**Nillion Gives Crypto & Data Security a Human Upgrade – Conrad Whelan – #971**

Dave Asprey:

You're listening to The Human Upgrade with Dave Asprey. Today is going to be a powerful show because we're going to talk about something I haven't spent a lot of the show talking about and it is related to crypto, but not the stuff you think about. Our guest today is a very well-known guy, Conrad Whelan, who is a co-founder of Uber and like me, he's a Silicon Valley guy who's done software and hardware at pretty much every level of the software stack.

So, I'm just going to say Conrad's one of my tribe from the tech world, but he has a cooler beard than I do, if you're just wondering about that, which is a sign of his retirement in 2016 to focus on philanthropy and personal and passion projects. We got connected because he came out of retirement for a company or a crypto project called Nillion. I'm an advisor to Nillion as well. Nillion, I believe, is as fundamental to change in the world and building the kind of world we want to live in as crypto itself and it's different than anything that you've ever heard of. If you're rolling your eyes going, "I've had enough of crypto. There's nothing going on there," crypto's just technology.

End of the day, yes, you have the ability to have distributed logs everywhere, all over the internet, that you know haven't been changed or you can track changes to, but we've never had compute. The big issue is if your information is out there and you wanted to be able to pay someone to do something to it and you didn't want them to be able to see it, you couldn't do it. What that means we can spread visibility, but we've never spread compute cycles. This new tech is going to allow us to distribute everything everywhere, I believe, over time and this is what's been missing.

So we're going to talk about how this works, how important it is, and I'm going to ask Conrad a bunch of other stuff that is going to completely be interesting because this is a guy who can do whatever he wants and he's doing this. I want to find out why. Conrad, I'm so happy to get a chance to connect with you.

Conrad Whelan:

Yeah, me too, man. Really nice to meet you.

Dave:

You're in Amsterdam as we speak.

Conrad:

That's correct.

Dave:

All right. What is a founding engineer of Uber doing retired in Amsterdam? It sounds like a hell of a story.

Conrad:

I mean, I got moved to the city by Uber. Launched a technical team here. This was around 2015, '16. Yeah, fell in love with the city, enjoyed the friends that I made here. I did actually move back to Canada to pursue one of my passion projects, which was skiing and to be close to my family for a few years. But then, I ended up moving back. Part of the reason to be here is travel. It's one of the world's best travel hubs, lots of amazing places to go. I like the vibe of the city. The Dutch have that dramatic mindset

where engineering is actually valuable. I like the way the society runs. The airport here, the machines they've built for everything seem to make everything work quite efficiently. So yeah, a very well-connected global but small and relaxed city that's got a focus on efficiency? Sign me up.

Dave:

It's a beautiful place, but just missed you there. I didn't realize that. I would've interviewed you live there if I'd have put the dots together. I absolutely adore Amsterdam, all the bikes and like you said, it's a well-run city, except when the tractor owners in Holland blocking food distribution, because the government's trying to stop them from raising animals to feed people. But that's a different issue and that'll pass [inaudible 00:04:02]-

Conrad:

Yeah, that's a whole another... I don't know if it's going to pass. Is climate change going to pass? I'm not sure. [inaudible 00:04:11].

Dave:

I don't think climate change is going to pass, but I'm just assuming that the protests will pass at a certain point. Either they're going to have farming or they're not going to have farming, but I'm little worried about food shortages for the short term, but we shall see.

Conrad:

Me too.

Dave:

Now, why'd you come out of retirement for this?

Conrad:

I mean, I've got a bunch of reasons. Some of them are personal. Some of them are professional. I mean, first of all, being out of the game for five or six years, I think it was time.

Dave:

Yeah.

Conrad:

I was definitely a good long break. I'm 44 now. I'm still young, I'm still healthy, I've still got all my faculties about me. So, it was time in that sense. I had a big project finish up last year. It was a birthday party for a lot of my friends, which I won't really talk about here, but when that was all done, that was years' worth of time and effort and a lifetime of curation and collaboration with all sorts of great people to pull that together. I hit up Andrew in maybe December to ask him what he was working on, because you know Andrew. He's always got his fingers into all sorts of interesting pies for sure.

Dave:

This is Andrew Masanto for-

Conrad:

That's-

Dave:

Listeners who's a pretty well-known guy in crypto. Only started two of the top 100 cryptocurrencies and he's been a biohacker and a friend for years as well, which is how we got connected.

