

CRYPTO TOKEN



TALK

Episode 113: Rajiv Phougat On Leading Transformation of Automotive Industry Using Blockchain at IBM + Ben Taylor (CEO of LedgerDomain) On His Communal Trust Platform

PART ONE

Kelley: We're here at UCLA Cyber Days event. I'm here with Rajiv Phougat who is the CTO of the automotive ...

Rajiv: Industry.

Kelley: Automotive industry department at IBM.

Rajiv: Yes.

Kelley: Thank you so much for joining us.

Rajiv: Sure.

Kelley: I'm curious how you discovered blockchain. You said you've been working at IBM for 12 years. How did this ...

Rajiv: That's correct.

Kelley: How did blockchain become a part of your day to day here.

Rajiv: Yeah, so, blockchain is a technology, which is, I shouldn't say is in its infancy, but it's pretty new, relatively new technology. IBM started working on blockchain a few years ago. We are one of the largest contributors to the Hyperledger Project, which we created and donated to the Linux foundation, which was the foundation, which manages Linux as a technology. IBM is one of the largest contributors of that and that's how we, when we started exploring where this technology can be applied, from industry solutions or industry platforms perspective. All people know about blockchain is that, they know it because of bitcoin, which is one of the most popular use cases. That is only one kind of use case is the cryptocurrencies. We wanted to apply the technology into the real business in the enterprise B2B space, is where we were focused. For my industry, we've started exploring how we apply blockchain to automotive industry, is where I started getting involved in the process.

Kelley: How do you feel like this technology is going to shake up the automotive industry?

Rajiv: The technology is definitely going to shake up pretty much all industries but as far as the

automotive industry is concerned, IOT, which is Internet of Things is one of the key technologies, which is enabling some of the things like connected vehicles. But, also, autonomous vehicles, is the key focus for any of the auto makers these days. The autonomous car, how does it pay for the transactions it needs to do? How do you make it secure? How do you make it communicate with other cars or other technologies, even with the mothership if you will, for either a fleet management company or the OEM or who is the manufacturer of the vehicle. Those are the key aspects why blockchain is important for this industry because blockchain has a few inherent characteristics. One of them is the security itself that the transactions are meant to be secure. Second is that it's shared distributed ledger. Multi party agreements of contracts need to be made where you need to agree upon certain transaction the way it needs to happen. The immutability of a transaction is the other characteristic, which is important for blockchain, that once a transaction is completed or it's written on to the block, it becomes immutable that nobody can change it. Those are the characteristics, which makes the technology very interesting for an industry like automotive where it's a large supply chain, there's a lot of code which runs in a car. 10 million lines of code for an autonomous car, which is much more than an airplane. That makes the technology very interesting and it's going to be a transformative technology for the automotive industry.

Kelley: How far away do you think we are from automotive cars? I know everything is in pilot phase right now, or whatever. How long do you think we'll be seeing cars driving themselves around?

Rajiv: Well, you can still, you can see the cars driving by themselves in a controlled manner where they're being monitored but, large scale projects are already going on and autonomous cars are already a reality. They are not, from a technical perspective, they're already there. What is missing is a few things, which is delaying the process of making the mainstream adoption possible. One is the fear in the users or people that, what happens, there's nobody in the car who can control it in certain situations, it's inhibiting or slowing down the adoption of autonomous cars. The second is the regulation that there are no clear regulations available at this point and the government is kind of struggling in terms of how they make the regulations possible so that it makes the adoption of autonomous cars or autonomous vehicles at a larger scale possible. Who is liable when there is an accident? Then, similar issues when it comes to what type of regulations are needed for this industry. We use an analogy, which is quite interesting. I saw one of my panelists use in other panel discussions we were in, is, the regulation itself is in its infancy and the government doesn't understand what needs to be done. For example, when the internet came, the regulation they were using was for telephones. Because it's so new, that nobody actually knows how to regulate it.

Kelley: That's interesting.

Rajiv: That's the reason, which is slowing down the adoption. It's going to take a few years but the technology is already there. Autonomous cars are already there. Autonomous vehicles including minibus like Olli, which is enabled by us, by IBM Watson is already there running in Washington DC and some of the other cities in pilot right now. Kelley: Is the US ahead of the game in terms of this globally or are there others, smart cities in other jurisdictions that you think because of maybe the regulation they may get to it first?

Rajiv: The US is comparatively from technology perspective is definitely advanced and what I

see globally is that there are other countries who are little bit ahead in terms of adoption. The government being more open in terms of accepting and adopting and changing the regulation or being fast in terms of defining what the regulation should be. Europe as a region is definitely advancing faster maybe because of the automotive industry being advanced there and that is one of their key industries, which brings a lot of revenue. China is pushing for it a lot from infrastructure development perspective. I think US is there but, from a regulation and from infrastructure perspective I think a lot more has to be done. It is being done at more regional and local level than at a national level.

