



MACRO Voices

with hedge fund manager Erik Townsend

Josh Crumb: The Future of Decentralized Finance

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Erik: Joining me now is Josh Crumb, the former head of Global metal strategy for Goldman Sachs where he worked with Jeff Currie. Now founder and CEO of Abaxx technologies. Josh, I've been so looking forward to getting you on the program because quite frankly as I told Grant Williams on your own smarter markets podcast, I don't think most of the finance industry has really figured out this digital asset thing. What's going on is a whole bunch of guys are looking at cryptocurrency and how they can trade it, what can we do with Bitcoin, so on and so forth. And they're also looking for what I would consider to be low innovation ways to make a buck doing something else with digital assets.

And as I told Grant Williams, I think what we need to do is step all the way back to what is the reason that we allow these capital markets to exist in the first place. In the case of the stock market, it's supposed to be to promote the efficient formation of capital to finance the growth of businesses, and thereby to create more prosperity across society as a whole. And I would contend that if we really stepped back and looked at what is the finance industry, and how could we apply this new digital token technology to it, what I call Secure Digital Bearer Assets, what should it look like? And how could we actually make the planet a better place using this technology? You're one of the very few guys I know who's actually involved in a business that's trying to take on that big picture. So I want to start at the very highest level, what is the finance industry today? What's wrong with it? And how could we make it better by applying technology?

Josh: Thank you, Erik and thanks for having me. Look, I'm really looking forward to this discussion, because in many ways that has been sort of the arc or trajectory of my career is looking at these types of macro problems. So you know, maybe just as a very quick background, I'm actually a mining engineer, and come from sort of an engineering systems background educationally. But I'm also an economist and you know, have thought a lot about and worked in the finance industry, you know, really thinking about these big macro economic systems. And, you know, after I left Goldman, one of the first things that I really got into was the Bitcoin white paper and thinking about this new call it you know, triple entry, you know, Ledger accounting and really what that would do to finance. I'll admit that I was never particularly interested in Bitcoin as an asset, you know, as a new digital gold, you know, having a metals background having a gold background, I think there are different commodities with different forms of utility.

So I've never actually, you know, looked at Bitcoin in that way. You know, that this is a new, low risk store of value. Now I don't want to stop start this podcast off on the wrong foot. I actually think there are some absolutely revolutionary aspects to Bitcoin itself. And not just the Bitcoin technology, but the actual proof of work and the ledger system that comes out of that. But you know, you know, just in the in the nature of decentralized timestamps and decentralized computing, I think it really is revolutionary. But I think it's probably important to focus more on the finance aspects, you know, capital formation, rather than get into, you know, sort of a heated political argument about layer one or layer two technologies, you know, I think we can naturally get into some of those aspects. But I really wanted, you know, I think you would agree, you know, we want to focus on capital formation and what decentralized computing and digital bearer assets, you know does to that. So, you know, maybe just to step back for a second, I actually believe that there's still a lot of misunderstandings of some of the core concepts in finance itself. How these financial systems work, where they came from, and ultimately, you know, it's an ever evolving system. The finance of you know 200 years ago was very different from the finance of today. The finance of, you know, two decades ago was actually I would argue, in many ways very different from today. So this is a constantly evolving system that really evolves with our political systems. And most importantly, I think it evolves with our information technology systems, and just you know, what voices are heard, and what information is sort of spread, spread around around the world. So anyways, that's a lot to set up. So I'll leave it there for a second and see, you know, see what's the best way to take this conversation forward?

Erik: Well, Josh, I think this whole topic of Bitcoin and what could you do with bitcoin and how can you use Bitcoin boy, three gazillion podcasts have covered that in gory detail? I don't even want to bother with that because plenty of people have done justice to that subject. I want to talk about what comes next after Bitcoin. So let's talk about your high level vision. Of we're secure Word digital bearer assets. That's this idea of tokenized assets. How does that move beyond cryptocurrencies which were designed to compete with government issued money, both into government issued money, but not just money, other financial assets. How do they get tokenized? How will that revolution occur? Because frankly as I said in my book, I think the entire fractional reserve banking system, the 700-year old, or whatever it is, system that has defined everything in finance for centuries, is ripe to be completely re-engineered, but when I tried to get my head around, okay, how's that gonna play out? Boy, it's a big problem. How do you see this happening?

Josh: Yeah, you know look I think it goes back to really the ongoing digitization and what digitization is doing to the world. And it's really an ongoing process of removing intermediaries right? So I really think that's, you know, you can lower cost and increase transparency by having much more direct economic relationships. And also, I think, in an excellent podcast that you had with Charlie Magaro on Smarter markets, you know, about a year ago. You really talked about how the system would change, when there's not so many middlemen taking fees, not only for service, but also for layers of risk within the system right? You know, needing to be compensated for putting up working capital or collateral. So I really think it's that, you know, back to that software's eating the world thesis. It's about changing the nature of

disintermediation. And how many people sort of take a cut of a transaction along the way. I think that's really where things change but before we even get into all of that, I actually, again, I think it's important to step back and maybe take a you know, a very abridged version of the history of finance and where those intermediaries came from, and actually just sort of the nature of capital formation. Because again, this is an ever, you know, ever changing system you know, beyond the IT side of things that I think a lot of people don't really get in context very well.

So one of the first, you know as an economic historian, and someone that really tries to understand how these very big system, long cycles work. I would say there's probably two books that are probably the most important sort of histories of modern economics. And that's, you know, Ron Chernow, *The House of Morgan*, and *The Prize* by Daniel Yergin. So it's more or less the history of modern banking, and the history of the oil industry. And I think it's actually the interplay of those systems of energy and economy with banking and the intermediaries, I actually think those are probably the two most important systems and history to understand. So Ron Chernow now I think setup an excellent in fact, it was probably his later book, *The Death of the Banker* where he really summarizes all he learned in studying these great dynasties like the Warburg and the house of Morgan, and really broke it down to, you know, a very simple a really set of a simple framework is, you know, you've got the sources of capital, those that and maybe talking a little about, you know, where that general capital surplus comes from in the economy.

So you got the sources of capital, you got the users of capital, you know, those requiring the capital formation, and then you've got the intermediaries in the middle, you know, those that are really brokering the power between the sources and uses of capital. So I think that's the first most important sort of structural framework to understand is where those middlemen come from, and what they actually do within the financial system and where you know, where that's actually always changing. So again, you know, taking you through a broad sweeping, you know sort of history of finance. You know, if you look back to again, that the time of the Warburg, or the early house of Morgan with Pierpont Morgan, what you're really looking at is really, you know, the early stages of globalization and mass communication with the telegraph, and information networks going global. You know, the rise of energy, you know, more dense energy like oil in transportation, and of course, the early industrial revolution.