Conrad:

Yep. I was in Costa Rica and he sent me the paper, the NMC, the Nillion paper that they were working on. I had a call with Miguel and Rob. I started to dig into the technology. I thought it was really interesting. Full disclosure, I'm not the biggest "crypto-is-everything" person. I definitely think the technology's interesting. I think token is a software tool, a very compelling one. I think the blockchain is interesting for certain, but again, I'm an engineer. So, efficiency is my thing. I just saw it as very inefficient architecture. But with NMC, I saw something different. So to me, if you look at a decentralized blockchain architecture, adding more nodes, more compute, more whatever to the network, all it does, it does the same things and it maybe can process more transactions, but it doesn't necessarily do it more efficiently.

What I thought was very interesting when I read about NMC was here's a network that when you add more nodes, you increase the security guarantees on people's data. There's actually a functional improvement that we can get by adding more nodes into the network, which means, the decentralization story to me was quite interesting. This was my thoughts on the crypto space and it's now even more confirmed. I think it's just really fascinating that if you're the age that we are, we've basically been watching all these technologies that have been developed and coming along and changing our culture, whether it's the internet, whether it was email, or whether it was cell phone, then the smartphone, social media. All these things have come along and changed culture.

What's been fascinating to me about crypto is just from that cultural side, I almost feel like this is one of the first times where culture, more specifically the youth culture, is actually trying to push technology in a direction, because like I said, these architectures are really... They're hard to work with, they're quite difficult, they're inefficient. An engineer wouldn't pick them to solve a specific problem, but the culture is pushing this and it's been fascinating to see in that way.

Dave:

So-

Conrad:

When I read the paper, I began to think about, "Okay, well, this is a different type of decentralized network with a different functional story as you add more nodes to it." Maybe in the future, there's going to be a bunch of these decentralized networks. Some will be blockchains. Some could be NMC. Some could be other networks that haven't been discovered yet. But the cool thing is we now have this token to interact and mediate between them all. I put that together when I was reading the paper. And then of course, combine it with information-theoretic security and the privacy guarantees, which we can talk about of course, and I thought, "Man, as far as projects going in the decentralized space, which is the most exciting space in computer engineering right now, this would be a pretty good one to try to hat back on." So, yeah.

Dave:

I hear ya. Okay, it makes sense from an engineering standpoint. A lot of our audience isn't engineers. So, I'm going to do my best to translate this like CTO/marketing guy. What's happening here is real engineers, like Conrad and most of my other CTO friends, throughout the entire history of crypto have said, "Interesting, useful software tool, really crappy transactions per second." We have been designing systems first on single computers, and then as a distributed thing all over called N+1 architecture. That's what I did in the data center business. That meant you could add another server and you could have another 100 transactions per second, or whatever it was. Just keep adding servers and that changed the world. That allowed everything we're doing today. And then, someone somewhere said, "Well, hey, let's make a really inefficient thing that's burning maybe 5% of the world's electricity to spread that stuff around." That hurts my brain as an engineer. It hurts yours as well, right?

Conrad:

Yep, definitely.

Dave:

Okay. That's what we're talking about, where this maybe doesn't make sense except this idea that everyone can see what's on the blockchain, the idea of a token as a software tool. In my other life, I was one of the 100 most influential cloud computing bloggers when I was a VP of cloud security at Trend Micro.

Conrad:

Very cool.

Dave:

I invented this term called "ambient cloud" that no one used, but the idea, the vision was that essentially, most of our cloud stuff is going to move to the edge, I couldn't have told you which technologies it was going to be exactly, and what's happening now is we managed to move some of it in a very inefficient way to just it's on your phone, it's on your computer, it's all over the place. That's a beautiful thing.

Conrad:

Yes.

Dave:

What happened though is, okay, great, now we have a record of it, but you got to go back to a data center where someone... Because if you're doing compute, you can look at it for the most part. You can still have some data encryption or whatever. But that's a secure issue and it's a privacy issue and it's a scalability issue, because if all the servers are full, then what are you going to do? Well, it turns out, if you can add additional compute and increase security when you scale, that's never been done before. When I heard you came out of retirement for this, when Andrew who always knows what's going on in the future called me and said, "We need to talk about this," all of a sudden, I'm like, "This matters because it's going to get rid of this." How much less efficient is Nillion and this NMC that's behind it? We'll get into NMC in a minute. Is that versus just going and getting something on AWS, on Amazon's cloud, and just doing it? Orders of magnitude, where are we?

Conrad:

I wouldn't think it'd be orders of magnitude, but definitely when you think about... Yeah. If I were to explain NMC, the way it works is that you pull data from a network that's owned by a bunch of people, and then you put that data together with math, with your personal data. That's what creates the privacy guarantee. The pulling of the data from the network is the key thing. So if I pull data from 10 nodes, it's going to be roughly 10 times more expensive. If it's a hundred nodes, it might be a hundred times more. It basically depends on the level of security guarantees.