Kelley: I was told by someone and I heard this through the grapevine, this may not be correct, that, the driving is the number one job in the US. Like, there is more drivers than anything else in the US at this given time. Is that correct and how is this going to change that?

Rajiv: Yeah so, driving, not sure about the job itself but there are more drivers definitely because there are more number of cars than anywhere else. US since, beginning or from ... It was a strategic decision, I don't know from government or from businesses, who lobbied for what but, US has the best road network, is one that, the roads are connecting the whole nation and they're pretty good in terms of connectivity of roads. Public transport is not adopted at a mass level or larger level in most of the cities. Only a few metro cities have a very good connectivity from public transport perspective.

Kelley: Not Los Angeles.

Rajiv: Exactly. Driving is, kind of it's a necessary evil even for places or people who don't want to drive, they have to drive because there's no other way to get to places faster and safer than driving their own car. That's the reason that, there people want to drive. Now, that doesn't mean that it is going to inhibit the adoption of autonomous cars because autonomous cars are actually going to change that and you see that the millennials or younger people who have access to public transport or car sharing services and things like that, they don't want to drive. The applications or the test for driver's license is going down. The age of people applying for a driver's license is actually increasing in many cities in US. That means people don't want to drive, especially the younger generation don't want to drive. If there is a larger adoption or availability of autonomous vehicles where you can just sit down and go to where you want to go, I think the adoption is going to go very fast once it's there.

Kelley: One thing I'm curious from all guests is, there's so much information about blockchain and crypto all over the internet, but it can be intimidating for people when they're looking to get started, like where do they begin. I'm always curious where you might be receiving your news, or what resources you recommend, or like to use to sort of see where this fast paced industry is at on any given day.

Rajiv: Yeah, so me personally, I rely on curated content, because there's so much noise out there that you can't read everything, and you cannot absolve, or you cannot even validate whether the information you are receiving is authorized or not, or authentic or not. How do you trust something, "fake news" out there a lot. I rely on curated content. We internally have our own content curation as a key job within IBM, where we listen to what's going on in the outside world of IBM, and we curate what is needed, what's authentic, and then we provide it to our employees, so they get the right information and they learn from it. We have our own learning

channels, where we learn internally. As far as public information is concerned, I think LinkedIn news does a good job in terms of curation of content, what's going on. Again, what is trusted and what's not is left to the user, so it's kind of hard to know. As far as learning itself is concerned, if you want to do development or you want to learn coding, or how to apply blockchain technology, we have our own blockchain YouTube channel, so you can actually learn how to use the technology we are using. For example, Hyperledger, how do you apply that or how do you code [inaudible 00:02:11] applications on top of Hyperledger fabric. IBM's cloud for example, how we are providing the APIs. We have YouTube channels, and developerworks.com is a website, where we publish articles specifically for the developer community, so that they can learn coding on a specific technology and blockchain is one of them. I would say developerworks.com, LinkedIn, and the YouTube channels from authentic sources like IBM and some of the other providers.

Kelley: Those are great suggestions, thank you. One thing I'm curious about is blockchain in general has introduced this concept of decentralized systems. Hyperledger, for example, there's public and private blockchains, right? What is your feeling on, like what are public blockchains going to be good for, and what systems do you think will rely on more private blockchains, you know?

Rajiv: Yeah, so public networks are being used by the cryptocurrencies for example, right? Private networks are needed where you want only permissioned users, or permissioned network members to be able to participate in transactions. Anyone use case is going to leverage the private networks. For example, even if you want to create a cryptocurrency for automotive industry where the OEMs are able to pay in a cryptocurrency to their suppliers for example, or the autonomous cars are able to pay for parking, or for tolls. Those type of things need to be on public network, but ... transactions need to be on private networks is the way I'm able to describe it in a simple way like that.

Kelley: What are you excited about in terms of the future outside of just your specific vertical within IBM? You're doing this autonomous, or automotive, but IBM is working on so many incredible projects that I've heard about from supply chain systems to all healthcare, what else are you excited about for the coming years to see these evolve?

Rajiv: Yeah, so I'm definitely excited about blockchain as a technology, and the awareness is not there, that it's much, much larger than just a cryptocurrency, because cryptocurrency even like bitcoin is built on certain type of anonymity in who is actually doing the transaction. Not exactly, because you can still track it, so if people think that they cannot be traced if they are paying in bitcoins, that's not true. The blockchain technology actually is totally opposite of that if it is applied to a... or in a business environment, where actually you can identify who is doing the transaction and when did they do it, and what for they did it, and how did a particular asset exchange hands, whether it was money or anything else exchanging hands at any point of time, and provides that kind of traceability. The use cases are enormous, and there is a tremendous opportunity in the market for any use case where traceability is important, for example counterfeit drugs. It's a huge issue. Even recall management for food, like food safety, what we are doing with WalMart. You can read about IBM and Wal-Mart coming out with a blockchain project on food safety. Whether it is trading, where a large scale trading happens, but there is

millions of pages of records, which need to be maintained for any shipment for example, what we are doing with ... It's a .. which got announced by IBM and .. in terms of using blockchain for trading in a global environment, where you're shipping something in a container, it needs to go through shipyards, the government is involved, the ship yards are involved.

