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Capgemini

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[00:00:00] Welcome to Cloud Realities, an original podcast from Capgemini. This week, a conversation show exploring the state of the art of drones, how that fits in with things like intelligent industry, data platforms, and we might finally get to the moment when we're gonna get flying cars. I'm Dave Chapman. I'm Esmee van der Giessen and I'm Rob Kernighan.

And I am delighted to say that joining us for the chat today is Dario Valenza. He's the founder of Carbonix and speaking to us direct from Australia. Uh, Dario, just want to say a quick hello and introduce yourself. Hi, thanks for having me. I'm Dario. I'm the founder of Carbonix.

Very good. And you are joining us from where in [00:01:00] Australia? Uh, Sydney. Sydney, beautiful. Beautiful, and thanks so much for spending Friday evening with us. So I think it's, has it gone dark yet, where you are? Uh, yeah, yeah, it's 8pm. It's only, um, the beginning of spring, so it still gets dark relatively early.

Oh, that's the bit about, you're coming into your summer and we're declining into the winter. Oh, curse the Southern Hemisphere and all its good weather. And joining us from the other side of the world Is our intrepid producer, Marcel. How you doing there, Marcel? You alright? Yeah, I'm fine, I'm fine. Thank you, thank you.

Still on holiday. Late holiday, this time. Literally hear the waves in the background. Uh, Ez, how are you doing today? You alright? Yes, I'm, I'm doing really good because, you know, every minute I'm getting closer to drinks with a fun group of people. So yeah, couldn't get any better. Fabulous. I'll have fun. Now, Robert, what's confusing you this week?

What's confusing me this week, David? Well, there is a war, I think, on [00:02:00] principles starting around the way people are integrating AI into their ecosystem. And this is best borne out by the Google versus the Apple debate, which is if you're a Googler, your AI is integrated into the Google ecosystem. But if you're on Apple, what they've decided to do is take all your context and use ChatGPT as the engine.

So essentially they've, they've federated. with chat GPT. And now if you do an AI type thing on your Apple device, it's going to go all the way over to chat GPT and process there and come back. So you could argue that chat GPT is actually the best or the gold standard in AI engines at the moment. And the one that came to the fore and created the generative AI revolution.

However, your data and Google and Apple have a lot of data about you, let's be clear, and we trust them to a degree with that, because you run your life off the back of these [00:03:00] platforms. How do you feel about all that data now potentially being accessible by chat GPT? And it's starting a raging debate about data privacy, and there's lots of concerns about it.

And again, regulators are starting to get interested. Now we're a bit confused about, is this just this going to be the natural federation we've got? talked about, you know, the phone experience changing from it's just an API into everything. And there's one app when you talk to a system, and this is just the next evolution of that, or is it actually, there will be a debate about you need to keep your data inside the closed ecosystem.

And actually the AI engine from within is the right, uh, the right strategy. I'm confused about how people are going to react to this and data. flowing around. We've discussed in the past about terms and conditions, we like threats, and they own everything associated with anything that goes into the platform.

So is it just the next set of mass proliferation of your data going elsewhere? And I am confused about where it's going to go with the debate. A couple of thoughts on it. First of all, the Apple decision, you know, you know, kind of thought, is that similar to when they

used to integrate Google Maps, e. g.

they [00:04:00] just hadn't got their map technology yet there and they wanted it on the phone. And what, what, what a bit, well, the big argument there was Google wouldn't give the location data back to Apple and that's why they fell out. So it was actually an argument over data that meant that the Apple Maps, which has had an interesting history.

Um, some would say it isn't quite where it should be. Uh, that's why that whole project got started because of a data argument where Google wouldn't release the data outside of the ecosystem. Now on the data. And your question there, I think what's going on in my head is, I'm not sure at this point whether it matters as long as the data exchanges are, you know, are legal, safe, you know, kind of controlled versus, you know, spitting random data into, into different sections of the internet without really thinking about it.

You know, like why is it, why is it better or worse that my data is. [00:05:00] You know, kind of going to be resident in open on open AI servers and Apple servers versus say, Google servers. I think the point is you hit the nail on the head. If you trust the organizations, then okay, fair enough. However, can I point out to several long stories in the press about how tech companies may not have acted in the best interest of the end user and may have sometimes just occasionally put profits ahead of data privacy.

And this is the rise of the legislation that we see and why certain services now don't get launched in, say, the EU because they have much stricter regulation about protecting the individual. And so I don't, you know, trust is a, is a key part. And I'm not sure the tech industry has demonstrated that we should give it the trust that they think they should have and what the consumer actually believes to be true.