The current network that we're working with has five nodes. So, it's maybe five times more. That being said, the key thing that Nillion and NMC can do is that once my data has been put into this private form, I can put it up for a computation with your data that's also been in a private form and we can start to see the output of our data together without actually finding out anything about each other's. That is invaluable. So basically, you and I could do a computation together. My data's never left my iMac, your data's never left your iMac, and all we do is we see the results. It's very interesting.

Dave:

This is the thing that got me jumping up and down when Andrew talked about it. Back when big data was still, I think a term we used... GigaOm had the first big data conference somewhere in New York in the meat packing district. I gave a talk saying, "Well, here's the problem. If you're going to share your health information, you only want to share enough of it and you don't want to give it up permanently because if you want to do a search of, I don't know, people who have herpes let's say, maybe you don't want to raise your hand and add your name to that list, or people who are pregnant or whatever else."

There's confidential stuff everywhere. But the drug companies and frankly, lots of other people who aren't drug people like biohackers... Wouldn't it be great if we get all openly, but not openly share all of our data to figure out the actual operating system for humans and how we work? You have to have Nillion in order to do that and that's what makes me super stoked. I don't want Apple to have all my health info. I want my health info. I want to get paid for it, but I want to contribute to the betterment of humanity. Do you think Nillion's going to be able to do that?

Conrad:

Yeah. I mean, I think obviously, we need to build it. It's a startup, right? As we have very interesting mathematics, building a real network is something completely... It's an order of magnitude harder challenge. But we're able to hire good people now, which is great. Yeah, I think these are the types of applications that I personally am very excited about coming from a science background. We do talk about medical records all the time. Being able to do scientific studies on pools of data that include information that would personally identify you is very interesting because right now, you don't want to do any research study that has personally identifiable information because typically, the research studies are being paid for by the insurers. You don't want insurers to find reasons to prevent you as a specific individual from getting insured for something, right? Yeah, there're all sorts of implications for this type of scientific research and I think Nillion and NMC really is well placed to basically capitalize on that for sure.

Dave:

Talk to me about NMC. We have listeners who haven't heard of it. So, they need the basic explanation for it.

Conrad:

Yeah. It's an evolution of a programming technique or area called SMPC and that stands for secure multi-party computation. So secure means that your data is private, multi-party means you can also collaborate with other people's data. Both of your data remain private. Computing, obvious. What makes NMC really interesting is that initial stage where you pull all these things we call "blinding factors" from the network and you pull them to your computer, you mathematically combine them via our library or application. You mathematically combine those with your data, and then that goes back out onto the network. The computation that then happens, it's called Nil Message Compute. That's where NMC comes from. The reason we call it that is because there're no messages being passed between all the computers that are participating within a computation.

Now, this is different than SMPC, where NMC is an evolution beyond SMPC. In the traditional SMPC techniques, there's a lot of communication that has to happen and the amount of communication is based on the complexity of the computation that you're doing. So, if you want to basically do just a very complex, a bunch of additions, multiplication... The more computation you need to do, the more communication has to happen, the slower those algorithms get to the point that even very simple things that we would think are very simple, calculating the average of 10 numbers, is actually really hard. NMC solves that via some clever mathematics and basically gets rid of all that communication, so in theory, we'll be able to scale much better for all applications.

Dave:

It's awesome. I absolutely adore speaking with you because you can go straight to it because you're a real engineer. I realize I'm actually missing some of that from Silicon Valley. If we had a whiteboard, we'd be poking each other's eyes out, getting all excited, right?

Conrad:

I love whiteboards, yeah.

Dave:

That's how you do it. For our listeners, I'm going to do my best to translate to non-technical people, although we do have a lot of technical people. There's investment bankers and doctors [inaudible 00:17:38]. Some of them are going, "I don't care," but many of them are going, "Wait a minute. This actually is going to change my life if it works." What NMC stands for is Nil Message Compute. I want you to imagine that you're listening to this. If for you to get something done, you had to tell everyone what you were doing before you could do it and you have to tell them each individually, pretty soon if everyone's like, "Hey, I'm about to raise my dinner fork," and so everyone's just talking all the time telling everyone everything they're going to do at a certain point, no one can get anything done because we're all too busy talking about stuff and hearing what everyone else says.