Kelley: All the customs and Bill of Lading, all of that paperwork.

Rajiv: Exactly.

Kelley: You can just imagine it's ...

Rajiv: That all goes away and something that used to take 20 days, now takes 30 seconds to do. That's a lot of time saved, and that's a lot of energy saved, and it's going to make it very fast to ship things or receive things, and move things around. It's a tremendous opportunity, and it is going to be applied into every single industry. Wherever there's exchange of goods happening, or assets I should say, happening between two different parties, or multiple parties. I'm pretty excited about the technology as a whole, and what kind of transformation it's going to bring to all the industries.

Kelley: Thank you so much for taking the time to chat with me today.

Rajiv: Sure.

Kelley: How can people get in touch with you?

Rajiv: Yeah, so you can connect with me on LinkedIn using just my name, Rajiv Phougat. You can find me on LinkedIn, you can follow me on Twitter @rphougat. I would say those would be the best ways to contact me.

Kelley: Perfect, and we'll put that in the show notes.

Rajiv: Sure.

Kelley: Thank you so much for your time.

Rajiv: Thank you.

PART TWO

Kelley: Today I'm here at UCLA Cyber Days event with Ben Taylor. Welcome Ben.

Ben: Thank you.

Kelley: So I'm curious what your involvement is within the blockchain ecosystem.

Ben: So we started LedgerDomain two years ago, and my background was on Wall Street where I built my own trading systems to run my own hedge fund for the last 20 years, and as blockchain rolled out our takeaway was like, "Wow, this is really cool technology." It reminds us of our trading system on Wall Street but it's a trading system for everybody. It's not just stocks and bonds, it's everything. So we got very excited and we started talking to people and we were like, we're looking for somebody who really gets it and really understands how you would want to set up a trading system for everybody. It's got to be easy, it's gotta be accessible, the contracts have to make sense, but at the same time you've got to be careful about how you set these things up in the same way that when you log on to your Charles Schwab account, or your Fidelity account. They actually have these fail-safes to keep you from doing something crazy in the same way we would expect the same thing in a blockchain system. And so do they have that on bitcoin? No they don't. Absolutely not. They can't, they don't protect you from yourself. And so those are the common sorts of things we started looking for, and the more we dove in the more we said to ourselves, "We're not sure that everybody needs a trading system like Wall Street, there maybe all kinds of flavors that we don't understand and don't even pretend to sort of appreciate at this point, but we do think there's a room in the marketplace for a Wall Street style trading system that's based on blockchain for people who want to put a communal transaction platform together, and we think we can offer those kinds of things." And that's the path that we started down.

Kelley: This is two years ago?

Ben: Two years ago, yes.

Kelley: That's pretty early to be identifying that as a ... well, early-ish.

Ben: I don't know. I mean everyone has a theory, and what we would like to emulate is the idea that just as Yahoo was very early to search, Google came later and sort of got it right. And in our own minds, you know, we're gonna watch the other guys, and bitcoin's been around for almost a decade, amazingly. We're gonna watch them closely, we're gonna respect them, but we're gonna say to ourselves, "How can we help our stakeholders be a little bit more effective than they might be with sort of a bitcoin or an Ethereum kind of solution."

Kelley: Okay, so for the consumer, if they're looking to get into other assets they can do so on your platform?

Ben: Oddly enough, no. What I would say is, and it seems funny but it's something you should think about, around 2004 consumer applications started actually being ahead of business applications, and the iPhone really put the nail in the coffin. So oddly enough, consumers are more sophisticated and more fashion forward than business.

Kelley: Yeah, that's true.

Ben: My daughter, who's 16, uses tons more applications on her iPhone than I do. She's much more able to grasp what an application is used for, what it can be good for, and where she's gonna ... than I would be. And so, in fact, oddly enough you could see me as sort of a dinosaur helping other dinosaurs. And so Global 2000 companies have certain expectations about security, about how their organization is gonna be treated, about how they're going to manage

their risk, about how they're gonna handle compliance, and they have those expectations. They believe that every application that they're working with is going to have, with all those things, come right out of the box. So what we try to do is to say, "Hey, we can offer a blockchain platform for the Global 2000 and the Web 2.0 companies that can enable them to meet expectations right out of the box." It's not going to be a roll your own model that you're used to seeing today in bitcoin, the hobbyist market, or in the Ethereum markets, which I think are terrific. I think it's been amazing. You know, its incredible proof point for the transactions and the technology, but the expectations on the part of the Fortune 500 is a little different. And their expectations are that we're gonna help them build something that's a little bit different. So as an example, when your wilding out on bitcoin you're spending your own Bitcoin, it's your own business, right? When Pfizer has employees on their blockchain, their putting Pfizer at risk, and so Pfizer only wants their employees to do certain things. When you buy something on your phone, you're just buying it. When a Pfizer employee goes on a Pfizer phone and buys something, that's called a rogue purchase. They don't want that to happen. They want them to work through the procurement department.