So you had this early globalized world, but you had a political system that was, you know, still very regional, and I'd say aristocratic you know, sort of globalization, you know that era. And so you had these middlemen power brokers, that were taking those surpluses of early industrialization that you know like actually, almost all economic surpluses, you know, they really follow a power law. And so, you know, inequality, you know is a core part of the system that we can talk about later. And you know how politics tries to remedy that. But you know, it was really, you know, a few people that had these networks to take the also few people and power broker that access capital into, you know, very large capital formation think about the railroads or the canals or some of the early, you know, energy and information distribution systems. So it needed this power broker one to find where that excess capital is, you know, globally, but also to sort of organize and almost in many ways, you know, these middlemen were very important and in power broking what are oftentimes very monopolistic networks. So, if

you think about telecommunications, it's not super efficient to have, you know, 40 of them competing, when you can actually, you know, sort of centrally organize a telecommunication network much better at a consolidated level. The same thing with the railroad right? You don't really need five lines running the same route, particularly in a fixed, you know, fixed track infrastructure. You know you don't need 30 different pipelines of natural gas or oil, you know, all competing with each other between one route. Now, there are some areas where that will be efficient. But there are a lot of these structural network, you know, efficiencies in the economy that are almost better in some sort of central planning.

Now what we all know from politics though and looking at, say, input-output models and central planning of Soviet Communist Russia is you know, power corrupts. And so you still want competition in the system. And really what that that role of that sovereign banker played was was really to rationalize, and on behalf of the sorting of the sources of capital, you know, to rationalize the uses of capital. so it was it was competition but that middleman played a very important power brokering, you know, you look at, you know, essentially someone like you know, Pierpont Morgan, you know, he really was the power broker, you know, between European sources of capital, and heavy consumers of capital, particularly, you know, the early industrialization, you know, railroads, canals, etc. So I think that's from from big finance perspective, I think that's a very important thing to understand is the power brokering of the middleman in natural natural monopolies and oligopolies.

Erik: It seems to me, Josh, like something changed. Can you talk about the early house of Morgan, maybe I'm just falling for the sales pitch, I don't know. But the way that I interpret that history is look, obviously, these guys were greedy, self serving guys who wanted to make money just like everybody else. But what they did, the way that they did that was to really improve society. They said, wait a minute, if we could design this stock market idea, public equities as a way to promote the efficient formation of capital to grow businesses, that would allow the country to be more successful, it would promote more prosperity for more people because of more employment. And then somebody comes along and says, we could invent the idea of commodity futures exchanges, as a way to allow both producers and consumers of commodities to essentially shed market risk and give it to speculators who want to take that risk, protecting American farmers, allowing them to be much more efficient in being able to know what they were going to get paid for their crops in advance, something that you know, in other countries that farmers didn't have that. So they were making the world a better place. And of course, they were getting rich along the way. And they created monopolies that serve themselves, that's human nature. But they were making the world a better place. I for one am not persuaded that CDO squared and other recent innovations in financial engineering, are making the world a better place. What happened, what went wrong? Or did I just buy into, you know, a story that didn't really happen?

Josh: No, I think it's a great way to frame it and ask the question, but I would actually probably disagree with you a little bit. I think the world becoming a better place is an emergent property of you know this capitalism. This capital formation, and again, this rationalization of allocating

resources properly. So you don't have four competing rail lines. So I think the the world becoming a better place is more of an emergent property, but at the micro level, you know, I actually still believe that it is that sort of seeking, whether it's resource rents, Ricardian rents, you know, the surplus capital and I wouldn't go as far as, you know, the greed is good. And that this is, you know, very, you know, I'm Randy and, you know, sort of the ultimate power to the individual. I think it's a more complex dance between, you know, those that are that are trying to optimize for either power or money and the sort of the political democratic, you know, sort of, you know, balance of powers that play out here. So, you know again, going back specifically, I totally agree with you, when you're looking at something like the futures markets and commodities, actually making society a better place, because it brings forward, you know, a lot of forward information into the market and allows to take the risk off of the balance sheet or you know the ultimate risk of the farmer.

So actually, let's dive into that a little bit more. And that's, you know, Abaxx is our business, you know, we're very much focused on these commodity futures markets, because we believe that, you know, better information and better organizing and forward planning, you know, often comes from futures markets. So, what is the fundamental problem of maximizing crop surplus and storage and distribution. You know, the fundamental problem is that the producer is always going to have more top line price risk exposure to that crop than the intermediaries and consumers. So, if you think about it, you know, a wild fluctuation in crop prices, you know, can put that farmer out of business very quickly. However, if you're somewhere in the middle of the supply chain, you can likely pass that on. And if you're somewhere at the end of the supply chain, then then like that price fluctuation, you know, although it hurts in the short term, it really doesn't change your life significantly. I'm a metals person, so I'll use use copper, as an example, rather than, you know, say grains. Again, a swing in the price of copper from, you know \$2 to \$4 can drastically change the economics of a mining project or a surplus that's there. But at the end of the day, you know, the change from \$2 to \$4, isn't going to really impact the price of a Tesla or impact the price of a nuclear power plant or even a large, you know, electrical grid. So it's all along the supply chain that those those risks can can be sort of managed and pushed along.

So ultimately, you need a speculator sitting in the middle, you know, it's not always just matching supply and demand. In the future, you need those speculators that are actually, you know, trying to bet on what's actually going to happen in the industry in the copper industry, or what's actually going to happen in politics, you know, to change the supply and demand of copper. So that information is what helps rationalize, and when there's liquidity in that forward curve, you know, that copper miner can plan their output much better than if they're just taking, you know, daily volatility. So that mechanism is very important. But one other thing I think it's important to introduce here is that it's not just speculation that drives capital markets and capital formation, actually, the vast majority of capital is really in the business of arbitrage, right, you know, taking information and applying capital in one place, you know, almost in a risk free manner, either try to try to get some free optionality or to, you know, really arbitrage, you know, think about early organizing supply chains, right? If I can buy, you know, buy something in one location and the cost of transporting it to another is, you know, is cheaper than buying it in that

other place? You know, that's a risk free arbitrage, other than maybe some, you know, logistics risk. So actually, most of the most of the capital markets is looking for that risk free place to store capital, whether it's in savings and, you know, savings bonds, or it's an this sort of arbitrage information arbitrage between one or the other. What's really pushed on the world is this sort of gambling form of speculation, you know, and these instant riches, so but most of the actual formal industry of capital is involved in arbitrage rather than speculation. Speculation is what they try to sell to other people to move that risk elsewhere.

Erik: Josh, something I have to touch on, because you're saying that a lot of this is about eliminating middlemen? Look, the finance industry is basically middlemen. That's what people do in finance. And I think a lot of people are understandably, a little bit concerned that maybe all of this new digital technology puts them out of a job. Now I see it the exact opposite way. And the reason I say that is the opportunity that I see for applying this technology is really to re-engineer some of the most fundamental aspects of the financial system which frankly, the people who may feel threatened, I think, are the experts. And I'll give you an example. I believe that the entire tri-party repo system, which is kind of the center of the way a lot of things work and institutional finance needs to be completely replaced by something much better based on digital bearer assets. Here's the thing, that crypto kids that know all about these tokens don't even know what the triparty repo system is or what it does. The people who are expert on that and know all about the role of the tri-party repo system, and how important it is to institutional finance and what it does and what it's for are in a position to be the architects of a new digital replacement for the tri-party repo system. But to my astonishment, it doesn't seem like many people in finance are seeing that opportunity. Am I just early to think that that's an important thing or how should people who might be inclined to feel a little threatened by all this be thinking about what it means to be a finance guy in this new world?