Well, there we go. So I think it's regulation. It's a regulation question to me, not an architecture question, I think. Yeah, absolutely. [00:06:00] And I think it's the point that you can't rely on the tech companies to protect the consumer so much. It's going to be the regulator that has to mandate it. I think actually there'll be a huge debate about the two ecosystems being connected, especially in the EU, who have started to become very tough on this sort of stuff, and in the right way and for good reason.

Maybe to jump in, I think with AI there's a difference of kind as well. If you look at Apple and Google storing your data. When it's just literally, it might be an email, it's your information, it sits on a server, it's segregated, it's tagged, and you know, they may or may not use it in a different way, but it's knowable and controllable.

I think with AI, there's a certain permeability that comes with the way the models learn and improve. where the data could leak and nobody would know, or it could go and influence something else. So, I think it's a, it's a slightly, it's analogous, but there's an additional element. Yeah, it's actually more risk than [00:07:00] something that you've done, trains the model and off it goes, and bang, and yeah, yeah, absolutely.

Or it comes up in somebody else's answer because it was part of how the model learned about that specific area. So it could be your competitor, it could be. I think, Dario, though we've come back to Rob's question, I think what we have to recognize here is that this was just a thinly veiled attempt from Rob to try and promote Android over iPhone again, wasn't it, Rob?

I've had this conversation, Dave, and one day you'll see the light. On that note, on that note, on that note, let's start with Carbonix themselves. So why don't you just give us a sense, Dario, of what is it that Carbonix do? So Carbonix is about aerial data capture at scale,

meaning we take a payload that has a capacity for a high resolution Uh, imagery or scan, uh, or live video.

We carry it over assets over large distances for a long time. Uh, so it's really about, obviously, the vehicle that does that is the drone. Uh, the [00:08:00] drone is the tool, the output is the data. Uh, and our specialty is putting the package together of the aircraft, the systems, uh, the processes, the regulatory approvals, to be able to do large scale aerial data capture.

Right, right. And so give us an example of the sort of scenario you might do that in. Yeah, so our principal customers are utilities. So power lines, we do a little bit of work for open cut mines. Anywhere where you have spread out assets that require regular high resolution scans to generate digital twins effectively.

Something like a power line would be a good example where it's a, it's a linear asset, it's spread out over large distances over the countryside. Um, you know, doing it with a satellite wouldn't give you the resolution you need. Doing it with a crewed aircraft, which is sort of the old way of doing it, is expensive and potentially dangerous and there are limitations around the conditions in which you can fly, how low and slow you [00:09:00] can go.

And so a drone really slots in to be able to give you that, that high resolution over long distances in large areas. And are these drones autonomous? So you set them off and they go do the scan and then they come back and the data capture occurs. How, how, how is it actually working? Is there a human in the loop?

What's the setup? Is it like a, a load of them go out? Or is it one, what, what's the kind of approach you would take to sort of deploying it in the field and sort of getting all the data back and collecting it? Oh yeah. So it's a pre-program mission. Uh, so generally with, um. You know where the asset is, you know the terrain, um, and usually it's a repeat mission.

Uh, so you upload to the aircraft the path that it's intended to follow, um, and it will then go and execute the mission. It'll take off, they have vertical takeoff and landing, so you don't need an airfield or a prepared area. Um, you'll go up above any local obstacles, transition into horizontal flight, and then start your scan.

Uh, in the case of a power line, it'll be usually two passes sort of there and back, um, over the asset. In the case of a [00:10:00] mine, it'll be a, a grid scan and the aircraft will just fly a grid pattern. Uh, for a survey, the information will be stored on board and retrieved on landing. Uh, if it's, um, what we call an ISR mission, so a surveillance mission, uh, where there's a live feed, then it'll just be transmitting a video back to the operator, uh, and the operator can actually manipulate the camera independently of the aircraft.

Uh, so it varies from mission to mission. And there must be a safety feature here, the ability to hunt for like a human in distress or find, you know, something that's gone missing, etc. Is that a scenario you get involved in as well? So you're being able to programmatically hunt a particular area for something.

Uh, we can do that as well. So again, with a scan, it's a sort of pre programmed and you just fly the planned mission, uh, with something like a surveillance mission. And again, with, you know, security, military. Yeah. You will have image recognition on the camera, you'll have the ability to pan, zoom and tilt the camera [00:11:00] independently of the aircraft and then tell the aircraft to follow a target or loiter over a given area.

And so that really depends on the mission and we are fairly agnostic to the payload and those specifics and we partner with our payload suppliers. So for example, the gimbal camera that we use. Uh, we'll have those features built in and we'll integrate it into the

aircraft and the aircraft basically provides a platform for that payload to stay airborne long enough, reliably enough in weather, um, to, to be able to execute that mission.

Pretty cool. I like the, the shots of the footage when, you know, there's like a massive field with like loads of drones on and they all take off at the same time to do one of those drone shows. That's the sort of thing you've got going on in my head, Dario. That's swarming. I mean, I know you're talking about light shows and, um.

