[Transcript] FYI - For Your Innovation / Flying into a New Age in Travel with Dirk Hoke of Volocopter

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Welcome everyone to Arc's four-year innovation podcast.
Today we've got an incredible guest.
We've got Dirk Oka, who's the CEO of Volocopter.
Welcome, Dirk.
Thanks for having me.
Hi, Sam.
Hi, Tasha.
So how did you come to join Volocopter?
I guess we start there.
You didn't found Volocopter, but you're leading it into hopefully commercialization pretty soon.
So how did you find Volocopter?
That's quite a long story.
I try to cut it short.
I knew Volocopter since 2015-16.
Florian Reuter, who was the former CEO of Volocopter, reached out to me because he knew me from Siemens Times and we met regularly on different conferences and regularly catched up.
And I was following the UM site already as CEO of Airbus Defense and Space intensively, also being involved in many working groups at the Volocopter Forum and others, following up with the institutional side, authorities, to understand better what needs to be done in order to make urban mobility really a reality, learning a lot about the challenges.
And yeah, so following from the other side, and then when I left Airbus, Florian reached out to me, first more towards an advisor board seat, and then somehow when I was in discussion for other jobs, he said, why are you not becoming my successor?
So this was, of course, because I didn't expect him to step down.
Firstly, secondly, I was not prepared for the question.
So I said, please don't turn it down, literally give me some, and I said then give me some time to do my homework and give you a proper answer.

So I did because I knew the ecosystem and the industry pretty well, and for me it was more decision, do I want to now continue to work in a big company?
Because I had a lot of offers I had, even had a contract on my desk.
So or should I try something new?
And I was always, yeah, I liked the idea about a new modality coming into the market and to be part of that.
And I said, if I don't do a startup now, then I will never do it.
So yeah, also after consulting with my family, everyone was supportive.
My daughter said, dad, you have done big companies, you have made good money.
Why don't you do something really cool?
So you can always count on kids to give you the truth.
Yeah, it's very seldom that you get from your 19 year old daughter or 18 year old daughter at that time, that this is really cool.
So yeah, it played a role.
My whole family was supportive and all the discussion with the board of advisors, with the team, the management team was very positive.
So then I said, I will do it.
And yeah, I'm really happy to be now part of that team.
It's very visionary, very motivated, highly engaged team, trying to do the impossible because we really want to fly next year in Paris.
And so Dirk, I think you might be the perfect person to help everyone understand.
Aviation is full of acronyms.
Even just now we're talking FAA and EASA, EBTOL.
So can you kind of just break down the landscape, electric vertical takeoff and landing?
Why now?
What is FAA?
What is EASA?
Why is it so important to understand what those two are?
Yeah, you have two authorization bodies that certify vehicles for civil aviation.
And that's EASA in Europe and FAA in the US.
They have also an agreement to accept the standards.
So normally if you certify by one of these big bodies, it's very simple to certify then also for the other part and then also get local national authorization to fly in the national aerospace of other countries.
So what we will do is we will certify with EASA in Europe, we'll then of course apply for certification by FAA in the US.
With that we have let's say a very broad access to the global markets and national application processes are then rather fast.
So like you probably have read yesterday, we published that we will have an alignment between J-CAP, the Japanese authorization body and the asset to make also a very smooth certification process so that we can fly in 2025 in Osaka in Japan.
So these authorization bodies ensuring that we have a safe transportation in the civil airspace and as you know so far aircraft are still the safest transportation modality