Josh: Yeah no look I think that's a perfect place to sort of transition from the, you know, the broad sweeping sort of goals and how finance works into the actual, you know, infrastructure and systems that have been built. So, you know, the last thing and in making that transition, so I can answer your question, you know, what's changed between the days of, again the sort of House of Morgan and these big powerful intermediary brokers between, you know, sources and uses of capital, of course was really the building of the securities industry. Instead of large, powerful, loan brokering, we really fractionalized this and got all sorts of new participants in both equity markets, as well, as well as debt markets, and lending markets. And that really came, I would argue, sort of around around World War Two, and actually, probably one of the largest promoters of this was the propaganda of the war bonds efforts. So you had much more powerful nation states with the inventions of their their central banks, and their ability to tax income, you know, created a much different source and use of capital system that disintermediated some of the big power brokers, and really what happened is, you know over time, more and more of that risk transfer, from, you know, the savings of the retail public, you know, in mutual funds, and in particularly with the baby boomer boomers and the need for, you know, much, you know, saving for much longer, you know, periods of life really created a much broader securities industry. So you no longer needed, you know, JP Morgan, you know, negotiating with John Rockefeller for excess savings, you know, to put into the next equities, you know, there was a much more

dynamic system on both sides. But that securitization and that fractionalization of all of these different bonds, and equity issuances, you know, needed a lot of a lot of trust infrastructure. And over time, you know, the early equity markets were just an absolute Wild Wild West right? The entire functioning of those systems was insider information right? Those intermediators became powerful because they had that inside information, they had access.

But over the last 100 years, we've built an incredibly robust infrastructure of market information, you know, from bond rating agencies, to equity analysis, you know, buy side and sell side, and all of the market data facilities. So again this explosion of information has changed the issuance and the sources and uses of capital and fragmented a lot more, so we can, we can trade it a lot more, and we've create all these secondary markets. But the problem is to get back to your question, you know, as we try to build that system and every crisis, you know, brings a new regulations to try to, you know, to manage the risk of, you know, whether it's insider trading or some of the incentive misalignments and glass Steagall. You know, there's always this sort of political balance to regulate some of the power imbalances of those markets. And part of that system was the actual, you know, the title, like how you actually own that security, right? How you trade it is one thing. How it gets settled. How it gets custodied was infrastructure that was built over many, many decades of fractionalizing the sources and uses of capital, and I think were you know, getting to the crux of the rest of this conversation. You know, where this technology can change things is starts to remove the intermediaries and start collapsing, that, you know, that high frequency trading system where you're pressing ENTER from the two days of settlement it takes, and then the custody of where that asset sits.

So like, we already have, you know, very, very fast trading of markets. Very fast, you know, securitization of markets but the settlement and clearing system, as well as the custody system, there's still a lot of middlemen sitting in there that are taking fees for two things, you know, one is their information and sort of gatekeeping fees, you know, their access fees, but also just the risk, right? You know, all of these different middlemen also have to have certain amounts of collateral and capitalization, you know, again, back to those political, you know, trying to remove risk from the system. You know, they all have to put up capital to be involved in that system and take those fees. So, if we can cut the risk and cut the fees, both from the intermediation and also the working capital then this whole system becomes a lot faster and a lot cheaper. Again, back to the whole Software is eating the world. You know, can software remove the risk from those systems more efficiently. So, anyways, I think that's where, where you wanted to go with this.

Erik: Well, and I've predicted what I call the digital currency revolution. And to be clear, I think that digital currency is really just the tip of the iceberg of what decentralized finance is ultimately going to deliver. But it's what everybody seems to be focusing on first. And something I think is finally already happening is a prediction I made in my book four years ago, as I said, Look, there's going to be a new space race where basically, everybody's going to realize Holy crap, whoever can come up with the digital currency system that's actually scalable enough, that it truly is viable to replace the United States dollar as the world's global reserve currency, the

power associated with being in charge of that thing, whatever it is, is going to be absolutely immense.

And I think it creates a probably a three way power struggle where governments, including the United States government, say, hey, wait a minute, this is our monopoly, if there's going to be a new thing that competes with the US dollar that's digital, it better be the digital US dollar. And of course, we've just recently seen the Fed come out with their first white paper saying, yeah we get it. Now. We understand we need to focus on this. Meanwhile, the finance industry, the big banks are saying, no, no, we should be in charge of this. We're the bankers, we're in charge of the financial system. And big tech is saying, bullshit, we're taking over everything, baby, we're going to come up with a digital currency system that's fully integrated with social media and everything else and blows everybody away. And we are going to completely control this monopoly ourselves. Would you agree that there is a formative power struggle or space race between government, big tech and big banking? Or is it a different race? How do you see it? Do I have the right basic vision and how do you think it's gonna play out?

Josh: No, you're absolutely right. And now you're getting to the to the, you know, the big, big question and the big, big power struggle. And that's really, you know, again around the unit of money. But I think it's important to separate the technology of Bitcoin or blockchain because a lot of times these things get lumped together. So when I talk about the technology of money, you have the technology of communications and settlement, right. The actual moving a ledger from, you know, it's my asset and your liability. Now it's your liability, my asset, right. So there's communication technology, you know, what we were talking about before. That's about the settlement, that's about identifying who actually owns underlying title, that's custody for them in a safe way. So you can't lose that title over time. So that's all a communication and settlement technology. So if I think about something like PayPal or even going back further, to the paper check, or the ATM machine. You know, these were all these were all settlement and communication technologies to move around somebody's money. And so and the same thing is happening in the securities industry is can we can we move around the communication and settlement of assets? So that's, I would say, that's a little bit separate from what we know, as the technology of money itself, right. You know, what is a US dollar, what is money? And I think a lot of times, we we often mix those those two together and create some, some issues. So particularly in call it the gold bug community, oftentimes, people like to separate the concept of money from the concept of currency, right? So money at the end of the day is sort of a is an economic technology, that, you know, it's actually an underlying title to something where possession is 10 tenths of the law, right? So when I have an obligation, and I pay you a bar of gold, or you know, I pay you a Bitcoin, you know, something that's a bearer bearer technology, where, you know, possession is 10 tenths of the law. Your your obligation, whatever the contract it was is final, there's finality. Same thing with \$1 Bill right? A paper dollar bill that's accepted, you know, broadly, you know, is a bearer instrument that once that title is passed, like, you know, the contract is finished, and that's done.

What currency is something very, very different. Currency is a broad debt based system, where you're just moving around the ledger, all the time. You know, the power brokering of what this

this fiat currency is, is being moved around all over the place, right, and both place and time when you when you look at sovereign bonds and so forth. So I think it's very important to separate the settlement and communication technology from the underlying unit itself of what is the measurement, what is what is the bearer asset that can settle a transaction, where I think blockchain gets very, very interesting is that perhaps we can even disintermediate you know, the fiat currency system itself, right? That you don't actually need to have one common ledger unit. And you know, you already see this in FinTech, where someone can go right from a stock, you know, and, you know, pay for their coffee, in a very quick settlement of basically trading stock for coffee without needing a unit of fiat currency necessarily in the middle. Now, you always going to need some sort of unit of measurement in some sort of exchange to, you know, to bridge, you know, the relative value of those two assets. But I think that's, I think that's where this is going. You know, we can debate that, and we can go through that. But I think it's it's sort of almost a real time bartering system that emerges through communication and settlement technologies, getting almost instantaneous.