It's like having not just your own notifications on your phone turned off, everyone else's is going, ding, ding, ding, ding, ding, all around you. That's actually what a compute environment is like, until you solve it with NMC and specifically Nillion. So because of that problem of just too much chatter, we've been unable to accomplish this really important task of letting you own and protect your data and still make it useful for the world. What's happening now is earlier we talked about global warming, right? There're all sorts of information there about the state of the environment. There's information about the state of your biology, the state of your company, the state of all things. With this tech, we're going to be able to share it with, or to at least compute, to be able to calculate things, without actually sharing the data itself.

So if you wanted an aggregate of a bunch of things, you could do an aggregate of a bunch of things. You could have real economic calculations of what's happening because companies can share things by computing them together without actually sharing the root of what it is. When you look at saying, "How do I get an accurate measurement of reality?" It turns out you need a technology like this, so that you don't run into that problem of everyone yelling the current status of everything all the time, which would be absurd. And so, this gets a little bit esoteric, but I'm genuinely excited. This is only the second crypto project I've been involved with. The other one was through Andrew Masanto as well, which was Hashgraph. They were establishing trust the same way that our mitochondria actually vote to do something called "quorum sensing."

Conrad:

Pretty cool.

Dave:

What I think is happening here, it started to look a little bit mystical. Are you a mystical guy? I know you and Andrew met at Burning Man, which is where all the cool tech projects start. But I mean-

Conrad:

No...

Dave:

Were you there rolling on mushrooms and doing crazy stuff, or are you-

Conrad:

Yeah.

Dave:

More of a traditional engineer?

Conrad:

I'm not, no. I wouldn't say I was a traditional engineer. I don't know if I would call myself mystical, but there is a magic in mathematics and there is a magic in numbers that is impossible to catch. It's a different magic than the magic in trees. Maybe, it all comes from the same place. No, I think this is just the continuing evolution of computation as part of the human experience. These are just still tools. If you think about where we came from, it's what separated us from animals, like language and tools. We are continuing to build very fascinating and interesting tools.

One thing I really like about NMC almost even more than blockchain... If I think about a blockchain and a token, that's a financial asset. Well, guess what? Humans will trade financial assets, but so will robots. But when I think about NMC, when I think about data that needs to be private, that's almost always going to be human. It's a very human-centered aspect of our system that I think is really good. I'm sure there's going to be robots that also have private data as well, but it fundamentally comes back to things about us, right?

Dave:

What do you think about the old, oh geez, who said this? "Information wants to be free?" Wasn't that Kevin Kelly, the founder of Wired magazine?

Conrad:

I mean-

Dave:

Or Neal Stephenson or Bruce Gibson or somebody? Do you remember who said that?

Conrad:

I can't remember who said that, but that's not Malcolm what's... No, [inaudible 00:21:48]-

Dave:

Oh yeah, Malcolm Gladwell, maybe? It's one of those things that as a computer science guy in the early '90s, when I was studying that, yes, the Internet's going to set all this free and there's another class of person who says, "Well, if you haven't done anything wrong, you don't have anything to hide." But here it is, we're both talking about security and privacy. Talk to me about your fundamental beliefs about privacy. Is it a human right? Is it something that's dangerous? Where are you on that spectrum?

Conrad:

It's very interesting. I mean, I think it's incredibly important that it is a human right. I do always worry building technologies like this about people being able to fund nefarious activities that we all agree are not good, whether it's a bioterrorism lab. There might be some point in the future where we're like, "Oh, fully anonymous currencies? Maybe that wasn't actually a great idea." But that being said, I think there's definitely a certain level of privacy that is incredibly important. It is a human right. And especially in this day and age, with the tech companies out there and the advertising-driven world that we have, that data clearly has value. So the other side of it is I think people deserve their privacy, but I also think getting some of that value back is part of it that's the important evolution that's going on here.

Dave:

Giving some of the data or some of the value from your own information, just because you're a member of society, if you can share that information without giving up a fundamental right, that's part of giving back, but it's not a 52% marginal tax rate giving back thing. It doesn't actually cost you anything, right?

Conrad:

Yeah, that's right.

Dave:

It's almost a charitable thing.

Conrad:

Yeah, kind of.

Dave:

Yeah. When you get into the realm of quantum computing...

Conrad:

Yes.

Dave:

You start overlapping with the realm of quantum biology. I don't mean the woo-woo, "Oh, let's do a quantum meditation at Burning Man," and I'm down for that by the way, but I'm talking about real, hardcore, "We don't understand this quantum tunneling effect within a cell membrane, but we're starting to figure it out and you can get a PhD in it," kind of real, hard science. Do you think that we're approaching something when we have enough scale, enough of, I'll call it, a global brain that something different will shift? I mean, we have the first AI hiring an attorney at Google. We have distributed memory systems across the planet. We have fiber everywhere. Are we building a giant brain on the planet?