Again, in some applications where you want to cover an area, you can use a fleet of drones. Uh, so for example, one application, uh, is, uh, bushfire or wildfire [00:12:00] prevention, uh, monitoring. So the prevention is, uh, basically what we, there are two, two flavors. Uh, one is fuel load monitoring, which is basically just a scan that'll give you actual data about how much flammable material, uh, is in a given area.

Uh, the other flavor is what we call storm chasing, which is. Looking for smoldering tree trunks after a lightning storm. Uh, so we're partnering with the, partnering with the Australian National University who's doing some work on that. And they're looking at this sort of large area coverage and that will involve eventually a fleet of drones rather than just ones and twos.

But again, when you think drones, you know, there are multirotors, there are sort of little, um, DJI quadcopters that you can buy down at the shops and go and fly, we're a slightly different looking, you know, Uh, aircraft. We think of a glider effectively, so six meter wingspan fixed wing aircraft that can carry five kilos.

Like in Interstellar. Have you seen the beginning of the movie Interstellar? Where there's like, where the [00:13:00] drones have gone rogue and it's just like flying around and they're like chasing it in their car and have to bring it down. Uh, yeah, and they almost drove over a cliff. Yeah, yeah, exactly, exactly.

It's sort of, yeah, that's not dissimilar. So in terms of the, um, the wingspan and the shape, the only difference with ours is it has vertical takeoff and landing. So it has a set of four sort of horizontal rotors, uh, that lift it off the ground. So it doesn't need a runway. You know what this sounds like a precursor to, to me?

Flying cars, Robert. Oh, not this again, Dave. Now, we've attempted to crack the whole flying car thing on this show a couple of times before, and I think we actually have a legitimate expert in this field. I would say, Dave, that you've become obsessed by the concept of flying cars and have been perennially disappointed by what's been presented.

It is the disappointment that I'm obsessed with, Robert. We were promised flying cars. What's happened is you've watched the film Fifth Element where a yellow taxi cab from New York style flies around and you think that's how the world should be. [00:14:00] So, Dario, we were at the um, World telecoms conference in February this year in Barcelona, and there was a great deal of hoo ha about a flying taxi that they had at this conference.

And people were talking about it. There was a bit of a buzz on the floor. So a couple of days into the show, we had a bit of time off. We walked, you know, kind of 3000 miles across this conference center to go and see this flying taxi. It wasn't a flying taxi, Dario. It was a shittily designed helicopter.

Yeah, it was, the way you described it was quite properly, you just went, that's a helicopter with more rotors. But what I loved was, I was looking at your face when I revealed it, went, look, it's flying taxi. And you just went, what is that? It's like, if you took the idea of a helicopter and you sort of made a retrograde version, like a worse version of a helicopter,

you'd be something like what this flying car looked like.

It was incredibly poor. But like, from your view though, you're [00:15:00] putting, you know, big. you know, quite substantial aircraft up that have got vertical takeoff and things like that. So what's your bet on? You know, when Uber, for example, are actually going to have some form of recognizably car like machine that you can get in, like a Blade Runner spinner.

So I think when you look at the Fifth Element, Blade Runner, those kinds of cars that hover, there's a leap that needs to happen in terms of how they hold themselves aloft. So there's some new kind of anti gravity propulsion or some power source that we don't yet have that would allow that to happen.

Unfortunately, we are still constrained by the physics of internal combustion engines, batteries, and we need to either beat the air into submission with a rotor, uh, or have enough airspeed to fly on a wing. So the reason our drones look how they look is that they combine the two. So they, they beat the air into submission with a rotor [00:16:00] for the shortest possible time just to get off the ground and get above any trees or obstacles around the launch area.

Then as soon as possible, they transition into forward flight, and then they're on the wing. Uh, and that is a much more efficient way to fly. That means that you're basically only needing to provide enough thrust to overcome the drag, uh, and you're getting all your lift through the wings. Rob's been working on a, on an anti gravity propulsion system, haven't you Rob?

Yeah, I think you watch too much sci fi Dave, you need to take a break. Watch the documentary channel instead and get some realism back in your life. I think you've been, you're getting confused. It's just like documentaries 20 years ahead. Dario, do you, do you need to ask permission every time you do something?

Like, because if it's quite, you know, up in the air, do you have to like warn the entire ecosystem and get permission before a drone can set off? Uh, no, not exactly, but there is a process that you have to go through. Um, so that regulatory framework has [00:17:00] been evolving. And again, we're now, you know, Carbonix is 12 years old.

Um, we've been working on this for a long time. We've seen that regulatory framework evolve as, you know, the standards are set and the regulators get their head around it. Uh, especially at the moment, if the operator has what they call a remote operator certificate, Um, so they're, they're sanctioned to fly drones commercially, they can fly anywhere anytime within certain conditions and that's generally keeping the drone within your line of sight, uh, in, uh, certain kinds of airspace and not over populous areas.