Erik: Well, I think that really is an essential point Josh, is you could make the argument that, well, it's so much better to not pay for your coffee with currency, which is just a debt instrument, it's a piece of paper, it would be so much better for the seller of that coffee to actually get you know, grains of gold. So they have something that is absolutely immutable, it's it is it has value that's independent of any bank or any intermediary or any custodian. The problem is, it is completely and totally impractical to pay for your cup of coffee with some microscopic size, basic gold, it doesn't make sense, what's changed is now we have the technology that we don't need all these intermediaries, we don't need the currency system, which is a proxy for real money. We can actually have real money that is a digital bearer instrument, and what I give you for the coffee is real money, not currency. Am I wrong to think that's kind of the essence of this, and I think a lot of people don't really see that.

Josh: I think that is right. I think in many ways that that is where we're going with with real time exchange, real time interoperability between you know, an exchange of assets. And, and you know, ultimately even in defi right? The automated market making between two digital assets. It could be, you know, it could be a Bitcoin or Ethereum or some sort of digital asset that has some sort of an automated rule based market making with either a central bank, digital currency or so called stable coin or again, it could be two totally different assets that aren't normally liquid. But because of the composability of this entire ecosystem, again, you can now trade coffee for a bar of gold or, you know, a barrel of oil, you know, two months out, you know, a future, you know, uh, right for delivery. You know so I think this composability and sort of you know exchange for everything may actually start cutting the need for, you know, organized liquidity of a central banking system.

Now again, I think we're a long ways out from that, but I think that's the concept people should explore, you know, mentally is why the Eurodollar system? Why sovereign bonds, you know, became the ultimate collateral in banking and ask those questions like, are we on the right track with that? Or do we keep keep building the interoperable system, so that, you know, as as title for any things become, you know, fully digitized with with almost instant settlement without that

risk of all those middlemen, you know, you almost get to a digital barter system. Now. Now, I think the futures and prediction markets are still going to be a very important part of that, you know, the, the economy is not always planned in real time. You need forward information, whether that's in, you know, in various bond prices, for, you know, for duration of savings, or through futures markets, you know, we talked about the need, the fundamental need to match the mismatch of uncertainty in the future, production and delivery of commodities. So, you know, I think futures are going to be a very important part of this but again, I think having real time exchange of asset for asset, you know, through a very complex system is ultimately where we're headed.

Erik: For people that are trying to just get their head around this Josh, and maybe the reason that so many people in finance are only able to talk about the price of Bitcoin and nothing else is because this is so complex. You and I share a vision, where eventually secure digital bearer assets transformed the entire financial system, the entire market system into something new. Well, that's a really big transformation. How do you see this playing out? What's the roadmap, obviously, it's impossible to predict, but give us your best guesses it start entirely with currency systems, and we don't get to redesigning other markets until later, or does it all happen in parallel, and everybody has to adapt to changes and other parts of the financial system as they advance? How does this all go from here?

Josh: Well I think the sort of wild innovation that you're seeing in the Ethereum network and call it DeFi 1.0 or you know, alpha, I think this is actually starting to show and there's sort of emergent trends that are just absolutely fascinating. So you know, I guess you know, probably as a financial you know, very conservative person financially, you know, coming kind of from that gold based certainty, you know, understanding of the financial system, there's probably times I look at something like Bitcoin, as well, you know, the network is far more secure. You know, the computer processing of the Bitcoin network, you know, really creates ultimate, you know, security of the ledger which is what, you know, the decentralized nature of the proof of work was supposed to do, and I probably don't share that same view of the ultimate security of the Ethereum ledger. But that said, you know, the rapid innovation and sort of showing what's possible, that's happening in other other decentralized computing ecosystems, whether it's, you know, proof of stake or Ethereum. You know, I think is showing, you know, the cultural power of the NFT. The automated market making, you know, creating new forms of governance through, you know, decentralized autonomous organizations, DAOs. Rather than just the equity formation or the debt formation of capital markets. I think we're seeing this wild innovation. Now, you know, like most wild innovation, I think most of those current assets are going to trend toward zero, but I think it's showing a path of how this technology can can move forward.

But the two things that I'd say that infrastructure as more and more sort of Value at Risk is locked in this system. I think the two core pieces of infrastructure that need derisking is identity. The actual real world identity and matching that into the system. You know, for all the political and property rights reasons for for doing so. As well as custody of these private keys. Right. So I've always seen and I've been in this market, you know, innovating, I think I wrote my first patents involved in in with a group writing our first patents in blockchain based commodities in

sort of 2013. So I've, yeah by many terms I'm one of longer longer term persons in this industry. But the two parts of that I think has still not been fundamentally solved, is the, you know, matching someone's identity on on a decentralized blockchain to their real world identity that can actually be, you know, to settle problems in the court of law in an actual sovereign jurisdiction. You know, for that title to be recognized by a state in law, you know, not just in the blockchain law. You need to tie a real world identity, and how do you do that securely without creating just an absolute honeypot of surveillance and so forth? So I'd say identity is one big problem. And then again, custody. That's the other problem with a bearer instrument is that possession becomes 10 tenths of the law in many ways, right? So if I lose a private key, you know, who now owns the title. How has that title recovered? There's the purely digital world issues there, but also matching it to a real world security. And that's why we have all these different layers of accounting. And basically, the human blockchain of trading versus clearing versus settlement versus custody. You know, this whole stack is to basically manage the trust of who owns what in a very complex system. So that custody and that identity piece, I think, are the two most important piece. And I've been essentially working on both of those pieces for the last eight years.

Erik: I want to drill into both of those. Because if we think about the first big digital bearer asset system to really go big, it was Bitcoin and what was Bitcoin designed to do? It wasn't actually designed to be anonymous. It was pseudonymous. But the whole idea was to be as close to anonymous as you could get, and to thwart the ability of governments to know who the real human being was behind a particular bitcoin address. And of course it's not completely impossible, but they tried to make it difficult. What you're saying I think is if we're talking about the mainstream financial system, we really have a different set of goals. We don't want to hide that we need to be able to in a very secure and reliable way, with certainty verify who the legal identity is of some actor in this digital system. So tell us about this concept called self sovereign identity, which has become something of a buzzword and this whole defy revolution that's going on what self sovereign identity and why should we care?

Josh: Yeah well first, I need to challenge the premise a little bit of anonymity. I actually think it's a very important part of the broader financial ecosystem. And so while I agree with you that there's a lot of governments and there's a lot of vested interest, that that doesn't want that kind of power, you know, to the individual. I actually think it's an important part that's never gonna go away, right? There's always going to be, you know, a sort of marginalized minority in society that sort of doesn't trust some of the intermediaries all the way up to the government. Right. You know, you and again, I'm I'm not trying to be political, I'm not trying to choose sides in this, but I think you need to recognize that's always going to be part of the system right? You know, there may be a political narrative, you know, let's talk about some of the, you know, some of the marginalized economic activities in say. You know drugs and narcotics or or in, you know, sex workers, or, you know, various things that, you know, there are always going to be an intermediary, that's going to say, you know, what, I just want nothing to do with that, you know, it's just too risky. And whether it's, whether it's morals, or it's, you know, that the risk of somebody, you know, freezing those accounts, because of, you know, political movements.

There's always gonna be an intermediary that just doesn't want the risk of banking, or providing financial services to people on the sort of the marginalized or minority of a society.