in the world even in a more than 100 year history.
This was done because they applied very harsh safety requirements.
One of the requirements that is important in the civil airspace is that you can have only a serious mistake or problem after one billion operational hours.
So this is what we call the safety rule of 10 to minus 9.
So only one mistake every one billion operational hours.
That's quite impressive and this is of course a big barrier to entry.
In order to get certified you need also to pass a couple of other certificates.
So it's not, we cannot decide in our garage to build an aircraft but we have to be authorized to design and to build an aircraft.
So this is called design organization approval and production organization approval.
And we have already achieved these two very important milestones so that we are allowed to design and also to build aircraft that can then be used in the civil airspace.
And I guess on that you know Tasha maybe this ties into some of the autonomous work.
One in a billion mistake per operational hours.
How do you get enough data and comfort to accept that that's the true probability of a mistake when you know obviously you're not going to be flying this aircraft for a billion hours before it's approved.
So what type of things go on to ensure that type of safety?
So it's a mix of mathematical calculations, simulations and flight tests.
So it's three elements that come together in order to make sure that you can achieve these one billion hours that say standard.
What you do is that you combine these elements into a simulation in order to understand where are the weak points of your system which could lead to a critical mistake.
And in this case where you have critical components you have to plan for redundancies.
So in case a certain safety relevant system fails you need to have a backup solution.
So with that you can then increase the safety criteria and you can make sure that you get a higher valuation towards the 10 to minus 9 rule.
And then it's of course the combination with the checking the mathematical model and the simulation against reality.
That's why you have to do perform a lot of flight tests.
That's what we start for example again now in summer we will fly thousands of times in order to make sure that we comply with the envelopes defined by ASA.
And with that we verify our mathematical models.
It's a combination of thorough science work and also mathematical calculation simulation and then verifying by real fighters.
And you know as you said regulation is such a big barrier to entry for this industry.
Of course like we understand in theory that this is a really rigorous process but what are the components that actually make this so difficult and what are some of the pitfalls that you see potentially other companies falling into.
The problem is that in order to be certified you need also certified components.
So it is not that you go into a shop and buy some components build an aircraft and you get it certified.

So what we do is in order to reduce the time to certification is we use already certified components from certified suppliers that have worked in the aerospace before.
And with that we can then shorten the time for the certification pathway.
Whenever we bring a new component into an aircraft we need to re-certify.
So this is of course a very very rigorous process and this is something which at the end leads to long lead times for companies that have never worked in the aerospace.
So you need to be able to understand what are the critical components, how do you certify them or how do you use certified components and how do you integrate that into a certifiable system.
So this is a huge barrier.
This is also why components for aerospace are so much more expensive than for automotive because you have a much more complicated certification process which is adding then on the conforming
process.
How do you say the regulators have reacted?
You know typically I think people think of regulators as extremely conservative.
Now there's this huge wave of new technologies being pushed simultaneously by different parties all trying to get their attention and approve different types of flying vehicles or flying designs.
What has the reaction been from the global regulators?
I can only say from my experience since 2015-2016 but this started already earlier.
I think it started mostly when the first toy drones came into the market, when the first multi copters, so whatever you flew a toy helicopter which is pretty complicated and then you got the first toy drone and then especially when DJI came with the more advanced versions into the market you could see and witness how easy it is to fly a drone even with very difficult weather conditions, strong winds and so on and this was of course one of the let's say accelerators for the ideas to create this kind of system also for cargo and for passenger transportation.
This was one of the key points for our founders to look at this technology and see how this toy technology can be used to accelerate the access to passenger taxis also in the VTOL area.
From the authorization bodies, certification bodies, the reaction was mixed at the beginning.
Looking at EASA at the beginning of course everyone was like how do we certify these new vehicles?
EASA was from the beginning very open to it and I even discussed at that time from Eva's perspective with the bodies and they always said I would love that your team is as agile as the startup companies that look at us how we can create this education pathway.
So they were open for assessing how this can be certified so they were not let's say blocking it they were embracing it but of course they were looking also on how to make it a tangible experience and a safe experience because they don't want to put the reputation of aerospace at stake so this has to be clear.
Bringing new modality into the market is for both sides a risk because they don't want to spoil their reputation and of course we want to do business and we need to make sure