Kelley: Okay.

Ben: Right? And so that's a work stream that we have to model, for their blockchain, for them to be happy that it's gonna be managed a certain way. So the idea is that we're modeling with smart contracts Fortune 500, Global 2000, Web 2.0 work streams, to meet the expectations of people that say, "Oops, I didn't mean to do that." Okay, if you've an oops I didn't mean to do that button, like if you go on the airlines they say you have 24 hours to cancel. They don't have that on bitcoin, right? And so we can build a new smart contract, a time lock, that says, "Okay, yes. We've given the customer a confirm but we built in a time lock that says you've got a certain amount of time to say no."

Kelley: Okay.

Ben: On bitcoin, there's no seven second tape delay for the dirty word. It's out the door, it's gone. And that's how they like it. It serves that community, that's what that community's expectation is.

Kelley: We've had issues with that in business practice, where we've paid for something and they've said, even though there's a clear record that we sent money from this account to this account, they'll not deliver on the goods or services that they promised. And then there's absolutely zero recourse, so now unfortunately, even as a blockchain based business ... a company that's built around blockchain communications, we prefer to use PayPal for example, because there's actually recourse if those things aren't delivered.

Ben: Exactly right.

Kelley: Which is so frustrating, but it's just an infrastructure ... like, we just need to get there.

Ben: Exactly right. It's all about modeling real-world expectations and having it match up with the smart contracts. So, again, how many of us maybe I'm the only one, how many of us have bought an airline ticket and only realized afterwards you were supposed to fly on April 8th, and not April 7th?

Kelley: Many times.

Ben: It happens. Then you're like, "It's nobodies fault but your own." But you just got focused and Kayak showed you the day on either side and you went for the cheapest fare, and only then did you realize that you're flying out on Saturday instead of Sunday. That's not gonna happen. You gotta go back and cancel it.

Kelley: Everybody listening has done this.

Ben: Let's do the do-over. Let's do the do-over. So again, we know that our Global 2000 customers want blockchain, they have a blockchain counsel, they have an SVP of blockchain, they're excited. But when they roll it up, then there's certain expectations. With our pharmaceutical clients, they're like, "Well, so you're telling me that when I sell a bottle of Viagra, and it drops on Ethereum, it's gonna be right next to the crypto-kiddy? No. That doesn't fit our brand, we're not interested in having drugs, illegal drugs, blended in with our real medicines. That's not kosher for us, we've got to have our own blockchain." Okay that's fine, that's an expectation. We know that they have that expectation, it's our job to help them build a system that meets their expectations, and their stakeholders and customers expectations.

Kelley: Wow.

Ben: Yeah, so that's what we do. We've got a team of PhD mathematicians that spends their time thinking about how to implement these real-world contracts, and to build the quality of service that people expect. And I think that's another big thing that we're just grappling with on the blockchain side, which is quality of service. The expectation that you have when you push the button on Amazon, it's okay if the little thing takes like maybe half a second. You know, you're easy going about that. But if it doesn't swipe immediately, all of a sudden your angsty. Now you remember just a couple years ago, you had to get in the car and drive all the way to the store to get this stuff, and half the time it wasn't even there. But now, when you push the buy button on Amazon, if there's any delay it's a total conniption fit. It's a disaster for your life. Well, again, with-

Kelley: That is so true.

Ben: ... with building in these expectations you've got to model this with the smart contracts, and model it with the way that you do the data setup, and everything that goes with that quality of service. And so again, it's like there's been a huge storm of cryptokitties buying on Ethereum today, and therefore everything is lagging behind 20 minutes. That's fine in certain industries. 20 minutes is not that big of deal, you're used to waiting 20 minutes for the pharmacist to count out your pills. Maybe a little bit more, but you're dealing with it. But for a lot of stuff the expectation is, no, no, no. 20 milliseconds, you know? I need it now. And so again, if we're working with customers that have those expectations, how do we help them with the dev-ops, the data structure, and the modeling that's gonna match up with that? Because unfortunately the answer with all of the stuff is no, you can't have it all. So if you're gonna have your own blockchain, and you're gonna put it on a Hyperledger, which is a system we like a lot. You put it on a Hyperledger, you're gonna have to manage it yourself. You don't count on all these hobbyists running implementations of bitcoin to do all the processing for you, you've got to pay for that, it's gotta be on Amazon Web Services. Are you good with that? If they say yes, it's fantastic. But if they say we're not ready for Amazon Web Services then you're like, "Okay, fine. Are you ready

to host it yourself? A lot of work." This is a whole new world, and so you work through this, and you find out what their expectations are. I'll add as a sideline, it's interesting how many big companies now feel very comfortable with Amazon Web Services, which is great for us and great for blockchain, because that's a great place to host. But again, people are moving slowly, expectations are gradually moving in certain directions, and it's our job to work with folks to meet those expectations. And that's our focus.