Conrad:

I mean, we're definitely building a giant chatter box, which could be the beginning of a brain. Will that brain be the same as our brain where it's an independent thing which has an agenda and wants to go a certain direction? My worry is that we're not building that in some ways. Basically, we're creating so much chatter and we all have our own agendas, but the world is like, "The planet is in trouble and we're not able to come together to do it." We're building these technologies and thinking it's bringing us together more, but it's actually helping us stay apart and argue more and be separated more.

As to the quantum aspect, are we approaching some sort of thing? I always tend to think it's easy as we get older to think, "Nostalgia things were better when we were younger. Stuff's getting crazier as I get older." People a hundred years ago were probably thinking the same thing we are now and we're just a spectrum. Our children, if you have them, or their children are going to have a different set of problems and a different set of technological transitions happening. We're on the path. As to are we approaching something that would be some either end game or full transformation? I'm never really fully convinced of that. I think the human element is pretty match call and is always going to be there.

Dave:

Oh, that's a good perspective. I worry for my grandkids that they're going to get repetitive motion injury from twerking the way we're doing internet. We've-

Conrad:

Pretty much TikTok, yeah.

Dave:

Are you sad at where tech has gone? I remember the sense of liberation from when we were first building the modern internet, the first web servers. You could anonymously email anyone. It was possible to have conversations you would never have in-person on Usenet. It's just privacy and all that, that's been just destroyed. You can't get a Gmail account without a cell phone number. So, they know exactly who you are and where you've been driving and all that. All these algorithms using our precious computer science knowledge to make people twerk. Does that-

Conrad:

I mean-

Dave:

Sit with you? Sometimes, you go, "Oh, my God?"

Conrad:

I mean, I kind of. When Google changed its name to Alphabet, I was like, "That's actually a very scary thing." What? Does that mean basically, they're the... Am I watching Blade Runner and they're basically going to be the...

Dave:

[inaudible 00:26:53].

Conrad:

Are they the corporation that wants to have their fingers into everything? So there's part of that where I'm like, "Man, this is sad." The connectivity is just, it's also such a special thing. I live a very international life. I live far away from my home. Weren't for my family, I live back in Canada. It's very easy to do. All my friends, I can stay connected with. It's like those things are actually good. I think I'm less disappointed about tech than I am that our economic style of political capitalism has not been able to keep up with it. I'm more sad about us because we're still the monkeys with the paper and we're still fighting over all sorts of things. We have cool technologies that we can apply in all sorts of good ways, but we're still stuck in an old way of running a society. So I think I'm more sad about that and think we need to have a dose of evolution there, more so than in the tech world I think. Will the tech world be able to drive that? I don't actually know, but yeah.

Dave:

I feel the tech world won't be able to do that because humanity itself needs an upgrade. That's the mission statement for my portfolio companies. We're upgrading humanity and it's mostly operating system level stuff. It's not our conscious thoughts. It's the stuff that happens in the 350 milliseconds where your body's doing stuff that you can't be aware of, because your brain hasn't started wiggling yet. We have all these urges and we do these things. Then we take credit for them and think that was why. There's some core tweaks to our operating system that I think are necessary.

It doesn't matter if we have robotic attack dogs, machine guns, or stones and pitchforks. The behaviors will be the same until we fix ourselves. And so, I'm working on that, but I want the tools to get visibility into that because once you see what your body is doing without your permission and making you believe, then you can change it. I think we actually need this type of massive data visibility, which includes privacy. And so, that's why when this project came up with Andrew, I'm like, "All right, I'm all in on Nillion where it's going to be a big thing." You guys are maybe a little bit more magical than you think. Tell me about how Harry Potter is involved with Nillion.

Conrad:

How Harry Potter is involved with Nillion? Oh, man.

Dave:

Horcruxing.

Conrad:

Oh, Horcruxing. Yeah, of course, I should have known that. My fiancé love that we use that term. Horcruxing is the creation of this thing we call a particle. It's a new term that we've come up with, although we should just call it a Horcrux really. This is the operation, the clever mathematics that we use to basically combine the network data with your personal secrets before you can then put them out onto the network. That's the Horcruxing. That's the core operation that happens on your computer. So when you interact with the NMC network with your computer, let's say, you want to upload your passport into NMC, the passport never actually leaves your computer in plain text. The only thing that leaves is this Horcruxed particle and that particle could go anywhere in the world. It can be public. It could be available to anyone. For somebody to figure out what was in that Horcrux particle, they would need to either hack or control at least a third of the network that produced it, right?