that we don't sacrifice safety on the way to it.
It was a good communication from the beginning, good interaction that led also a few years ago to the first draft of the certification roadmap that is defined by EASA and this is now leading to a very in my opinion robust plan how these vehicles will be certified.
But yeah but this is only the first step there are still many more steps necessary to make it let's say a scalable model around the globe because once we are certified this is one important step but we still need to discuss how we integrate these vehicles not only into what we call USPACE but also into the ATM, ATM is the air traffic management of the civil airspace how we let's say regulate the traffic of all the 24,000 aircraft around the world and this is mostly done still by humans and in order to integrate now 1000 or 100,000 of drones be it for cargo or passenger transportation in the future we need to do the next step of digital transformation also for the air traffic management and this will need some time because only then we have a system that can handle the complexity of merging 24,000 aircraft with 100,000 of drone into a safe traffic management.
Another question I had so the physics at least from what I understand they apply the same way to everyone and there's different use cases but even for let's say fixed wing aircraft most fixed wing aircraft look similar they might have different use cases and they might look slightly different but they all look fairly similar when it comes to drones that's definitely not the case right now there's I'd say a huge variety in what a drone looks like what an electric vertical takeoff landing aircraft looks like.
Volocopters is I'd say you know unique just like everyone else's why are there so many different designs and why is Volocopters design the way it is.
Yeah I cannot talk about the designs of other companies and what was the reasons for it.
I think the Volocopter design was done in order first of all to make it fly but the most important criteria in the design phase was built to certify so I keep it simple make it sure that it doesn't become fancy just to be fancy but make sure that it can be certified.
So again as I said before use certified components or use certifiable components make sure that it's simple so that the certification bodies can understand the choice of the components and understanding also how we calculate the safety standard.
So here we have a clear focus on certification from day one and this is something that in my opinion also differentiates Volocopter from other more fancy designs.
And also then you have to look at what are the requirements for the market Volocopter with the Volocity has chosen to fly within the city environment.
So normally in a city environment you don't need to fly 200 kilometers or 300 kilometers you need to fly 20 30 40 kilometers you have rather a short hop on hop off experience.
So you have total different requirements than you would have in order to fly 200 or 300 kilometers that's why you see the design for the world region is totally different.
Here it is more about the efficiency of a flying medium distance versus the stability in an urban environment that we want to provide with the Volocity.
So what is what is important to get the public acceptance is you need to feel safe.
So here you need to see 18 rotors and where we already demonstrated that we could lose easily to and we can still safely land.
It's the noise level compared to helicopters 80 percent lower.

So we could have a normal conversation like that if a vehicle is landing 50 meters beside us that's not possible with a helicopter.
So reduced noise level most most security and safety and emission free and sustainable.
So these were the main requirements what we said are necessary in order to fly within a city environment so that we can blend easily into the normal noise that you have in a city.
So if you look in and hopefully you can come and visit us and see demonstration flights and test flights the frequency of the noise is also in a frequency band that is very acceptable because it blends into the normal noise level of a city.
So you will not really differentiate our the noise of our vehicles compared to the street noise that you have from cars.
So we believe it's really acceptable and it's also the feedback that we get from the public test flights from the audience that was witnessing and listening to the vehicle in operation.
So this is why we designed the vehicle 18 rotors mostly for stability and safety.
And then the region with the wing design it is it is designed to fly efficiently but also safe.
So we have is we have lift motors and we have push motors.
So we separate we don't have any tilting technology because there you could have easily problems in the tilting process.
Here we have the lifting process six or more lifting motors and then we have to push a motor so we separate that vertical from the horizontal movement and whenever you go into the horizontal movement you go into an aircraft mode where you use the wing and this becomes very efficient.
So it is an efficient way of moving medium distance.
This is something that we will use with the wheel region up to 200 kilometers are flying in one hour.
But also to be honest this will not be possible today because the batteries are not good enough yet but with the batteries that we will get to 2025 we will be able to fly these parameters.
I'd love to expand on that point.
You know we've talked a lot clearly this is it's a it's a very difficult thing to do.
You have to pass these safety hurdles these regulatory hurdles but it opens up a lot of opportunity and it seems like it's empowered by you know these technologies like batteries you know in the case of unmanned flight like autonomy that are now available that you know previously were not.
So it seems like you know I'd love to hear from you sort of yeah what what what was sort of the key unlock to make this possible for you all and then what's what are you hoping to do for passengers for cargo like why is let's you know I want our listeners to know how exciting this is.
We look at you see there are tons of different business cases and use cases.
So first of all maybe I'm not sure that this was clear for that for the years to come we will still fly with a pilot and only in the next decade we will go into automation and then into autonomy because the certification pathway it still needs to be defined and this is pretty complicated because of course you have to overcome a lot of let's say biased opinions on it and and we have to prove over a certain time that we fly the EVTOL systems