Kelley: Wow, very cool.

Ben: Thank you.

Kelley: Rewind a few years. How did you discover bitcoin and Ethereum in the first place? Like, how did this come across your desk?

Ben: It's kind of a crazy story, and I won't name names, but I went to MIT many, many years ago, and one of my younger fraternity brothers is an absolute bitcoin junky. Great guy. He's going to appear here at the Cyber Days conference I believe. And he got into a jam with the New Jersey state attorney general. He had designed a bitcoin mining scheme that involved harnessing other peoples compute power. Yeah. And it was a homework assignment at MIT, and he got into a jam, and just to be helpful I called up and said I'd help him out with his legal costs. And at the end of the day, luckily MIT stepped in as did the Electronic Frontier Foundation, and they backed him up and paid all his legal fees. The New Jersey state attorney general backed off. That was my first taste of bitcoin, and it wasn't a good one. But as he taught me more and educated me more about the process, initially I was quite skeptical to be completely honest. But I paid attention, and as he continued to move ahead as bitcoin continued to work, as there came more and more momentum, it became clear to me that even if bitcoin didn't turn out to be a great asset, there was really something clever about this mechanism and that there was something really neat about the way that people built trust. And what I was reminded of was Ebay. Remember the early days of Ebay were kind of the wild west. There was a lot of good stuff there, but as people built up these feedback percentages where you sort of said, "Hey, this guy's a legit person. This woman is trustworthy." Maybe she's in India, maybe it looks a little sketchy, but she's got a 99.7% approval rating, I think I can afford to buy the little wooden elephant from her. I wouldn't spend a thousand dollars with her, but I'll spend \$75. And so I think that bitcoin had the same effect, but it was completely anonymous. People gradually became more and more comfortable with what was going on, and you saw that it was working. And one of the things that people don't realize, particularly in the press, is when one of these intermediaries hoses some other person, the bitcoin system didn't fail. These people trusted a bad person with their wallet. So Mt. Gox, they shouldn't have your wallet in the first place, you should be holding your own wallet. You know, would you give your wallet to a stranger in a bar? I don't think so. And so, when something bad happens later, well guess what?

Kelley: Well it's just too early, people didn't think about it or know better.

Ben: Possibly. Possibly. Or they let maybe the greed get ahead of good practices, and all of us probably don't change our computer password as often as we should. Guilty. We probably shouldn't give away ... I just gave away my Google Sites password to my marketing guy because he wants to update the webpage and I'm here, and I don't want to log in and do it myself. Is that a smart idea? Probably not super smart. He'll probably give it to his girlfriend,

she'll get mad at him, who knows? Path can be very bad. But we all tend to make these decisions at the spur of the moment, and again trusting your bitcoin wallet to somebody else? Not the greatest idea. But it's hard to remember that long thing, and it's easier to put it down somewhere where somebody can snap it up. So again, what we try to do-

Kelley: And in the real world that's, you know, the practicality of where we're at today, and the reality of what consumers expect based on what you were talking about earlier, the fact that as consumers our expectations are-

Ben: Very high.

Kelley: Very high.

Ben: Very high, which is great.

Kelley: You have this expectation that you're gonna be able to have some recourse, and unfortunately when I evangelize bitcoin and crypto assets all the time, and so people come to me asking questions and unfortunately I do feel responsible for educating them for at least 15 minutes about the best practices and the security of it. And the fact that you can buy and sell in Coinbase, but you probably don't want to store it there, and it requires additional conversations and my hope is that in the next ... in 2018 ... and Coinbase is amazing because it's a easy on ramp for people to get started, and they have a vault, and they have all different things that are great, and it's consumer friendly. But we have much more user-friendliness and built in things that need to get there, where we can see true mainstream adoption of this.

Ben: Correct.

Kelley: So I love hearing-

Ben: But they're making progress.

Kelley: Yeah.

Ben: And all of this stuff is a step in the right direction, and I think it's all ... we're gonna look back on this stuff and say, "Wow, that was amazing. How much we collectively got done in this space in such a short time." I'm not an expert on everything that's happening, but as I said we're very involved with Hyperledger, and we've been a member of Hyperledger since late 2016, so a year and a half, and it's mind boggling what's been built there. I mean it's really a beautiful, robust, fine-grained system. Still, a lot of work to do to make it easy and out of the box simple, it's certainly not ready for everyday consumers, but it's a great system and it's incredible how much has been accomplished in such a short time. And I know the same sorts of things are happening with the bitcoin core developer group, and Ethereum Enterprise Alliance. There's a lot going on, there's gonna be mistakes made, but it's really incredible the pace of innovation.