Looking what happened with the Canadian truckers. This is actually another another perfect example, is, you know, you had a group of have, and I don't want to get into the core of you know, who's really behind the truckers or anything like that. But but the end of the day, there are many legitimate protests, and protesters that just don't that believe that Canada's, you know, that Canada's mandates have just COVID mandates are just too strong. And it doesn't, you know, a one size fit all mandate just doesn't work for all the complexities of society. And so there are many legitimate protesters that are backing through GoFundMe or other sort of crowdfunding platforms, trying to put their money into the protest. And then you know, that the Canadian government comes out, and essentially changes the rules and actually sort of suspends a lot of civil liberties, you know, through an emergency mandate, and basically just gives banks an ability, you know, on good faith efforts, you know, to seize accounts and seize funds, without any recourse or liability. So that, you know, the political ability to use these intermediaries in the financial system for a legitimate protest. You know, again, not getting into, you know, who's ultimately behind the truckers, there's lots of political dynamics, but but the end of the day, there are there are many legitimate protesters, and people trying to fund protests or support it with their, you know, put their money where their mouth is, that really just got frozen out of out of political opposition. So, you know, this is this is the problem with a centralized system, is you're always going to have that ability, you know, it's really a power brokering system, as much as it is a, you know, an economic system.

Erik: Well, Josh, I couldn't agree more. And I have to say I myself personally, like the idea of being able to have my financial affairs be my business and not the government's business. But I'm also a realist, and I know that the trend in society is toward more trust of government, not less. And I know that governments want to control everything. So does that mean that we have completely separate digital systems where there's kind of a marginalized bitcoin system? That's for the guys that want to do things without government knowledge? And there's a completely totally separate parallel digital bearer assets system, which is more wired into the mainstream financial system? Or do they all operate kind of on the same network?

Josh: Well, I think they will, in some ways, operate on some of the shared network, and ultimately, you know, politics is is going to drive this right. So, you know, I do believe there, again, going back to my framework of the money itself, you know, where certain assets, you know, possession becomes 10 tenths of the law, whether it's a, you know, \$1 bill, you know, the person that legally owns it is the one holding that bear bearer instrument, a Bitcoin, a bar of gold. So there are, you know, there's always going to be people seeking that, you know, that that, you know, where you don't need to trust intermediaries to make a transaction, you don't need to trust a PayPal or a GoFundMe, or any other financial intermediary. So I don't think that ever goes away. You know, right down to the point of bartering, you know, even if the government tries to make it illegal bartering for, you know local farm, you know, co-ops and swaps, right. So I think there's always going to be marginalized peoples that will create systems and so there's always going to be demand for software intermediation between them now,

you're absolutely right, there's gonna be a lot of governments or particular philosophies within government, that's always going to want to, you know, it's going to be a constant, you know, war and struggle, you know, between these two groups, it always has been, and I don't see that any different, and software just becomes a tool to raise that confrontation to to a greater scale. So I would say they're always going to live exist, not necessarily in parallel, but sort of, you know, they're gonna be, you know, edges of the system, where they're always going to interact. But that said, I think, you know, putting that that, that aside, you know, the, the pseudo anonymous transfer of a digital asset like Bitcoin, putting that aside, how do we still use other aspects of decentralized computing in a more, let's say, regulatory or government and friendly way and maybe we can take the discussion forward from there.

Erik: Well, let's start with self sovereign identity. What does that phrase mean and how does it play into what you just said about, you know, the government friendly version of this?

Josh: Yeah. So if you think about the, the movement of a bearer, you know, essentially the ledger of a bearer instrument in, say, the Bitcoin network, or one of these pseudo anonymous networks, it's about what public key matches with what private key or you know, the unspent transactions, you know, specifically in Bitcoin, you know, available if you have that key pair. But you know, that identifier of the public key on the blockchain network, of course, is not tied to an individual. But if we wanted to make a, you know, a permission blockchain, you know, ultimately someone's going to have to manage the rules and permissions of tying, you know, tying identity to those long strings of digits, you know, public keys. And so this is where self sovereign identity comes in, is creating or tying a real world identity through a proof of basically a proof of ownership of that, you know, of that public, private key pair. And so right now, like, one of the big problems of the internet is it always needed, you know, the, you know, some people in web three, or blockchain call it, you know, the original sin of the internet, is that there was actually no identity layer within the internet. So we created all these ways, you know, like PayPal or, you know, ultimately, you know, once we got into the cloud computing era, you know, we authenticate. We log in with Google or we log in with Twitter or Microsoft. You know, you have all these sort of centralized identity managers that can manage, you know, manage the, you know, the ledger or, you know, whether it's digital assets or, or information assets, you know, they manage, you know, who owns what, within a within a database.

And so it, you know, the internet as an IT systems as needed today, you know, you rely on on central parties, you know, very much like the the financial system, to manage the the user password access of a person, what self sovereign identity does, is, it gets away from that it uses that same public private key cryptography to prove, you know, certain credentials. And so, you know, the way that we're building an id plus plus, you know, as an example, you know, in order to, to log in to your, you know, to your trading account, which in many ways other than, you know, government, you know, regulatory reasons, you know, we actually have very little access to understanding who's trading at what time, that's managed by actually having a credential presented in a key exchange to log in. So, you know, on an actual user's, you know, phone like, like a digital wallet, you know, they will say, Yes, I am a, you know, I am a credential trader at Citibank. You know, I've gone through the onboarding process, I've got my credential of Citibank

in my wallet. And because I am a member of the exchange with a credential by my institution, I can log in by presenting that Citibank credential to the AMEX exchange to log in. So I believe that that that system of providing credentials, you know, through a much more, you know, private key held system will allow much more secure verification of identity, rather than, hey, I logged in with Google, I am who I say I am, because you I use my Gmail account to log in. That's not very secure. But you know, there are systems to make that identity credential far more secure.

Erik: Well hang on a second there, because I agree with you that just logging into Google is not terribly secure. But from a functionality standpoint, Google is beginning to give me something that I want very much what I can do now with Google his login once to Google. And then I can use Gmail. And I can use Google documents. And I can use whatever other Google Apps and I'm already logged in, and it knows who I am. And I don't have to have multiple passwords. And if as soon as I have more than five different passwords on different systems, I'm going to start writing them down. And that compromised the security. What I want to do, Josh is I want to log in to the entire financial internet, once with one username and password, hopefully, it's going to do some kind of biometric you know, fingerprint check or something and make God damn sure that I really am who I say I am. And then I want that to just plain work. So I can go to any place, any financial institution, and I don't have to log into anything because I'm already logged in a secure enough way that it truly is trustworthy, which as you say, just logging into Google is not really solving that problem. Can we get to the point where I just log in once at the beginning of the day, and no financial institution has my password stored in their system, but they all trust that I am who I say I am because some larger, broader system solves that for us.

Josh: That's correct. And I think we're headed there. And I think actually, we're headed there faster than people may think.

Erik: I think that whoever owns that is in what I'll call a Bloomberg position. Frankly, as a software guy, I'm extremely unimpressed with the Bloomberg terminal system as a software platform. But boy, they've got market share, they've got functionality, and they've got all the data and they completely captured market share, nobody can touch them. I think whoever nails giving me one login to the entire financial internet that is truly secure and reliable, and works with all of my financial institutions has a monopoly. Would you agree?