So it sounds quite restricted, but for a lot of the missions that we do, that's fine. Yeah, there's a bit of a synergy, isn't there, between the sort of things that literally you would need it for and, and the fact that, you know, it's unpopulated so you can send them out there. Well, that's, again, part of the reason we focus on the areas that we focus.

So, utilities, um, spread out assets, uh, large companies with big needs, [00:18:00] so few customers with a lot of area to cover, uh, happen to be in the middle of nowhere. So, as a starting point, that is easier. And then, as you develop, I guess, a trust with the regulator in terms of putting hours on the system, um, getting all the engineering in place to demonstrate that, everything's built to a high enough standard that you can be very confident about the meantime between failures, et cetera, uh, then you sort of start to expand into more populous areas and eventually, uh, will be fully integrated into sort of

legacy airspace.

Gotcha. Right. So what's the timeframe on that? Do you think, and, and from, from a standards developmental perspective, how challenging is it? Uh, so it has been, I guess, on one level frustrating because it's just the speed that they move at. Right. Uh, but on the other quiet, productive because we have a good relationship with the regulator and being, uh, an OEM at the forefront of, of this kind of, uh, operation, uh, we were able to, to have those conversations to [00:19:00] inform them where it was very open, where they're like, okay, this is a new thing, we don't know how to regulate it, um, tell us what you're doing, let's look at the risks, let's look at how you're mitigating them, and the, the, the regulations kind of evolved around the specifics of the technology, um, because again, it's, it's a brand new field.

And obviously there's a, there's an existing body of regulation for crude aviation, legacy aviation, uh, different kinds of airspace, different kinds of certification processes for different aircraft. And we have to fit into that. So we, we take some of it in terms of the engineering and the reliability of the system, but The way we train our pilots, the way we set out our operations and do all the checks, etc, etc.

Uh, but obviously there are some bits that are not applicable because A, we're not carrying a human and B, the pilot is not co located with the aircraft, so there's some sort of proxy to account for that. So as a customer, how do I consume the service? So presumably it's some [00:20:00] form of drawn as a service.

type situation where me as a customer, I presumably got some form of data platform or tooling that I need the data input into. So I, is the way that it works is I come, I come to Carbonix and you effectively provide the infrastructure to get that information back to me. Is that broadly how it works and what kind of business cases have you seen that?

How creative are they? Yeah, that's exactly right. So the customer will have an existing either their own ecosystem or they'll use a supplier to do that. They will ingest the data and generate the insights that they need. Our job is to capture the data and that's the input for the customer. Uh, and that means getting the accuracy and the precision required.

the geotagging, the format of the data, how they want it, uh, and the frequency, getting it when they need it. Um, so basically, they look at us as the source of the data, and then, you know, frankly, they couldn't care less whether we use a drone or a hot air [00:21:00] balloon or whatever else. Right. But it's really about getting that data in a timely fashion.

And that on our side means we need to not be too restricted in terms of weather, in terms of, um, you know, reasons why we can't fly on a given day. Uh, so that uptime is really critical. Um, now having said that, uh, the business model has evolved because sort of naively, At the beginning, we're like, well, we're an OEM.

We build aircraft and we sell them. And there are still certain types of customers that want to own the assets, and in that case, we'll sell them an aircraft. And then we'll either provide pilots or we'll partner them with an operator. Um, it's still fairly varied because it's a new ecosystem and different people want to do it different ways.

Um, for some businesses, for example, the CAPEX is So, Uh, less important. So they're happy to buy the asset for others. They want it to be an OPEX, uh, and then for, uh, you know, the military and security, they want to own it because they want to operate it themselves. Uh, so we're fairly flexible, but the main.

[00:22:00] core of the business and the business model that we have is to offer the data as a

service. Uh, and we build our own tool to go and capture that data. Can you pilot the drones remotely so you, you, you can, you don't have to go on site or do you, or do the pilots have to be on site? Uh, so the ultimate aim is what we call remote one to many.

So you have a remote operating center, um, imagine, fancy screens with um, dots on them and each one is a drone. I'm thinking, I'm thinking you're missing a trick if it doesn't look like the bridge of the Starship Enterprise my friend. Yeah I knew you were gonna say that. It's sitting right there, it's sitting right there.

I think Dave we need to have a chat. It's, except that they're not Cassette Ray tube screens, they're actual You know, more like a next generation version. Yeah. So, so that again, that's a journey. So at the moment we actually are certified to do remote operations and we have a remote operating center. But most of the time we do send the pilot out with the aircraft to watch it take off and start on its mission.