Kelley: In terms of the pace of the industry in general, where do you get your news? How do you find out about ... how do you keep your pulse on this fast moving industry?

Ben: Well, you know, I think like any area where there's a lot of hype you've got a ton of opinions on what's going on, and I think you just have to try to remain open minded about the path that things could take, and just imagine that over time there's gonna be a fair amount of turbulence. And I think that, so far, there's probably been less turbulence and more progress than I would've imagined. So I think for a lot of people they don't stop and ask the what about question. So okay, \$50 million worth of bitcoin was stolen, and then you might ask the question, "Well, how many bad transactions were made on the Visa network today?" They probably lost \$50 million in the last 30 seconds, right? So the story I always tell people where I know the facts, are on Wall Street. When I got into Wall Street, 13.3% of the trades were broken trades.

Kelley: Whoa!

Ben: Yes. Yes.

Kelley: Whoa!

Ben: It wasn't that long ago. 13% were broken. So in the morning, if you worked on Wall Street, you would get your sheets for all of your clients trades and 13% of them would be broken. They were called decays, which meant ... somebody said, I don't know what the hell this is. Yeah, 13%.

Kelley: Wow!

Ben: Yeah, and so over the fullness of time as we've-

Kelley: I'm gonna tell people you said that when people give-

Ben: Over the fullness of time, as we implemented all of these cooler real-time, wonderful technologies, many of which have found their way into the bitcoin and Hyperledger world, the error rate on Wall Street has just dropped down to just minuscule levels. And by the same token, very few of these errors actually reach the client. They never see them. But in the old days it wasn't at all uncommon for me to see tons of really bad trades, and have to call in and say, "No, this is not how it's supposed to go." If you pay attention now, not all of us do, you'll see more and more of these bad transactions that shouldn't be going through. I had an amazing thing happen. My entire company, and I don't think they meant to do this on purpose, but when I put the American Express card on my iPhone on Apple Pay, they show every transaction that goes through. Well, because I'm the payer for the whole company, everyone's individual corporate card came through my iPhone. Every single charge, in real time.

Kelley: Oh no. Maybe that's a good thing though.

Ben: Good or bad, what we found out, was that there was a lot of little charges that we were getting hit for that no one had authorized. And they were just slipping through, so somebody would cancel their subscription to the Wall Street Journal, and somehow it would come back by magic. And it was all little stuff that was killing us. Nobody was nailing us with-

Kelley: I hate that as a business owner.

Ben: ... huge stuff. It was tiny little stuff that was just sucking our blood. And so again, when people are talking about bitcoin, and Ethereum, and Hyperledger stuff, and the problems, I think they're just forgetting about the everyday problems that still see in transactional systems today. They're already there, but they're either being erased by somebody at some level, or they're slipping below the radar, or you just think it's a one time deal.

Kelley: I love that. That's a great soundbite.

Ben: Yeah, so in fact I would say bitcoin is probably already more reliable than the Visa network.

Kelley: Wow.

Ben: But Visa always makes you comfortable by saying-

Kelley: Well, the scale. The scale.

Ben: "Hey, if it's more than \$50 we'll eat it." Right? But at the same time you see the stuff going through. At one point, I know American Express is a great company, I know the people there, they're very smart, they're very capable, but they had to replace one of my corporate cards six times in a year, because people kept breaking in. And I would see these charges, like, "Oh, someone just bought a soda with my card in Colorado. Well, it's not me. I'm sitting in New York City. I'm sitting in Venice Beach. I'm sitting in Las Vegas." And I'm seeing these charges go through-

Kelley: I need to set up those alerts.

Ben: And they're like, "Alright, confirm that you bought the soda." And I'm like, who buys a soda from a vending machine with an American Express anyway? Seems kind of weird. But that was what was happening.

Kelley: And when you steal a credit card, you think I'm just gonna run to the soda machine.

Ben: You just wonder. What people are thinking, I don't know. I have my own thoughts, I'm gonna keep them to myself. But anyway, that was what was happening and so they kept replacing it. So again, you know, this sort of resilience has to get built into the system so we can meet expectations and help people achieve their goals. And on the quality of service side it's all about us helping the clients assign the right data structures, and data models. What's gonna be on chain? What's gonna be off chain? How are you gonna handle structured and unstructured data? And because essentially, if you put a ton of stuff on the blockchain it's a real pig and runs very slowly, and customer expectations aren't met. But if you can just put a little hash on your blockchain that references the music file, as opposed to the whole darn file, you're okay because you know that that's what that is. This eight digit hash corresponds to a particular music file, that's all you need to put on the chain. You don't need to put the entire 4.5 meg file on there. Because once you do, every time you crank the system it's gotta drag along all this stuff, right?

Kelley: And clog it up.