Dave:

In Harry Potter, for people who aren't fans, a Horcrux is something that a wizard or a witch would use dark magic to create this object that could then go do stuff. Horcruxes are a way you achieve immortality by splitting a dark wizard's soul into separate pieces, so they're all over the place. It's an interesting idea. It's not dark magic in Nillion, but the idea is there's this particle that's not your data, but is representative enough that you can do things with it that goes out there. For a human brain, it actually is almost impossible to visualize that. Well, how can it go without going? And like you said, complex math. That's how.

Conrad:

Yeah, math-

Dave:

That came from-

Conrad:

Math is magic, yeah.

Dave:

It is. And that came from Miguel de Vega who did the original paper on this esoteric... Most people don't even know what NMC is, Nil Message Compute, and figured out the math behind this. That's how all the cool stuff that happens in tech. Some math guy somewhere says, "I woke up and I had a dream and I made up this math and no one even knows what it's for." And then five years later, you realize, "Oh, that lets us solve this problem that no one even knew could be solved."

Conrad:

Yeah, [inaudible 00:31:39].

Dave:

He was focused on this, but...

Conrad:

Yeah, or he works on the math for a while and tells other people and they're like, "Okay, this is great." Then finally get involved with someone like Andrew Masanto and Andrew gets into it and it's like, "Okay, sure." And then, gets further into it and he's like, "Wait a minute. We got to look deeper at this math. Is this for real?" And then eventually, get it validated by PhDs in mathematics and they're like, "Yeah, this is pretty legit." It's amazing. It's very magical. Like I said earlier, building the actual real thing out, that's the challenge. That's going to be a really hard lift for sure.

Dave:

Well, given the team you guys have, if anyone can do this, I think you can do it. Do you mind if I ask you a question or two about technology at Uber?

Conrad:

Yes, of course. [inaudible 00:32:25].

Dave:

All right.

Conrad:

Please ask, yeah.

Dave:

Okay. Scaling tech, and this is what I asked Eric Schmidt, the old CEO of Google and Chairman, is relatively easy unless you're doing something like Nillion where, okay, there's new math and all this stuff. But at Uber, you were taking existing things that we knew how to do, basically, add more servers, and you were solving some algorithmic things. It wasn't the hardest thing to solve on the planet, but getting an engineering team to work together at the scale of Uber seems much harder than actually doing the tech itself. So how did you spot narcissists and sociopaths, which are probably overrepresented in high-end engineers? How did you identify them? How did you get them out of the organization? How did you allow them to stay? How did you manage the team to build the engineering part of Uber?

Conrad:

Very interesting. Yeah, the way we joke about this is that computers are easy, humans are hard. That's the standard joke in the tech industry.

Conrad:

Yeah, the way we joke about this is that computers are easy, humans are hard. That's the standard joke in the tech industry. I think it's really tough when you're a company that's growing as fast as Uber is and scaling the team out as fast as Uber is. I think at one point in 2012 or 2013, I can't remember, we were doubling the size of our engineering team every six months I think.

Dave:

It's so frustrating, right? Because-

Conrad:

[inaudible 00:34:09].

Dave:

You can't even qualify people.

Conrad:

Well, yeah. In a way, it was amazing though, because you could feel everybody in the Valley wanted to get to be with us. That was an amazing feeling, but where it becomes really difficult, and I'll just for sure say that Uber struggled with it, is that managing people, bringing people in that onboarding thing, it's really hard to build the skills and expertise for that because A, it takes time, so you need to hire people to have that experience, and just because you hire the people that have that experience, some of those more nefarious, narcissistic traits, those things only come out over time as well.

Dave:

Right.

Conrad:

It's like, if you're basically, I don't know, how many tiers of management and everybody's been there for... Maybe, one guy's been there or one girl's been there for 12 months, but everybody else's been there for one month or four months or three, it becomes very difficult to spot. But I would say for me, this is very important for me and Nillion is making sure that the people we hire are smart, fun, get things done. Yeah, I think integrity and honesty are just massively huge for me. From what I've learned at my time at Uber is that it's really important when you see those values are not being honored, that you really have to fix it.

I mean, in a way, I hope that Nillion could become so successful that we need to scale like Uber. But in another way, I know that it's really hard on people. If we have this incredible patented mathematical system and we keep it simple, we don't add too much complexity for ourselves, and we build the network so that other people can participate in it, I think it's going to be an interesting ride that way. I don't know if I answered that question. It's a really hard one.