Um, and [00:23:00] then over time that'll transition more and more into. effectively as a drone living in a box out in the field and being deployed remotely. I used to, I still work with a chap who for a while was over in Perth and worked in the mining industry and the trains have a long way to go, Australia being very large.

And they do that, they have a control centre set up where there's a train driver and they're driving multiple trains and they'll occasionally send a helicopter out to check on it. But this idea of there's such a vast area to cover, I can be very, remote and control it. And we've seen that with the military application and drones as well, where basically the pilot's in a porter cabin and the drone is far, far away.

So yeah, it's, it's, it's starting to get like that on many applications, isn't it? It's just making sure that you've got the correct communication network in place to make sure. As glamorous as it all sounds, it's down to unit economics. Um, so the fewer people are involved in the operation, the cheaper it is.

Uh, the more area you can cover in a given flight, the cheaper it is. Uh, so they're really the drivers. They're being able to have [00:24:00] one person control multiple drones and have them fly long missions. That's really where, uh, the economics start to make sense. Because if you look at, um, the early days of drone adoption where multi rotors have sort of become commoditized and you could go out and buy one and most people are comfortable flying one because they're quite intuitive and they're fairly Um, easy to deploy and control the fact that you can only do 20 minutes of flight at a time means that logistically you have to take off, do your whatever area the multi launcher will cover, land, change the batteries, relocate, launch again, you end up with all this massive disparate set of data that you have to stitch together.

And there's so much time spent between the deployments. Uh, and you have a team of two people on the ground and a vehicle and you can't get to certain areas. By the time you add all those costs up, you're better off just hiring a helicopter. And so to really to be competitive in that, in that space, uh, you need to get those unit economics down.

I think the [00:25:00] big thing for me is when I look at this sort of stuff is battery technology has Not progressed a lot in the last 20 years, the lithium ion came along and there's talk of solid state and lots of companies come to market to say, Oh, this battery's amazing. It charges fast and it, you know, holds much more capacity.

Does it feel like you're waiting for that evolution of, you know, how I can store energy. And then that changes that economic model an awful lot. So rather than 20 minutes flight, you get 60 minutes flight or 120 minutes flight. And then suddenly that whole, um, logistics

system will shift. And do you have a view on that and where you think that's going to go?

Because lots of people talk very positively about battery technology. We actually look at the reality on the ground as it's not going anywhere fast. It's all tiny little incremental improvements slowly, isn't it? I think I've already said this is why we don't have flying cars, because batteries don't have enough energy.

Um, I, I thought we, I thought Rob was repeating what we'd already covered earlier too, Daria, but anyway, let's, let's, uh, Okay, all right, I had a slightly different point about the logistics of it, now that could all change the economic world, but fair enough, just rain on [00:26:00] my parade. Absolutely, so we, we have two models of our aircraft, there's an all electric one and there's a petrol hybrid one, uh, and to give you an idea of the sort of order of magnitude, the all electric one, Uh, we can eke out three hours out of it, which is really good because our airframe is really light and efficient and three hours is a lot for an electric drone.

Um, the Petra 1 can fly 10 hours. Um, and the Petra 1 is a hybrid, so it also charges the house batteries, the avionics batteries as it goes. Um, now our constraint is that the VTOL has a very high instantaneous power draw. And so the batteries have to be sized for that in terms of C rating and the ability to sustain that initial big burst to get her off the ground.

And after that, uh, consumption goes way down and it just sort of trickles, uh, a pusher propeller. Um, and the, that sort of drives the size of the battery. But in a drone, it's even more important than say in a car where mass is so critical. Um, and so [00:27:00] the energy density is a constraint. You're absolutely right.

and hence using a petrol hybrid to really get that range. Although, as you say, petrol hybrid drone, I have this steampunk vision of what it looks like with lots of tubes sticking out the top when it's flying around. Like, yeah, so I suppose that's just me, I guess. We've not tried a steam powered one. Maybe we should look into it.

Yeah, an external combustion. Go really back to the days of when it started, yeah. Moving on though to something extremely exciting in your world, the America's Cup. And, Ez, do you know how big the race courses for the America's Cup? God, no, I have no idea. Robert, do you know? I'll go for 7, 000 miles in length or something like that.

Brilliant. Is it miles out? Is it miles out? Yeah, yeah, that was an excellent guess. It is, it's uh, it's three kilometers long. What? And somewhere between 0. 9 of a [00:28:00] kilometer and one and a half kilometers wide. No, no, they go for long times, David, so they're just going in circles. The team turns over which side they enter from as the boat coming in from the right hand side has the advantage with the right hand, with the right hand way.

The race course is about 1. 7 nautical miles long and between 0. 5 nautical miles and 0. 8 nautical miles with boundaries on all sides that the boat must stay in. So I'm getting that from AmericasCup.com. No, I'm confused now because I thought the Americas Cup sail 7, 000 miles, 7, 000 miles. I'm just trying to justify my stupid guess answer now as I try to recover.