Ben: It gets clogged up, it's awful. And so we hear these stories, and even in bitcoin, which is a pretty nice, lean system, what have they got? 250 thousand in transactions stuck in the memory pool that they sort of are behind on. We all know these things exist. We try to get our companies ahead of these problems and just don't cause them in the first place. And so if you can have a 2D barcode that has all the information that you need for this particular object, and you don't need the CAD file, you don't need a lot of extra black box language, you don't need the user guide, you don't need the material safety data sheet. It's all burned into the 2D barcode? We capture the barcode, and then you want the material safety data sheet? We've got that stored off-chain in an encrypted file where you can go look at it to your heart's content. Print out a PDF, everyone's happy. User's guide, whatever. So again, the trick is keep the syndicated stuff off the chain, or hash it, do what you need to do. Run things lean, figure out what the user stories are, figure out what the users needs are, run the wire frames. Not everybody gets the same wallet. This isn't a democracy. You're trying to run a big business. If you're General Motors your auto dealer is gonna get a different wallet or client than the car owner, than the mechanic. Everybody's gonna get a different look depending on their privileges and what they need. You only need to see your car. The mechanic needs to see everybody's car. And the dealer needs to see the cars they sold. And everybody's gonna get a different look and feel, and that way you can have more of a constellation of different approaches, and you have this overlay so that again, you can have private correspondence, private channels with each of these people. And I think you're gonna see more and more of that. One of the themes that I think you should look for is federation of blockchains talking to each other, in a way the Lightning is some of this, but we're gonna see more and more of these federation. And I think you're gonna see more and more of these different role-based interactions. That's certainly what we're hearing and seeing. So it's fun.

Kelley: I love your perspective, and you're really thinking ahead of the problems, which is a great position to be in.

Ben: I don't know if that's true that we're thinking of it, I do think our clients are asking those questions. But you may have heard if you were listening, or a panel, that many of our companies are thinking that if they use blockchain it can help them manage their Federal Express expenses. That's the kind of stuff where they're looking a little more tactically. Maybe the startup is thinking about changing the world, overthrowing the government or whatever, but if you're a Fortune 500 company you just want to know how the heck did your FedEx bill get so high. And if you can now look at a transaction and track all of these things simultaneously, because today what happens, big companies are not unlike you or I. They get a big FedEx bill at the end of the month, it's all these codes, they try to match them up. It's not so easy. There's no particular stream of data that enables them to tie it back and then say ... because their employees are supposed to tag it, but nobody does. Everybody just uses the number and they're off to the races. Because who wants to get charged back for it? But if you're a big company you want to know if the warranty department, or the spare parts department, or the production department, is the guy that jammed your FedEx bill for \$2 million last month because they got caught behind. Those are the kinds of questions that they want to ask and get answered, and they're feeling with blockchain we can start tying all these transactions in just like you've got on Wall Street. You know exactly what's going. The trade, the SEC fee, the number

of shares, all this stuff is captured in one trade confirm. Why don't we see that in our business? We have no idea. We can't tie all these systems together because the systems don't talk.

Kelley: How far out is this stuff? How quickly do you think that some of your clients will be able to benefit from some of these solutions?

Ben: Those are great questions. So we have a theme that we've been talked to people about, which is let's avoid the circular firing squad. You know, circular firing squad. Everybody's pointing the gun at each other, they all get shot. And that's what's happening with a lot of these blockchain implementations, particularly in the financial technology arena. So you've got a whole bunch of guys that have a good business now, they get together, they talk about doing a blockchain. They have a consortium, blah, blah, blah, but they realize that they don't really trust each other that much. And that they kind of make more money today the way things are, and so nobody wants to be the last guy to the party. But there's no reason to mess up a perfectly good situation, right? That's a circular firing squad. You want to get out of that area, because to your point, you could get stuck thinking about those things for 5, 10, 15 years. So what we believe, and what we're talking to people about is applications where you've got more of a value chain, and you've got a lot of cost of compliance, and you've got a lot of steps, and you've got a workflow. And you really need to make sure that every step is done properly, and that the blockchain is gonna help you save money, and so we see more benefit in making cost centers more efficient, than trying to get people to fight over revenue. And on the compliance side we're seeing a lot of interest on the part of regulated industries, where the regulatory burden goes up and up, and the ability to satisfy that is worse and worse. So one of the things that we like is the pharmaceutical supply chain. They've got to provide all kinds of detail in terms of provenance, where did the stuff come from? Is this Viagra expired? Is this bottle of aspirin really good for sale in the US, or should it have been Canadian aspirin? All of these things they're expected to know now as part of the DQSA, drug quality and safety act. Right now, their answer is we're gonna try and hustle, and meet the government requirements with email. Not gonna happen. It's not a good use case for email. Why? Because they only have 24 hours to figure it out. How many big companies do you think answer their emails in 24 hours? And people read about a bad batch of a certain drug, how many phone calls and emails do you think they get in a 24 hour period? Hundreds. And it's not their fault. They probably had nothing to do with this. This was probably counterfeit drug. They're probably good guys, and they're doing all the right things, but all of a sudden they've got 300 things to chase down and it's a mess, but if they had a blockchain they'd

know where this stuff came from, they could look at the 2D barcode and go right back to the plant and know exactly what batch it was, what day it went to McKesson, what day it went to Walgreens, and what day it went to you. Right? Those are the sort of things that people are interested in. It's gonna take some time. But there's ideas where there's more collaboration, smaller areas-

Kelley: Efficiencies. Overall efficiency will be improved. The consumer may not know why or how, but overall it's gonna be a more efficient world as we get there, I think.