Josh: I would agree. And of course, well, I wouldn't say it's a monopoly. And we'll get into to where I'm going with this. But But absolutely, it's going to give a lot of power to, you know, whoever has the first applications running on that. So, so think about, you know, think about email for a second. You know, the Simple Mail Transfer Protocol of email was very powerful. But at the end of the day, people, you know, Microsoft built a business around Microsoft Outlook and actually have an application that works, you know, works very well with that protocol. Or the same thing with, you know, with Gmail or Yahoo Mail before that, right. So a very powerful system that sits on top of an open protocol. So I think that's where I think that's where the identity space is headed, is that someone with the identity management software, the wallet, so to speak, that works with a financial identity protocol, I think there's gonna be a lot of power in

that business model. So that of course, is exactly where Abaxx has been investing, I've been investing in that for about four to five years now. And it's going to take a long time but you know, we are getting closer and closer to that reality, by evidence by what's happening again in DeFi and say, with the you know, Metamask wallet, or the Ethereum name service. You know that system is actually already becoming superior. Now, there's a lot of problems and interoperability, it only works in you know in the Ethereum ecosystems and so forth which people are working on. But like the actual user, it's like the security of holding those keys is already better in the DeFi ecosystem. And the actual user experience of logging in with a meta mask wallet, or with an Ethereum Name Service is already better than a username password system. The only problem is in my view, a little bit of a sort of a cryptocurrency biased, you know, to always be working on Ethereum where I think we're headed in the future. And through efforts like the decentralized identity Foundation, is that we're going to be able to use multiple blockchains and present, you know, multiple credentials to login.

So the way I the way I like to think about it, is to try to use sort of a real world example. You know, say you go to a club and you forgot or a bar and you forgot your ID. And we can talk about for a second, my blood is anID but like, you know, you don't have your driver's license or your passport, you know, how do you get in. You know you show them here's my credit card, this has my name. You know, this person can vouch for me, let me call the owner, this person's dress nice. They look like a lawyer. You know, let's have all these people convince the bouncer that I'm trustworthy, I meet the minimum threshold to get in. And so we're presenting all of these identifier proofs in real time. And ultimately, it's that bouncer that's got a risk tolerance of, okay, what's my actual underlying risk for letting them in, like, this person clearly is who they say they are. All these people can vouch for them, all of these other forms of identity, although they're not exactly what I'm looking for. They get me past that threshold, because what's the ultimate risk, you know, that maybe this bar loses its license if it served an underage person, right? So it becomes a risk reward identity infrastructure, where there's a risk tolerance, right? Tell it to log in to a, you know, a website, you know, to look for something, you know, it's probably a very low risk tolerance that I need to know who that is. If I'm going to actually transfer, you know \$50, it may need a higher risk tolerance. If I'm going to trade \$500 million, it's going to have to have an ultimate risk, you know, zero risk tolerance, right?

So that's, that's what decentralized identity infrastructure is ultimately going to do is you're going to bring all of your digital proofs, all of your credentials, maybe my employment at, you know, like, you know, use the example i used, my employment at Citibank to get into the exchange. The fact that you've issued me an Abaxx credential to trade on the exchange that I've passed my series one or my series three, etc. So I can now trade on this exchange. I have this education. I have this login over here on my credit card network. You know, I have this login with my utility bill, right? So I can present all of these these credentials in real time. And whoever's on the other side, that bouncer is going to make a risk assessment in real time. Now Can I let them in? Can I let them perform certain services. So instead of going from a single login where again, Google's holding my email and password to say yes this person is, you know, my email@gmail.com. Right, instead of going from that system, you're going to a risk type system of the identity is who they say they are. And I think that's the key piece of

infrastructure to change the entire financial system, because then that becomes interoperable with a custody issues, right. So I need, you know, custody, where it needs seven different signatures to release these funds. You know, seven different auditors or regulators or internal auditors or compliance people, I can do that all if I've distracted to a level where seven people sign off on say, this digital agreement that pops up on my screen, and all seven of them present their basket of credentials. Now I've made everything more secure. And I made it more certain from a legal perspective and all of those protocols can be designed based on a risk based system, just like the financial system has.

Erik: Josh, I want to move on to the second major point that you made, which is custody. I don't know how you think about this. But here's my mental model of it. Almost everybody in the financial system worries about what happens when we get the next Lehman moment. Well, how do we define a Lehman moment? That is a time when there is one really big financial institution that is a custodian over so many different assets of both their own and their customers, that the counterparty risks that are embedded into the failure of that too big to fail institution could literally create this domino effect that takes down the entire financial system? My answer to that is, we ought to eliminate the entire concept of too big to fail by eliminating this concept of custodianship where there is a bank that has a bunch of counterparty risks that could break the whole financial system. That's crazy. Is there a way to solve that problem with this new technology?

Josh: Yeah getting back to self sovereign identity and making sure you know, that these keys or these assets represented by the keys they can sign, it's almost like moving, you know, a physical title certificate in and out of a bank vault, where you have four different people that have have keys to move it. So the intermediary becomes purely a vault, like literally like using a Brinks or, you know one of these, you know, sort of actual logistics custodians, you know, they really become a holder of keys, you know, based on a protocol, rather than what the current system is, which is dematerialize contracts. So, they're actually really is just a ledger entry of who owns what, right and so there can be risk, if they mismanaged their ledger, or mismanaged their, you know, their risk management systems of their collateral and so forth. You know, if this this firm goes under, then there could be this gray area, where people, you know before, you know, between the beginning of the quarter and the end, when they're auditing, they're kind of moving what should be a custody client asset, but they're really moving in into their own account or their own, you know, using it for their own collateral for some sort of risky trade. So that's the big problem in the custody ecosystem. And there's a lots of ways that regulators try to make this lower risk, you know, you have to hold so much capital requirement to be a qualified custodian. You know even in dematerialized contract custody, right, you have to hold so much cash or bonds, so that, you know, if something goes wrong, you know, through a bankruptcy process, people will always get their, you know, their assets back.

So that's the current system now, is that there's all these layers of risk in settlement and custody whereas in a purely, again, 10 tenths of the law, whoever owns these keys owns the title. You know, that system changes significantly to a more self custody system. Now, I don't believe it's fully self custody that the entire world is going to be running around with sort of Trezor USB

keys, you know, holding their entire financial balance. Now, from a risk perspective, some people may want that right. Going back to our Canadian trucker example, there may be some piece of the financial system, you know, very much like gold that they want outside of the, you know, outside of the regulated infrastructure. But for the most part, I think what it's going to be is a series of identity proofs to you know, to do something write a protocol where three different people need to sign using self sovereign identity, this transaction to release an asset from custody, you know, very much like two people, two managers of the company, two fiduciaries have to use their bank login tokens, and both digitally sign for it to send an electronic payment from a corporate bank account. Like that type of infrastructure is going to happen. You'll broadly across the financial industry know where you're gonna have to have multiple signatures in order to move, you know, custody or title of this, you know, this bearer instrument from one place to another.