I've clearly not covered myself in glory throughout this podcast. Uh, so that's been two. Uh, so I'm just waiting for the third cock up and then we'll be done. It was a terrific guess, Rob. I'm glad you came in this one. Sorry! Okay, fair enough. I'll just stop now. I guess you go big. When the Cup was in San Francisco, it was in catamarans, and that's when hydrofoiling really started to [00:29:00] become competitive.

Because, I mean, hydrofoils have been around since the 1960s. Um, but in the context of the sailing boat, the net gain of having hydrofoils was not evidently there because, uh, the

foils are too thick and too draggy and the physics hadn't been resolved and the structures couldn't handle it. Um, and so being able to have, um, the carbon fiber materials and the computational fluid dynamics and the data available to really optimize hydrofoils meant that from about that time they, they became competitive.

Uh, and so I was involved in that. It was actually the early days of Carbonix at that point. Uh, I was consulting for one of the teams, um, in developing these hydrofoils. So Robert, I understand our sponsor Capgemini is also doing pretty exciting things with the America's Cup this year and are a big sponsor of the America's Cup.

Yeah, yeah we are. It's uh, it's, it's quite cool actually. It's called Windsight IQ and it's this technology that basically allows you to visualize the wind [00:30:00] live on the screen. So like fans and commentators Like wind tunnel. style. Well, no, he's yet like this coloration going over the top to show you which direction the wind's going in, where it is, how it's moving around.

Cause obviously in this type of sailing, little wind currents all over the place can mean the difference between winning the race and not. So you get this view of what's going on. So you can understand like optimum routes and what team tactics are actually going to play out like, and it makes the coverage for the, um, uh, the people watching the sport far more interesting because you can sort of see where they're going and what they're about to do and how that is impacting the race.

And it's why it's really cool. If you check it out on like YouTube, Windsight IQ, you can see, um, an example of it and how it plays over the top of the coverage. And I mean, if you think about it and there's all that other stuff going on with technology where they can put the flag over the bow and they draw the lines on and everything else.

So it's again, that sort of technology making sport more interesting to watch. Yeah, and I think given what we've just been talking about, about the nature of the America's Cup [00:31:00] race, it's going to be critical to competitive advantage. Yeah, I mean, you can think about, you can use it to review what you did, see what was actually going on, understand, you know, there's, I mean, it's going to amass a huge amount of data, and then what we use that data for moving forward can be, you know, you can really think about the sort of, the algorithm helping out future, uh, future performance and such.

But of course, there is the, just the. broader entertainment value, which is you can see so much more information about what's actually going on in such a complicated sport. So Dario, so much technical advance on both what you were saying there, some of the recent case study that Rob's talking about. Have any of these things made their way back into the world of drones that you're focusing on right now?

Absolutely, and to put into context the 7000 mile thing, Alright, don't bring it up again. God, opening, closing, I heard that's like 305 times bigger than the America's Cup. You [00:32:00] can, you can think of the America's Cup as Formula One, as opposed to, um, Um, you know, around the world racing, ocean racing, which is like rally.

So around the world racing, you're, you're against the elements, people, you're, you're having 24 hour cycles of people sleeping and sailing the boats. And it's basically man against the weather and so on. Um, America's Cup is very much, it's a controlled environment, it's a flat course. It's about getting around an artificial course as quickly as possible and it's day sailing with rescue boats present.

So that environment means. You're chasing single digit percentages of performance and

there's a lot of money and a lot of effort and a lot of very motivated people, uh, doing that. And so coming out of that environment, you get tools that are able to, um, you know, generate very accurate models that can predict performance.

You generate manufacturing techniques that can optimize materials. Again, carbon fiber, titanium, the stuff that you need to really get that high [00:33:00] performance. And so that translates exactly onto drones because we are looking for the lightest, most efficient, lowest drag platform. Uh, to carry our pilots. So if we can make our airframe, you know, one gram lighter, that's an extra gram of fuel that we can carry and we can go that much further.

Uh, and so that throughout the whole thing, uh, means that, that really gives us the edge, um, the ability to have that efficient aircraft. And there's also a cultural element that comes into it as well, that, that sort of experience of being in a competitive environment is very analogous to a startup. You have limited time, limited budget, it's competitive, you've got to get it done by race day, um, you have to come up with creative ways to, to have the fastest work you can on the day, so that actually translates across as well.

ez what you've been looking at this week? Yeah, so we've been talking about a [00:34:00] lot of innovation ideas, uh, throughout the shows and especially also this week. I've been. tackling with failures and types of failures to actually get those innovative ideas and work done. And looking into Amy Edmondson's work, which we've discussed previously before as well, and talking about psychological safety, she's actually talking about different types of failure that can actually help, you know, to, to unravel it and understand how and why things go wrong.