Ben: And you're making an excellent point. We believe that blockchain, in most cases, should be neither seen nor heard. And so a consumer that's interacting with a blockchain based application probably will never see a blockchain. In our presentation that we show our prospects

and collaboratives, we show them a blockchain. In many cases it's the first time they've ever seen one. They wouldn't recognize it if it hit them in the face.

Kelley: It's because you don't need to know-

Ben: You don't need to know it, it's not that interesting, to-

Kelley: It's like, how does the internet work? I mean, I don't know.

Ben: Right, exactly. So our PhD mathematicians will sit around and talk about notarization endorsement schemes all day long, they love to talk about all kinds of things like that. That's their hobby. They love this. But for the rest of us, the goal is to just make it work for me, right?

Kelley: We just need safe drugs.

Ben: Yes.

Kelley: We need to know that ultimately what we're consuming, where it came from in case there's anything ...

Ben: And I can tell you, from meeting with people from the drug industry, they're 100% behind that. They want that to happen. They don't want there to be counterfeits, they don't want people to worry about this stuff. And they know that they're shipping good stuff in a-

Kelley: They just want to prove it efficiently.

Ben: Yes. And so for them it's more a question of, "How can we prove this to everybody that we're doing things the right way, and feel good about it, at a reasonable cost?" And our job is to try to work with them to help them understand how they could possibly do this. It takes some time. We all have to, as you said, you wanna start small. Pilot these things, test them out. Build confidence, show people what they look like, and then gradually get people to the point that they believe that it's true. And all of this stuff is really, when you think about it, it's beyond human comprehension. So when Facebook told me that they were ingesting three million photographs per second a few years ago, you're certainly like, "That's impossible." And they're like, "Not only that, we index every single one of them. We can tell you exactly how many...in them, and we actually count the individual Coke cans." And your sort of like, "Okay, I know it must be happening because I can go on a Facebook page and see all this stuff." And when I look on Instagram and I push on somebody's body, they'll actually pop up and say, "Oh, that's Kelley." And you're like, "That's incredible!" And so yeah, it probably is true, it probably is three million a second, but it's not within your human comprehension to be able to believe that that's true, you just have to prove it to yourself by watching. And we have to get accustomed to it. And that's where blockchain is right now. When you tell people, "Yeah, people can trade. They don't have to know each other, but they totally trust it, it's so good." You're like, I'm gonna have to see it for myself. And it's the same thing with our corporate customers. They have invested billions in their brand, they've invested billions in their quality assurance. People trust them, they have a great reputation, and when they roll out a blockchain-based system, they want to feel like it's additive to their brand and their franchise, and they don't want to be caught out. So they're gonna take their time, but still very exciting area, particularly in areas where sharing is gonna bring big, big

benefits. We just had a panel on healthcare. That's a classic example. You've got some horrible cancer, you've got all these people across the country with different flavors of it, they're in 25 different major centers. They'd like to share this data and learn more, by syndicating these learnings. But how do you do that? Well you want to protect them. You want to protect their privacy, and their anonymity. You've got to be compliant with HIPAA. How do you make all this stuff happen? Today it's been tough for people, it's not really working that well. But with blockchain you could start doing these things. And I think you might've heard today about our depression project here at UCLA. UCLA's doing some great stuff on the depression side. How does UCLA medical share its learnings with peer councilors? And alcoholic anonymous, and all these sort of groups that are helping people with these problems. You can't just blurt it out, you know. You have to permission in a certain way. You have to go through Kelley, and she's willing to share this information with people, and she wants people to know if she's having a bad day and she's feeling like maybe she's a little suicidal today. It'd be good to get that information out, but how do you manage that process? You've got to permission it appropriately, legally, do it the right way. You don't want a megaphone in front of your house. And so things like blockchain can help us deliver these sorts of permissioned experiences.

Kelley: Yeah. Well this has been a fascinating discussion, thank you so much.

Ben: Thanks for having me.

Kelley: Where can people reach you? Are you on Twitter, LinkedIn, or?

Ben: We are, we have everything. It's Ledgerdomain, L-E- D-G- E-R- D-O- M-A- I-N, dot com, and we've got a Twitter site, and we're always happy to hear from people.

Kelley: Fantastic. Well we can put all that information in the show notes as well.

Ben: Thanks so much.

Kelley: Thanks.

Ben: I appreciate it.

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