Erik: Josh, in the interest of playing devil's advocate here, I think some people would say, wait a minute, there is not necessarily universal benefit to a 10 tenths of the law system, because for some things, yeah, I really want it to be an absolute transfer of custody. And you know, once I've got it, I've got it, nobody can take it away. But you know, when I buy something on my credit card. I kind of like having the security of knowing that, yeah, I agreed, I gave them my credit card number, I agreed to buy whatever it was. But if it turns out that it was a scam, and they lied to me about what they were selling me, or they never shipped me the product or whatever, I can call the credit card company up, and they can unwind that transaction through the chargeback mechanism and say, Okay, Mr. sleaze seller, unless you can prove that you actually delivered the product you were supposed to deliver, we're gonna give this guy his money back, we're gonna take it out of your merchant account, and you don't have to like it. Do we still need to have those kinds of mechanisms and a new 10 tenths of the law based custody system?

Josh: I believe we do, but I think they'll just look as like, like something different. And actually, the credit card examples, a perfect one? Because you're absolutely right, there's an aspect of insurance within that system, that, you know, ultimately, the merchants are paying, you know, 3% plus interchange, you know, base fees on every transaction for that consumer to have that insurance. Right. So one of the big questions for, you know, kind of for society, is how much cost, you know, is that is that imposing, you know, particularly, it really is a regressive system, right, you know, people that actually have higher balances on their credit card actually get paid, they get paid cash back, you know to borrow money, right? Particularly in like, basically zero interest rate environments. But there's a insurance tax, you know, sort of spent on the rest of the merchant economy for that, and, you know, these big credit card companies and these networks, they've actually got very, very good, and that loan no longer costs 3% insurance per transaction, you know, to actually provide that service to the user. These companies now have 60-70% gross margins. So they've actually, you know, through operating cost efficiency and insurance, they've lowered their actual cost to provide that service yet they still capture this massive part of the transaction, where in many industries, you know, you look at some retail food industries. You know, you look at a lot of retail toys, and so forth, the margin on that payment insurance becomes higher than the margin of the actual industry it's serving. And that becomes very problematic, particularly, if you're talking about cross border, and you're adding

another two and a half to 3%. In foreign transaction fees within that system. It could cost you 6-7% overall for that convenience of having some chargeback risk.

So, you know, I guess the big question is, do we have better technology systems than just paying Visa and MasterCard, you know, a very high margin in oligopolistic networks for that user experience? And I think, again that's a perfect aspect of software disintermediation. Anytime there's those types of models, software is going to come back at it. And again, what is that? What is that transaction that you talked about? What is that actually doing? Its identity insurance, right? That's what that card network is doing? Is basically saying yes this person made this transaction. They are who they said they are and so I'm going to debit their account, and you know, and give it to the merchants account. And of course, there's that sort of four party system. So that risk is spread through this whole, you know, the merchant acquires, the card networks, the bank issuers. So it's this whole system to spread that risk. But ultimately, what is the risk? It's the identity, it's the identity in the ledger. So I think that there's, you know, with with better identity, a lot of that those card networks do go away over time.

Erik: Josh, let's tie this back into how it's going to work. What does it look like? Does that mean that if I want to buy something in the future is the website or whatever is going to tell me well this particular transaction is offered as a 10 tenths of the law, once you've paid your money, you're never going to see it again. But this other one, has the the ability to challenge the transaction, if you don't like it after the fact, or will this be, you know, all legislated and mandated by governments? And if so, how does that work across international boundaries? Because the Internet is a global place? It seems like there's a lot of issues to work out here.

Josh: Absolutely. There is. And I think that's where, you know, so many securities laws and consumer protection laws came from was more and more, you know, individuals getting involved in these systems, and where those potentials for conflict of interest or fraud comes from. So I generally agree with you that we're not going to move to a fully you know, possession of keys 10 tenths of the law system. I still believe If that people are going to want the security and the user interac or you know, just better operating protocols of intermediary. I just think they won't take so much, you know, cut of the transaction. So that, you know, I, again, I don't believe we're gonna be running around with, you know, with USB sticks, you know, where we keep all of our life savings. I think we're still going to trust intermediaries, we're just going to have a lot more checks and balances on the ability to withdraw or move assets. You know, one of the, you know, I was talking to a bank CEO. You know, many years ago in the early days of, you know, getting involved in this infrastructure. And one of the things that they said, you know, one of their biggest retail advantages is nobody likes changing bank accounts, right. And the main reason is resetting up, you know, their automatic bill pays, you know, resetting up the onboarding of the bank onboarding and proving, you know, all of the things you need to proved to onboard to a bank. This is usually something that becomes very sticky. People stick with their banks forever. However, if you remove some of the ability, you know, the the ability to very quickly through a couple key transactions, you know, prove your identity to a new bank or a new service provider, or a new custodian,. You can very quickly move assets, and really the financial institutions. You know, one of their main business models is gathering assets right? Getting paid for custody

getting paid to be able to lend it getting paid for consumer lending. So the customer acquisition versus lifetime value equation of a bank is to always be gathering individuals and always be gathering assets. Now, if you now have a system where you can very quickly move your assets to different intermediaries that make your life a little bit more secure than holding your own private keys, then you'll just create an incentive and a check and balance for those intermediators to serve you better, right, whether you're the capital provider or the capital receiver. And so that that's ultimately what what software is going to do is provide a more, a quicker check and balance to make sure incentives are aligned.

Erik: To talk now about what this means here and now to investors who want to be part of this long term story. And boy, it is a very complex and confusing roadmap that we see ahead. You know, if I draw an analogy back to the mid to late 90s, when everybody in finance had figured out that the internet was going to be a really big deal, but almost nobody in finance really had an accurate understanding of what that really meant. So all of a sudden, everybody is overpaying for pets.com. They don't really know what to buy, they just want to buy something with .com in its name. Eventually, we figured out if we have the benefit of hindsight well a company like Google that comes along and does something seemingly fairly simple. All they're doing is providing a search mechanism to help you find stuff on the internet, they in the beginning, they weren't providing any apps of their own or anything was just a way to find stuff. Well, that was so fundamental, everybody needed to find where things were. And more importantly, it put Google in the driver's seat to influence who was at the top of the list when you were searching for those things. There were dozens and dozens of different search sites on the Internet. Somehow Google became the Coca Cola of search sites, and that created an empire. The other big thing I would say, looking back was Jeff Bezos was not really trying to sell books back when he opened his online bookstore. He was trying to create the foundational platform that would eventually allow him to create this e-commerce empire of selling just about everything on the internet. So an E commerce platform, and a search platform turned out to be probably the best two investments you could have made in the late 90s in order to be part of this internet revolution. As we look ahead, it sounds like you're saying self sovereign identity is one of those, you know, like the search engine, it's a very simple thing, but it's so foundational, it's really important. What are the other things to avoid pets.com and to get into the Amazons and the Googles of the next 25 years. What are the things that are going to be foundational and most important to this digital bearer asset revolution that's coming?

Josh: Yeah, you know, it's it is it is very difficult. Again, I've kind of staked you know around self sovereign identity and custody, and the way the user interface and that, how you can help users, you know, through those tools is really where I've been focused, you know, I think there are going to be interesting protocols, again, looking at DeFi, you know, marketplaces for NFT's and really, what NFT's really what they are is you know, it's bringing a community into a financial into a financial network. So, you know, I think there's a lot of aspects of this that are gonna be very interesting, but ultimately infrastructure I just always come back to identity and custody as being the key piece is to balance a sovereign nation state world with a purely digital world. Right? I think those are the two pieces, and a lot of the software around that. But I would also say, you know, a lot of the service providers around machine learning and natural language

processing, you know, quote unquote, artificial intelligence. I think the ability to manage all of this data and metadata that's going to be in these blockchain ecosystems, you know, the composability of different pieces of data is going to be, you know, a key piece of all of this. And so I would say, that's another place to probably invest. And of course, the bridges, you know the people that are actually taking this new, you know, call it web three world and bridging it and unlocking the trillions upon trillions in the web two, or even web one, you know, local server custody world of big finance.