Dave:

Oh, it is a really hard one. I can tell you what Eric Schmidt said. He said that at Uber when he took over, they identified that there were-

Conrad:

At Google when he took over, right?

Dave:

Yeah, right. They basically said that there were knights and... Or no, pirates and knaves. And so, a pirate is actually someone who's looking to do harm and these are the people they needed to find. Knaves were basically those odd engineers, usually the most gifted ones, who don't follow rules. They hate the HR department, they won't shower, and they only eat pizza and, well, Jolt Cola, if we want to go way back in the day [inaudible 00:36:48]-

Conrad:

Yeah, but they do amazing things.

Dave:

Right. Okay, they're assholes, but they're not assholes to harm other people. They're just assholes because that's how they work. You and I both know some people like that who are gifted. He said, "Well, we had to sort them out." And he said, "When we found the people who were pirates versus knaves, these unusual people, well, we would take the pirates and we would publicly and traumatically fire them, so everyone saw what happened."

Conrad:

Oh, wow.

Dave:

He said after he did enough of those, that people stopped either taking jobs or they stopped behaving that way and it solved the problem.

Conrad:

Oh, interesting.

Dave:

I was shocked at that answer. It was just a few months ago when he said that. I wanted to ask you, because you were managing a type of human being, us engineers, who are just unusual neurologically and probably harder to manage that way, yet you scaled an engineering team in a very admirable way to solve what ultimately is a really big transportation problem globally. That is not to be laughed at from a technical perspective. But just the people side, I would've torn my hair out and probably booked an Uber to a hotel somewhere and got lost.

Conrad:

"Uber get me out of this job." Yeah, exactly. I mean, the other part you have to consider about Uber that's very fascinating is that we not only were scaling our technology, but some of the most amazing things that we were able to do and the amazing growth that we were able to have was because we were also scaling the operations team. So those were people that were with our driver operations people, our community managers, the general managers for the cities. The approach that we took, which I thought was one of the smartest things that Travis did, although eventually, we had to stop it, is basically, as an engineering team, instead of us building this product that was like, "This is how it's supposed to work. This is how we say it's going to work," instead we in effect decentralized the startup-ness.

We basically created tools, so that all of these independent city teams could then hire really smart people, they could use our tools, and then if they could show us that they could grow those businesses using the tools we gave them, then they would basically get the features that they might want to be developed for those tools to make them better, right? We had all these cities that were in effect competing with each other.

Dave:

Oh, wow.

Conrad:

Yeah, I think it was incredibly smart. It eventually was not the best thing for the company because you had different cultures. The French team did something with Uber Angels I remember and it just was not well received in the United States, this cultural difference and obviously it wasn't really a great idea. That started to happen and it was like, "Oh, maybe, we actually need to reign that in a little bit." Yeah. I mean, it's really tough because the culture was to allow people to be independent and have ideas and go. So sometimes, the pirates would thrive in that environment because they were, in a cutthroat way, just looking out for their ship and they might not have cared for the other ones. But for the growth of the business and getting Uber to as many people in the world as possible, I think it was a very interesting strategy.

Dave:

What are you going to do different at Nillion? You're one of the few people on earth were like, "Yeah, I was the founding engineer and I stuck it out." Because usually after a few years, the founding engineers are all gone and it's taken over by someone who's done it before. You stuck it out for a very long, high growth period of time. So, you've seen stuff that probably only 10 people on the planet really have seen that from zero to the scale you've done. What are you going to do different at Nillion? Because you're starting from ground zero, you have the ability to build a team and frankly, let's face it, you made more than $6 at Uber. So, you guys really could hire whoever you want and you have a name to do that as well. What's going to be different? You have your pick of the litter for all engineers. This is your second time through.

Conrad:

What am I going to do different? It's interesting because I don't think there's going to be many things I would want to do different from the stuff that I learned at Uber. We're going to make sure we hire the best people we can on the technical side. Maybe, I might not want to hire as fast just because I saw the mess and the difficulty it creates and the personality stuff it creates. I think we used to always say it was like Travis was trying to push an engineering team that would have more velocity at the expensive momentum, meaning, he would maybe change his mind and all of a sudden, we'd just have to all get jerked to one side and build. Whereas, I would maybe, hopefully, the CEO doesn't dislike me for this one, but sacrifice a little bit of velocity to build momentum because I know a network as complex as NMC, we're going to be working on it for years.