as as part of the ATM as I explained before.
So this will take time but in in the time frame what we will do is we will start with our two-seaters based on the battery that are available right now and then move into four-seater we will then go and add to our portfolio the the world region for medium distances and as you know we have already cargo drone what do we do with that.
We look at the urban air mobility different use cases fly from the airport into the downtown city mostly it is wherever you have congestion it's adding an alternative for people that need to be sure about the time of arrival it will be adding it will not replacing any modality.
We also look at and we have our partner ADAC attic in order to look at emergency response for example the water city would be in the first step it would bring the doctor to an accident so that we can have a first response in a shorter time than today and of course in a sustainable manner and secondly when we have the water region we have a high interest of ADAC to use that also to transfer to patients to the hospital so first starting bringing the doctor to the accident next step is not only bringing the doctor to the accident but also bringing the patient towards the hospital as it is done in many cities of the world today with a helicopter but of course we want to do it emission free we want to do it with a much lower noise level and more flexibility so this is a very important use case but then of course for cargo it could be maritime vessel to shore shorter vessel we see interest for of course all the logistic hubs of the world we see also use cases even in mining and other industries where it is about the reliability of the vehicle and the payload so there are many many different use cases and some of them already tested as you know from other companies that the transport organs blood and medicine so there are a lot of use cases that will make our life easier and better so I'm definitely convinced that once you have reliable vehicles we will have countless of use cases.
And in terms you know when we look at innovation at ARC we often look for you know something that has a competitive cost dynamics to the systems that already exist and I understand this is a very nascent industry right so first you're making something possible that previously just wasn't possible what do you think about longer term sort of you know who will this be available for sort of what are the cost and price structure dynamics that you expect in the industry.
You see at the end the business parameters are driving the development of the product so if we cannot create a viable business case it will be a very short let's say idea of bringing something new into the market no I strongly believe we can definitely create a viable business and at the beginning looking at passenger transportation you see there are a lot of statements out what it should cost and a lot of studies.
I think looking at what the cost of transportation is I think no one expect that it will be the same price as of a taxi or Uber but of course expectations are high to make it accessible to everyone which means probably like double the price of a taxi and then if it's in a congested area where you really gain a lot of time then it can be even higher but we also have to be realistic at the beginning we will start with if you do a total cost of ownership calculation the price of the ticket would be much higher with an increasing capacity with more seats it will then go down very fast and then you once you go into mass

production you have all the balance of scale effects that will easily lead to very competitive pricing why because the advantage is urban air mobility will lay somewhere between automotive and aerospace.
Aerospace has very small quantities automotive has very high quantities so we will be anywhere in between so you have the balance of scale economics kicking in because if you can do it for aerospace at a very low quantity you definitely can do it for urban air mobility at a much higher scale so here we believe over the course of time we will be able to bring the price per seat per kilometer which will be an important indicator down to 3 to 4 euro per seat but not in the first two years definitely not.
And then I think it's also interesting to think about what you were saying about the noise level right because obviously there is the regulatory approval for the aircraft itself has to be allowed but in a lot of our modeling depending on the city and areas with that high congestion you know the landing sites and the economics there can make or break some of these models as well and so having something that's not you know not in my backyard getting impossible to have landing pads right in in Manhattan right now I think there is three landing pads and so what are you seeing what's it is that the same in cities in Europe and what's the regulatory discussion around increasing landing sites.
We have to find new ways because today the certification of a heliport in Europe or in Germany takes a long time so here we also need to wait now till people understand better the impact of operating our vehicles which are totally different than helicopters so we believe that this will lead to also an adaptation of some of the routes that I use today for heliports and helicopters because the noise level is so much different and with that of course the impact for on the on the population they give you an example where we did the flight test in Paris we invited for the last time a lot of journalists and there was a bus with an open roof and all the journalists were on top of it and I had an interview with one of the journalists afterwards and I asked her so how did you experience the noise level and what do you think about the the noise at takeoff and doing the flight and then she said I have to admit that I missed the takeoff and I said how can you miss it you were like 75 meters away from it she said because I was talking to my colleague who stand by my side so she had a normal conversation with a colleague on the rooftop of an open bus 75 meters from the vehicle and she missed the takeoff so you get an idea about the noise level and this is something that that's why I say it can only be a step-by-step approach believing that we can come with thousands of vehicles in the next two years into the cities this is not going to happen because we have to demonstrate first so that people can see and believe that it is accepted before for their daily life and once we have done that convincing work by demonstrating that it is an acceptable addition to our modalities and at the end it brings more comfort than stress then hopefully we can scale and increase the amount of vehicles amount of routes and with that then hopefully come to one day to the dream that we really have a more open network of vertebrates where we have more flexibility not only a few routes in within a few cities I'd also love to touch on you you said that this you know this model is ideal for areas with high congestion one of the a thesis that we have at arc is that as autonomous mobility on the ground takes off that of course yeah longer term when every car is autonomous maybe traffic could be more efficient but for the