You know, there's all this experimentation happening in almost a completely separate ecosystem. Now, there's, you know, there's a few bridges in stablecoins, and so forth. But for the most part, you've got an almost completely independent, you know, sort of sandbox of decentralized finance happening in one place, with, you know, some yeah, maybe it's now, you know, 10s of billions or hundreds of billions of dollars, but now you're talking about many deca trillions of dollars in the formal financial system. So those that have the bridge between the two and allow money to flow between the two, you know, with some sort of service fee or SaaS application fee. You know, I think that's another place to invest. And of course, that's where Abaxx is investing by launching a more formal Commodity Exchange, but slowly introducing a lot of these ancillary products, you know to bridge the worlds. That's where we've, you know, and look, full disclosure we're not there yet. We've been investing for four years and thinking about this, testing it building systems, you know, but we actually have not launched our core piece of it, which is our exchange to allow some of those systems to flow. So you know for us, it's a big long term investment. And I think, yeah, I think it's investing around some of the service applications around self sovereign identity. And this is tough, right? It's very different than a winner take all market. And going back to your examples of Google and Amazon. At the end of the day, they're both markets, right? What was the transformational event in Google's history that made them more powerful than anybody else? It was actually, in my view, it was the the acquisition of AdSense and creating a marketplace for ads, rather than necessarily their, you know, all of their algorithms providing the best thing to the top. They allowed markets to service things to the top. Now, there's a lot of problems, you know, their their market is very different than the New York Stock Exchange and many would argue it's almost a rigged market in their ad exchanges between them and Facebook, right? So they're taking 30% of the cut of these markets rather than three basis points. So I think there's a lot of problems in the market of Google. But that, you know, ultimately, it was a market that gave Google power. Same thing with Amazon, right? You know, Jeff Bezos, you know, first, he really decided you know, the many Skews of books was the perfect ecommerce platform to provide all sorts of different skews in electronic format and organize those Skews much better than the skews of a bookstore and knowing what inventory to hold. And he was able to revolutionize ecommerce and ultimately distributed computing, because he wanted that big marketplace to be up and always available and not dropping. So he eventually also, you know, created Amazon Web Services. So it was really markets that drove all so we still believe that markets will drive all and being in those marketplace points of this transition is still the most valuable. And you've even seen that in Bitcoin, right? Like with, you know, with FTX and with Coinbase. The marketplace is still the place that's driving the transition.

Erik: Josh, it sounds like your answer to Amazon search is the the newfangled thing that needs to be a foundational technology is self sovereign identity. You guys are addressing that at Abaxx with ID++. And with respect to the Amazon, if you will, I think what you've done is rather than try to take on the stock market, which is everybody's going to try to do that. And it's not really your background, you're saying commodities market, which you know better than anybody. You're going to look at reengineering a commodities exchange using this new technology. But you're a big boy, you know that our investors who are professionals probably are invested as I am and in the interest of full disclosure, I do have a seven figure investment in your company Abaxx technology. So I want to make sure that that is fully disclosed to our listeners. But investors like diversification they want to be in on you know, not bet on one horse and make sure, especially for something like this, that they're exposed to all of the potential winners. What are the other areas of this market including those that Abaxx is not directly involved with that if you're serious about Defi just have to invest in.

Josh: Yeah, again, I probably don't invest a lot, I mean, I'd probably make three trades outside of my own businesses, I've always sort of invest in my own businesses. So I'm probably not the best to do any sort of stock picking. But I will say that there are companies that I think truly get this, I would say, you know, one of them is Jack Dorsey's Block, you know, what used to be Square and the things that they've done in Cash App and the things that they're trying to do and self sovereign identity. As well as you know, essentially more organized DeFi. Now they you know certainly anyone that's followed what, you know, what Jack is doing since he's left Twitter. In fact, he even wants to build a version of self sovereign identity based decentralized Twitter. So he's actually gonna go disrupt his own business there as well or his own creation there. But I think I think they're onto something, I think they're looking at it right. Now, they take a very Bitcoin centric view of this ecosystem. You know, for good or good or bad, but I think they understand the fundamentals probably as well as anybody. So I would certainly, you know, take a look at what what block is doing and what, you know, Blue Sky Ventures is doing in or sorry TBD, I forget which one, but you know, what they're doing in decentralized social media. So that's definitely one. I think Microsoft has been doing some very, very good work in self sovereign identity. And of course, they've got some of the biggest identity networks in the world.

You know, they have LinkedIn, they have GitHub, they have the enterprise authentication services with Active Directory. So I think they're very much in a good place. But as we all know, Microsoft tends to always hold on to something, you know, maybe through their dotnet infrastructure or otherwise. You know, there's always some piece that they always try to hold back from being truly open source. But you know, that said, I think they're doing really good work in that area. You know, I do think MasterCard understands where this world is headed. And some of the risks to the interchange system. MasterCard has been investing, I think quite heavily in self sovereign identity and new identity systems. I'd say workday has been investing in these ecosystems. I've seen some hints that even you know, with Slack and some of the new acquisitions through Salesforce. I think ultimately they'll have this way probably before others. So yeah look and oh Avast Security just bought a credential issuing platform. So yeah, I mean there's a few out there, particularly on the identity space, but you know, I'll probably leave it to a buy or sell side analyst to really go into the details here.

Erik: Well, Josh, I can't thank you enough for a terrific interview. But before I let you go, I know you've written not only patents but also some white papers talking about this. You've done a lot of work on this for people who want to learn more about all this Defi stuff and where it's headed. Why don't we start with your works but also beyond your own writings. Where should people go and what should they do to learn more about this?

Josh Crumb

Yeah thanks Erik. I mean first off, we did start Smarter Markets. Exactly for this reason. And of course, you were a big part of...

Erik: Smarter markets is your podcast.

Josh: Yeah, sorry, the smarter markets podcast. So I believe it's just smartermarketspod.com or just Google Smarter Markets. And so we do have a number of series that we're breaking down a lot of these components, and that is sort of the idea is over time, it'll build almost a series of white papers through through these types of discussions. You know and I think you had a number of excellent ones like with you know Charlie Magara which I mentioned earlier. So, you know we're going to continue that, that type of open sourcing of information. So instead of really always pitching topics, like, you know, we just want this information to sort of come to the top and build a better, smarter markets, you know, that really is what that's all about. We will over time release more and more information and white papers get book on IB++. We're not quite ready to do that yet. You know, it will be coming. But you know right now, of course, there are a lot of proprietary aspects to what we're doing. But be rest assured, smarter markets and open sourcing this type of information is is a key part of what we're doing. And when we're ready to do that from our specific protocols. That will all be very open source ecosystem, you know, probably by the end of end of 2022

Erik: Well, Josh, I can't thank you enough for a terrific interview.