It's not like we're going to launch the product and it's like, "Oh great." We're going to be working on finding the right markets that we're going to get this technology into, the right places that people are going to respond to it so that we can push for that growth. Scaling it out is going to be a challenge. We just have years of work. I think sometimes, pushing for that being able to move fast is really good, but I just think momentum is such an important thing. If you get the right people in place and then you could build up that momentum, develop that momentum, you don't really have to do major changes. You stay on top of what needs to be done. Yeah, I think a momentum-based approach versus a velocity-based approach might be how I would be approaching this one differently.

Dave:

All right, I love that answer. I know I'm putting you on the spot and these are really hard questions. Part of what I'm inferring in what you're saying is I think that some of what you're doing, you're doing in your unique operating system level that's hidden from the application that is your conscious thinking. And yes, I'm using terms that you and I both know what they mean. Maybe, not everyone knows the

difference between those. It feels like I was watching your eyes, watching your body language when you answer that and there's some part of you that's saying, "I just know how to do it," but you don't necessarily have a cognitive framework for it even though us engineers tend to build cognitive frameworks for everything. I think there might be some intuitive stuff in there. Is that a fair sense?

Conrad:

Oh yeah, for sure. When I did my Myers-Briggs, I remember it was either INTJ or INTP, but big. It's weird, I'm an engineer, but I'm not an analytical type person. I mean, I know how to look at the diverse and the data, but I like doing that with other people. I'm better with building teams and the emotional side of things. And yeah, I can get into really thorny hard problems, of course, but I'm like, "I can have fun when I'm doing that." Those are the people that I sense are really good to work with. And then I think because of that, I'm really excited about the team I'm going to be able to build, to take on this really challenging problem.

Dave:

If I was a younger engineer and not doing biohacking, all the stuff I do now, I'd be super attracted to Nillion, just because you've already lived that life at Uber. To be able to build the team you're building now with all of basically the algorithmic and pattern matching things you have to have had from doing that growth and all, I would imagine that the engineering culture at Nillion is going to be second to none because most people... Look, you didn't have to do this. [inaudible 00:44:29] because you wanted to do it, right? And so, with all that knowledge and to put together a team to solve a new problem, I don't know, that seems like one of those things where you're graduating, when you've got your computer science degree. This is the top of top places to learn.

Conrad:

Oh, yeah. We have to be good at so many different things to build something like this. These types of projects, they're super exciting places to learn. I think decentralized architectures are probably going to be the future. As inefficient as they are, I think this is definitely, as an engineer, the place you want to be, even though it's like you can't necessarily move as fast as you would be able to build a product in a centralized way. I think it's just for the future, this is a good place to learn for sure. To me, this is also one of the most exciting things about Nillion is that we're not building this to be like, "Oh, Nillion's going to be like the Facebook of private computation. We're going to capture all that value."

Instead, we're going to eventually become a protocol and the protocol will be run by a Dow and who will learn off the protocol is going to be all the people participating. So, Nillion will have some of those nodes. You might be able to put a computer on there. All your audience members might someday be able to put a computer into this network. I think it's like that idea as well just really appeals to me, especially thinking about your question about the tech industry and how disappointing it is. It's like when I said culture might be pushing technology, I think the decentralized story is a very compelling thing for that reason.

Dave:

A hundred percent with you. If people are listening and still saying, "How the heck do you spell it?" It's like million, like you have a million bucks, but with an N instead of an M at the beginning, which makes it easy to do. Do you have a Twitter handle or...

Conrad:

Yeah, I think we definitely have our Twitter. I think our discord is quite active. We're building a lot of community in there. That's where I did an AMA two weeks ago. Miguel will do an AMA there if he hasn't already. We're very active with our community development within our discord. So, I think that would be a great place for people to go if they want to know more or ask more questions or get to know other people that are excited about this technology as well.

Dave:

I feel like we shared some real excitement about Nillion, about how this idea that what would happen if you could send a little smokey signal out that didn't have your data in it, but allowed people to work with your data? That is actually magic from a real math perspective and I think it is going to change the world. Thank you for stepping out of retirement and taking all of that DNA from high-scale, high complexity stuff you did at Uber and saying, "All right, let's do something that really is transformative." I think you're a high integrity guy from everything I've seen and we need high integrity people doing this, so it doesn't get co-opted with an NSA backdoor and stuff like that. I don't think [inaudible 00:47:28]-

Conrad:

Yeah, of course. No, definitely not. Thanks for your support. This has been a really great conversation. Thanks for having me.

Dave:

All right. Conrad, been an honor to have you on and I look forward to working with you as an advisor.

Conrad:

Yeah, can't wait till our next conversation.