foreseeable future it seems like you know traffic should increase as you have sort of that integrated travel if you bring cost per mile down to something that's so low it might even compete with public transportation and invite more people into the ride hill market in your conversations with cities with regulators do you feel like that is is that talked about at all or you know what's their sort of view on congestion you see it depends which city you talk to and what problem they have if you have at peak time an average speed below three four miles an hour they're very open to these discussions because they see every day the loss of productivity in their cities and of course they need to find modalities that they can add without waiting 20 years for a new metro system or building new highways or see asking for something that is not going to be applicable in a short term our systems can be applied to any city in a very short term manner once we we have demonstrated that we are safe and low level on the noise side so we can be used in order to get at least certain relief in a very short term manner and as I said we will not replace a metro system it's a mass transportation is of course the better choice but you cannot have a metro system in any place of the world in the short term so so we can at least get at one modality that can improve the situation to a certain extent and can give more choices and without more flexibility in the end to end transportation but I think also what it needs to be understand we will add only one element of the transportation of mobility so we have to make sure that this is totally integrated into the user experience from A to B so that you see what I don't like is I don't don't like to use four different modalities on my way to a certain destination and then I have four different booking platforms and then I have to change my plans and I have to rebook in four different platforms because it doesn't add up anymore so we need also to ensure that we look from a realistic point of view how we optimize the end-to-end mobility concept and now we integrate our platform with other platforms so that you have a smooth user experience because at the end it's all about getting from A to B in the most efficient and most comfortable and of course also in the most sustainable manner.

And then how about on the business model side when the first airplane makers were making planes they were also the operators and then that split out over time and right now you know there I think there's a number of again everyone's kind of going at it their own way what's the decision process to make and operate versus just make and then sell to someone else and do you think that that evolves over time or it would be the same throughout?

You described it perfectly because why at the beginning they were operators and service companies they wanted to ensure the quality of the service they wanted to make sure that there is no accident so that the rotation cannot be damaged and I think what you see with our focus city approach now we do exactly the same.

We partner we don't want to do everything ourselves but we will partner and do operation and service with partners in the local let's say environment companies that know the local environment and need they understand the problem of the city and how to approach it but they also of course have the connection towards the different authorities in order to ensure that we get all the licenses that we need in order to operate.

So yes we want to be operator and service company at the beginning but definitely together with the local partners to ensure that this is a smooth user experience.

Later on to be honest I cannot tell you yet this depends then on the development how fast