So you have these preventable failures, and I think we all know those, right? The human errors. There's plenty of them in my career. If I'm brutally honest, you just need my career to be human error. Well, this podcast is a, is a great example of my ability to provide human error into the system. What's your biggest human error?

Oh, failure. We haven't got long. We haven't got long. There's a, there's a, there's a long list. Uh, that is, that is quite an interesting one. Um, meeting Dave Chapman. Can we go with [00:35:00] that one? Some would frame it like that. Yeah. So you have preventable ones. You could have prevented that maybe. Um, it could also be a complex failure.

Because, you know, it's Dave, so it, you know. He has many levels, actually, as you unpack it. So initially you think, oh, this is quite a good thing that's just happened to me. And then the layer, and then the next layer. It's a bit like a Christmas tree. It goes down. Good, bad, good, bad, good, bad. Some would say that you get to the trunk.

Some Yeah. And so a complex failure in that sense is like maybe a software failure that results in different interactions, multiple modules that you couldn't see upfront as a, as a designer, as a developer. So that's more complex, but we're really looking forward to intelligent failures. And I've done quite some presentations on agile and I heard quite some leaders say to me, Oh, please leave out the failures because that's negative.

And it's actually not because you know, if you feel really good. then you can actually learn from it. So I'm just very curious, Dario, do you have like an example, you know, I think one of the easiest one, or at least for [00:36:00] my, in my mind is like, did you ever lost a drone? Like that it went off and you've never found it again, or, you know, what types of failures have you come across?

Fortunately, we've never lost one. In a way that we haven't found it, but certainly during testing and development, we've crashed a lot of them and you do that in a controlled

environment in a clear field with a good plan around what you're going to do if X and Y happens, but definitely there's an element of trial and error and when you're dealing with a complex system, you can simulate so much you can sort of Do as much as you can in preparation, but the reality is that until you put the thing in the real world, in its environment, uh, you don't meet those corner cases that really show you how things can go wrong.

Uh, so when you think of a drone, it's a packaging exercise of making a whole bunch of stuff. talk to each other that doesn't really want to talk to each other. Uh, so you've got your avionics that are giving the inputs on how to control the thing and where it's going to go. They're [00:37:00] getting inputs from things like air speed sensors, altimeters, uh, GPS parks, uh, iNews, and getting all that stuff to, to, to speak the same language.

And then you've got everything from, you know, how the length of the wires affects the, uh, signal integrity. So, electromagnetic interference from the electric motors. Um, Getting all those bits to talk to each other in a way that's reliable, consistent, and where if you do get a gap or an error, you don't have a catastrophic failure is a massive engineering task.

And it's, it's taken us years to get that right. And that's now our sort of IP and competitive mode and trade secrets. Um, but being able to do that requires trial and error. And every time you crash, it obviously doesn't feel good. But you go and you analyze it. And also, it's very important to make sure that you're recording everything.

So all the various telemetry channels, you've got cameras on the drone, you can see what happened. As long as you learn from it, that informs you. And we always say internally, we'd [00:38:00] rather crash it in testing than crash it with a customer. And so that's what we've done. Yeah, and that's the key, isn't it? You said at the beginning, as long as you learn from it.

You know, it's useful. There was a great phrase I once heard very on in my career, which was let every mistake you make be a new one, which was kind of that recognition to say, you're going to make mistakes, but as long as they're novel and you don't repeat them, don't make the same one. Everything's good.

I don't know if you guys, we mentioned movies before the, I think it's the right stuff, whether they're going through the testing of the rockets and there's a guy in the lab cot in the lab coat that presses the button. And every time the rocket blows up and by the end of it, he's got this, um, dread of pressing the button because the rocket's going to explode and eventually it works and we've kind of gone through that phase and gone through all the failures to get to a point where we properly understand the system, we know the failure modes, we've got the fail safes in place and the thing works.

It reminds me of uh Musk's response you know when he was testing the vertical landing boosters and there was loads of failure videos and everyone was being snarky about it. [00:39:00] And he came back with a comment along those lines, didn't he? Like, well, we're not going to get to this if we don't lose a few on the way.

It's like, it's part and parcel of the journey. So very physical manifestation of learning loops. Hardware is hard, right? It's, it's, you need to physically build the thing and physically test it and physically see how it behaves to learn because there's just as much as we are smart and we can model and predict and think about how things are going to happen.

There are just so many variables, um, that when you combine them all, things come out in ways that probably couldn't have been predicted. I did a two day workshop once at the beginning of a cloud transformation program that was running. And one of the things that

we wanted to try and communicate as part of that journey is in very early days of things like agile working and adaptable thinking and things like that.

