously, the electric cars that François was referring to are a solution, but we tend to believe that there is another, because if you look at cities today, it is clear that there are very limited solutions on or below the surface – the subterranean areas around cities are also crowded. So we think what we need to do is go for the third dimension, because by definition it is open, and we have all the space we need for people to travel there. Once we say this, how close are we to urban air mobility and to the dream of flying around? From a technological standpoint, we are not very far. We have identified the blocks, which were not necessarily together, but are getting increasingly closer together. The challenge is how to make a totally safe environment for those technologies to interact and to develop the capabilities.

One block will be the batteries and the electricity, providing autonomy and power. Thanks to the automotive industry in general, this is not far away, and it is progressing very fast, so we are very confident that we are going to get there. There are also some new technologies, like the Sense and Avoid system which we see with drones today. We see an increasing number of drones around us and they use this type of technology; we can also use this type of technology and it is scalable.

Then, we have automation. I cannot say I drove for 240 kilometres without touching my steering wheel, but aircraft have actually landed on full automatic since the 1970s. You have all flown on aircraft and they are very often landing on full automatic and pilots are even instructed to use fully automatic landing when you have things like side winds. In the aviation business, automation has been part of who we are for the last four years, and it actually increases safety. It is something that we believe could also have large-scale benefits.



Therefore, the technology is not very far away, but there are many players: dozens of small and big startups – you may have heard of Volocopter, Lillium, and Ehang in China. What is interesting is these people alone raised \$400 million last year. Uber started to get into the game. Boeing just purchased a company called Aurora. Augusta, Bell Helicopter manufacturers, everybody is getting into this game because we all start to believe that it is not a dream, a kid's dream, or a feature in a science fiction movie, it is something that will probably fly in the next five years. It is starting to scale up – it will take time, like the car or aviation industries – but will hopefully happen in the next 10 or 15 years.

So what are the challenges to getting there? Again, we mentioned vehicles and their technology, but they may not be the biggest difficulty. The difficulty is integrating all the technologies, not only on the vehicle but also on the ground, in space, working with authorities regulating traffic and trying to make sure all of this is safe. Safety is paramount in the aviation business. Many of you flew here and you did not congratulate yourselves on arriving safely; you simply thought about whether the in-flight entertainment and the services were good and the flight on time. Nobody asks anymore whether it is safe to fly, and that is because the whole industry has been working for 50 years to make it happen. We have a lot of startups, but it is paramount that private companies, authorities, regulators, and governments, make sure that urban air mobility is also safe despite the rush to get there, because it is technically feasible. That is the big thing.

Of course, the business model will be another issue. How will it work? Will cities pay for part of it or just the users? Who is going to pay and how? Public acceptance is another question. Today, are we willing to take a form of transport with nobody at the steering wheel, which will take you 300 metres into the air and fly you to the other end of the city? We did a study on three continents and tried to get people's opinion. The results vary from one country to another, but people in general really value time versus money, and they need safety and certainty. Wherever you are in Delhi, Sao Paulo or Beijing, there is great value in knowing you can go from point A to point B and be sure that it will take seven minutes, rather than being uncertain if it will take 20 minutes or two hours. We believe that there will be public acceptance, since there is more and more buy-in to driverless vehicles, particularly from the younger generation. The idea is to work together with the authorities, cities, and governments, to make it work.

What type of benefits will this bring? Obviously, one of the limitations on the extension of the cities is that the centre is becoming very expensive and the commuting time is becoming a barrier to their development and economies. We believe that, while there are other solutions, this could be one. We believe that if we start at a reasonably low number, for people travelling for business or wealthy individuals, we should rapidly be able to move on and make it more affordable as we scale up. We also believe that the investment would be fairly limited. You are only talking about building launch pads in cities, so real estate and capital investment costs are low compared to building roads or trains, but it could contribute to city economies. In addition, you were talking about the Internet and parcel delivery. We believe that parcel delivery by drones is also something that will happen and develop fairly fast.

We believe that this revolution is coming and is no longer a dream and it is something we can work on. At Airbus we have two projects, one that will fly next year and another in a couple of weeks and I could not resist some free advertising by showing you a video of the prototype that is going to fly in the Silicon Valley in a couple of weeks.

Jim HOAGLAND

Patrick, thank you. I confess I was a little worried at the beginning to say that the future is now. But you just backed me up very nicely, and I appreciate that.