we scale and it is a journey and I think we have to be open for all different kind of models we might become an OEM I don't see that yet because I think the difference is that we as I just explained we want to be part of an end-to-end mobility concept and here this software platform also plays a role and this is maybe also where we differentiate from other companies in the market because we build our own software platform to ensure not only that we can monitor the telemetric data of the vehicle and the sensor data but that also that we can integrate into booking platform that we can integrate into the handling of the vehicle on the ground all of that can be done in our existing platform today and this is something that we want to then extend into the end mobility concept.
So I rather see us that we will stay involved over quite a period of time to ensure that this user experience is as good as it can be.
That makes a lot of sense and I think you know getting to the to the very exciting part 2024 Paris Olympics that's the goal for the launch before we before we get into anything else who's your dream passenger you know who do you what what athlete are you are you trying to to get to the stadium yesterday I saw an interview with Steven Spielberg at the Berlin Arena in Berlin and he said he was asked which movie he liked best and he said you know I will not answer that question this is the same as he would ask which child I like the most so you can always lose only lose with these questions.
Of course you saw a lot of articles probably where where it was promoted that we would like to have the president McCall flying into the stadium and this is something which we haven't discussed to be honest but of course if I could have a wish list this would be pretty much on the top of the list ensuring that we have the visibility of starting operation making sure that everyone can see it's safe to fly it's it's certified and we are licensed to do commercial operation this would be of course a big step forward to bring urban availability to life.
You just have to make sure there's a lot of traffic on that day which I'm sure there will be and have them pull up the app obviously there's a lot to get done between now and then and it's a pretty near in the future which is even more exciting it's becoming a reality what what are kind of the hurdles that remain to getting to commercial launch.
There are a lot it's not a walk in the park and we have to admit the challenges are still super high what we do is we currently in the critical design review of our vehicle which is an important step for us to get to the final design we will start this year the flight tests according to the envelopes that are defined together with ERSA so we will do intensive flight tests in order to verify our models and simulations and with that in parallel we will apply as an airline operator so we plan to have the air operator certificate by mid of the new year and we will start flying a fixed wing aircraft in order to get operational experience which will help us then for the preparation of the AOC the certificate that we will need to operate the vehicles in Paris.
So this these are some important steps that we will do this year and then next year is to prepare with our partners the infrastructure making sure that we have the processes in place in order to operate the aircraft on the ground to do the charging the servicing so we hope that we can announce the routes together with our partners at the Paris Air Show this would be something we are working together on to make that possible and then

we have to make sure that we can ensure a smooth operation and we can make it accessible to as many people as possible during the summer 2024 in Paris.
I'd love to switch gears a bit and talk about cargo you know so the the work that we've done at ARC has mainly been focused on kind of this last mile of delivery we've looked a lot at like parcel delivery and food delivery for small packages meals maybe maybe groceries depending but there's this really long tail of markets that are you know all of a sudden accessible and addressable by drones so what are the biggest opportunities in your mind you know is the lot like I'm thinking of maybe parcel is the biggest opportunity but is it actually that long tail of all these other industries you know emergency services that sort of add up to something that becomes more exciting.
It's the one billion dollar question and we we have done many brainstorming sessions on it and we're still discussing it regularly to be honest it depends on the type of vehicle you design you can because you see like our drone right now with 200 kilo payload with a range of 30 40 kilometers it is of course already eliminating a lot of use cases because it's it's narrowing down where it is makes sense to be used.
You will have and then you can see it already today you have thousands of different drone designs for different purposes the good thing is it will provide probably for every niche market an own solution and we would see that there's not a standard solution to the customer's problem so we would see a lot of different variation in order to approach the market so I don't think we can with one design cope with all the requirements of the different markets what we will do is we will focus on the most sophisticated markets which is the higher payload because you will see there are a lot of drone providers let's say below 50 kilos or even below 10 kilos it's even I cannot count the amount of drone providers that exist today already in the market in different countries and that run successful tests already all over the world globe but for the 200 kilo plus market it's it's quite limited because then you need a lot of aeronautical experience you need also to understand the the different steps from automation towards autonomy it's it's becoming much more complicated when you fly beyond the visual line of sight and also of course to to get a certificate to fly over crowds so here we believe we can differentiate because we have the experience also from the certification process for the passenger drones and in the combination with what we do on the sensors and on the automation on the software side towards automation and autonomy on the cargo drone side we have a beneficial overlap in both direction which helps us to define the use case as I said one of the big use cases we believe in is vessel to shore and shore to vessel because here if you look at the thousands of container ship and big logistic hubs and the need of transportation between the vessel and the harbour here here is definitely already quite quite a significant use case and then it this is can then be extended to in our case not the last mile concept but rather hub to hub that's where we can add let's say time critical and expensive freight where you want to be sure that it's arriving at a certain point of time here we can add an additional option in order to to make logistics more efficient and flexible got it and on the autonomy side you know I've heard other other people in the drone industry will sometimes say well actually for flight autonomy is not the hard piece you know it's really just as you said sort of getting the right certification the regulation making sure that you can fly beyond