And we did a session called, you know, fuck ups. And everybody had to sort of present to the room. [00:40:00] something in their kind of career that had, you know, kind of not gone well, but then also then communicate, of course, their leadership reaction to it, how they dealt with it, you know, kind of how they then incorporated that going forward.

And of course, it's those, it's those moments where all of the big learnings happen and building that into your culture. I think because you become a much stronger organization for being explicit about those things. We actually did that at a bank that we, you could actually win a like a Michelangelo star restaurant, uh, uh, dinner with your team.

If you had the biggest mistake of that 12 weeks. And just to highlight that you are allowed to make mistakes and make the best one, but obviously without, you know, causing Rob, that means you could have had four Michelin dinners a year. I would be the size of a house if that was a policy where I work.

Yeah. Yeah. And if you look into the preventable ones, it's the human error, right? And if you then dive into the agile values, I think [00:41:00] there's, there's friction there. You're absolutely on a point around, I always, we've spoken about this before, but the airline industry has an open. concept of when mistakes are made, they're analyzed, and that has dramatically improved safety.

Healthcare has a closed system when it comes to mistakes, and there's a whole, there's a, there's a whole book written on open and closed systems, and about the, if the medical profession had been an open, closed system. conversation where mistakes were made. The amount of preventable deaths would be dramatically less these days, but they've never had that culture.

But the aviation industry has always had an open, let's investigate our mistakes and learn from them. And pilots are asked to declare them and they're protected when they declare these faults. And that, that is two industries with dramatically different cultures, but they have, the open system has saved lives.

Many, many lives, whereas the closed one is under heavy scrutiny, saying, actually, how does health care become more open in its analysis of mistakes? Interesting with the way we look at, you know, [00:42:00] failures in testing to really understand the root cause. Um, there's quite a technique and a skill there because it's relatively easy to find the proximate cause, like, yeah, connector came loose or something broke.

And then why did that happen? Was it a quality assurance issue? Was it a selection of the components issue? Um, And it comes down to the design process. It's like how, how did the design process allow this component to go, um, to become the one that was specified. And so you, you go layers deep. And as I say, it's not a, you keep it blame free if possible.

It's, it's really an exercise in learning. Um, and you have to have that trust there that you can look at those things and, and improve rather than sort of blame someone for it. Well, I was, I was actually going to go back as a final note as to your link to psychological safety here. And maybe just build on, uh, on Dario's point, you know, why is it so critical at this point?

Well, I think it's crucial if you have, if you have the psychological safety, then you, [00:43:00] all ideas, crazy ideas, every idea can can, you know, can cross the table. And I think those are crucial when it comes to speed, innovative solutions, uh, staying ahead of competitors. Uh, but if, and psychological safety is like the essence of, of creating that room for all voices to

be heard.

Um, so, so then again, it all builds back to the work of, of Amy Edmondson. So it's, um, it's fascinating how all these things are interconnected, but somehow it all comes down to the human aspect of it. I think it might, might be an element of, by definition, you dunno the outcome. Because if it's not been done before, it's novel, so there's a chance it won't work and you have to go in with your eyes open that what I'm doing might not work, but I'm gonna try it anyway.

Then if it doesn't work, I'm gonna try something else. Or I analyze why or I'll improve it. And so you can't have that safety that, oh, someone else has done it, I'll just do it the same way and it's gonna be safe. Um, you have to take that risk and so the [00:44:00] business and the team and the philosophy has to support that.

Very good. Excellent discussion today. Dario, thank you so much for taking the time to join us this evening in your time. Oh, my pleasure. Now, we end every episode of the show by asking our guests what they're excited about doing next and that could be watching the America, America's Cup with Robert. In a two hours apparently.

Yeah, exactly. It's amazing. 7, 000 miles in two hours, isn't it? It's absolutely outstanding. I'm very impressed. Those things go fast, or it could be something in your professional life. So, Dario, what are you excited about doing next? Uh, I think professionally, my focus is still on, um, the growth of Carbonix.

So it's that, that journey from where we are now, uh, flying missions for customers, uh, to expanding that market and improving the technology to get to that remote one to many. operations. And so that's, that's a journey that we're on and we're already a long way down that journey, but there's still a long way to go.

A huge thanks to Dario this week. So [00:45:00] thank you so much for being on the show. Thanks also to our sound engineers and wizards, Ben and Louis. Our producer, Marcel, of course, all the way straight from the Caribbean, respect to that. And also for the beautiful backgrounds of the sun going up. Oh, we're all into the mood of drinks, or at least I am.

Uh, thanks of course, also to all our listeners. Great that you're a part of it. And obviously we are looking forward to all your texts and messages. We're all on LinkedIn and on X, of course. So, uh, text us there or message us there. Or you can use the old fashioned way, cloudrealities@capgemini.com. See you in another reality next [00:46:00] week.

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