line of sight is that correct in your view what's the most difficult piece piece of that
I think autonomy is not a technology problem again as as for for the passenger drone was
never a technology problem was a certification in public acceptance problem and maybe a battery
challenge but not a problem on the cargo drones it's it's it's it's also I think it
goes you need to be cost efficient you need to be able to deliver a drone that is highly
competitive on price but still very reliable in operation because at the end you need to
operate 24 7 and easy to manage so it means you need just a press of baton and it does
what it's supposed to do you don't want to have highly sophisticated pilots flying these
drones because then you don't get into a useful business case so making a drone that is highly
competitive has a high payload and still is let's say absolutely easy to use that's the
challenge and I haven't seen a lot of drone concepts yet that are there yet a lot of them
are testing but I haven't seen one being perfect yet so we that's why we also continue to
to test we will fly in Saudi Arabia at Neum in May doing test flights with the photo drone
version 2 we continue to work with DB Shanker and what we also do is you would see we will
work on a new concept that will be optimized along the criteria that I just described
so you would see that we will have an acceleration drone still being prototyped this year which
will be much more competitive on price and towards the criteria of our our customers
and when you say you know a lot of what you see sort of isn't quite there yet on this
ease of use and sort of like fully like it sounds like you're saying it's a fully automated
process from start to finish you're saying that there's still you know humans in the
loop at times where there's not ideal or what's what's what exactly isn't there yet in your
mind I think there will be humans in a loop for quite a while also on the on the cargo
drones just to I think what would be different is you will have more drones per person to
be controlled and monitored but but they will still be humans at least in our case we believe
that we will continue to use humor humans in the loop for quite a while I know from
a lot of different models across the world and we are in contact with a company in China
that is successfully for for years already doing agriculture drones and also food delivery
drones so there are use cases in place where where people already did some some significant
progress but these are very small drones which is where where a lot is done with off the
shelf components and it's a totally different use case than than what we aim for so you
actually have this advantage because since you've already you're already used to building
these larger aircraft that tend to not have off the shelf components gotcha great Derek
is there is there anything that you think we miss that people need to know about Volocopter
before we wrap up here yeah I think it's it's what I see in many of the discussions around
the world that a lot of people still believe that air taxies will only fly in 2030s and
beyond and even if we tell them we fly next year in Paris they look at us like we're
a bit crazy and so I think it is it is important to really understand we're getting there it's
only 16 months from now and we also even if there would be a problem we don't see that
we will miss 24 so it 24 will be the first year of commercial operation of evidols globally
and then it will be on us to prove that this is efficient that it is reliable safe and
that it's also fun to use and with that we already hope that this opens then a total
new market that people will embrace it instead of rejecting it and and yeah I'm very excited
that we are part of that story that we will enable people to get access to it next year

we're excited to and you know we're excited it's always exciting to see the the modeling work that we've done and the analysis then you know the people doing the real hard work like you making it a reality and seeing that theory meet practice and I feel like the evolution here right you saw it's like electric cars are now in and like the James Bond movies and now we'll have the Olympics and then we'll just wait on the next mission impossible for the for the volo copter appearance yeah I don't really looking forward to have you on board looking forward that did you tell us how you like it and yeah whenever you're in Germany please come and visit us we will fly intensively this year so you will have a chance to see the world city or the world region flying I think that's better than any movie or to to get a PowerPoint presentation so hopefully you can witness how much fun it is to to see these vehicle flying and and yeah hopefully we can can welcome your board of such a vehicle in 24 25 sign me up thanks thanks arc believes that the information presented is accurate and was obtained from sources that arc believes to be reliable however arc does not guarantee the accuracy or completeness of any information and such information may be subject to change without notice from arc historical results are not indications of future results certain of the statements contained in this podcast may be statements of future expectations and other forward-looking statements that are based on arcs current views and assumptions
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