

EPISODE 1481

[INTRODUCTION]

[00:00:00] SPEAKER: Web3 promises to change the way we interact and transact online. But today's dapps and wallets are hard to use. They are typically optimized for desktop machines and domain experts. In particular, it can be hard to bring value on chain and hard to know what to do once you've onboarded. Charlie Andrews-Jubelt is a software engineer who works on Valora, a mobile wallet and Revo, adapt that makes it easier to invest in DeFi and Git compound interest. Charlie joins the show to talk about the engineering challenges of making Web3 more accessible.

[INTERVIEW]

[00:00:38] JM: Charlie, welcome to show.

[00:00:41] CAJ: Thanks. Happy to be here.

[00:00:44] JM: You work on Valora, which is a mobile payments app. That is in many ways, like things that people will be more familiar with, like Venmo, or the Cash App. But it's based on the Celo blockchain. So, I think it's worth starting out by just explaining why the apps like Venmo, and Cash App, these apps for sending money from person to person that are critical to a lot of people's lives. What are some of the shortcomings of those platforms?

[00:01:18] CAJ: Sure. So, these apps are very good for specific use cases. Venmo, for instance, is really good for people who have a bank account, and only want to transact with peers in the United States, right? But if you have a friend in Italy, or maybe you're trying to send remittances back home, to your family, who may live in a foreign country, outside of the United States, you just can't do that on Venmo. Or if you happen to be trying to pay someone who doesn't have a bank account, maybe they're an immigrant without status, then you can't transact with them either.

So, there's really quite a few people in the world who that leaves out, right? There's actually a billion people, that is a statistic that I've heard, who don't have a bank account, but who have a smartphone.

That's a lot of people. One aim of Valora is to be a global decentralized Venmo that can include some of those folks.

[00:02:24] JM: So, the usage of a decentralized Venmo makes a lot of sense. It's built on the Celo blockchain. Let's go into the Celo blockchain and explain why it's notably different than other crypto platforms like Ethereum or Bitcoin?

[00:02:47] CAJ: Yeah, sure, I can talk a little bit about Celo. Celo's main differentiator from these other blockchains is Celo is a mobile first blockchain. Most of the early users of blockchains have used desktop computers to interact with the blockchain, which makes a lot of sense. Desktop computers are like very developer friendly, and tend to be more powerful. So, you can run a node, there's a lot more storage, network connectivity, et cetera. But if you really want to deliver on the social impact potential of blockchains, in general, for example, like supporting the unbanked and the financial system, censorship resistance, things like that, and remittances without crazy high fees, which are in the percentage points in a centralized financial system that we have, as well, as – I could really go on, right? Supporting folks who have highly variable currency to the point where they have to immediately run to the grocery store to buy groceries because they hold their value better than their native currency does.

These are some of the social impact outcomes that we want to see with Blockchain tech. But Celo is pretty focused on delivering on those. And so, what the founders of the Celo blockchain noticed is that a mobile first blockchain would be extremely useful in bridging the gap there, because there's a lot of people who have smartphones, but not bank accounts. Who maybe don't have a ton of hardware, but would benefit greatly from being looped into a financial system.

So, the technical innovation to make Celo mobile first includes a few things. One is Celo offers this ultra-light client capability where there's data connectivity issues with trying to run a node on a mobile client. Because particularly in like a developing world use case, which is something that Celo is trying to optimize for, you may have like a pretty expensive, limited data plan, right? So, if you want to run a traditional light client, you're going to need to download many thousands of block headers to be able to sync trustlessly with the blockchain.

But one, really cool innovation that Celo is found is the ability to run an ultra-light client and that involves polishing a zk-SNARK to allow syncs with very low data. So, you can essentially find that

current validator set with a constant space, just download of the zk-SNARK snark, and then from there, there's a small number of block headers you need to download on top of that, to be able to sync with the latest status of the chain.

So, ultra-light client is one innovation, allows for mobile first chain. Another is a phone number to wallet address mapping, that's done with some fancy cryptography and system design innovation that allows that to be done without exposing phone numbers to mass harvesting, but allows you to send money to someone if you know their phone number, even before they've set up a wallet, which is really cool. So, I think that's like, actually enables a lot of growth potential as well. But it's a big usability benefit if you're trying to interact with the blockchain from a smartphone, maybe the entire wallet address for your friend isn't really viewable on your screen, or can't easily be compared to expected value. But if your friend's phone number is in your contacts list, then you can send money to them as easily as sending a text.

That's pretty cool, too. And also, a little bit separately from that, but also highly useful in terms of like a user experience for peer to peer payments, is Celo is proof of stake, and also happens to be carbon negative. What I mean by that, so proof of stake, I think, as a lot of listeners know, is a consensus mechanism that allows for like thousands of times, or many orders of magnitude, less computation to go into publishing every block because there's not this like competition to waste energy that you see with proof of work chains. So, with the proof of stake chains, it also reduces the carbon – yeah, it reduces carbon emissions, as well as allows us to publish blocks every five seconds, which is really good for a peer to peer payments system, and we're able to achieve a carbon negative blockchain by essentially purchasing tokenized carbon credits with every block that's produced.

That was kind of a lot. But at a high level, Celo is a mobile first chain with ultra-light client capabilities as his phone number to wallet address mapping, that allows you to send money as easily sending a text and as a proof of stake and carbon negative blockchain. So, I think, better positioned to deliver on the social impact promise of a blockchain technology and DeFi in general, than a lot of other chains.

[00:07:43] JM: So, the proof of stake system that is built off of on the Celo blockchain, do you do anything notably different than the proof of stake algorithms that have been designed for the Ethereum blockchain? Are there any notable differences?

[00:08:06] CAJ: Yeah, so I'll qualify this by saying, I'm an enthusiast and obviously build on top of the blockchain, but I'm not an L1 engineer. So, take this with a grain of salt. But I think that Celo's proof of stake consensus is similar to a lot of like popular mechanisms out there right now, like Tendermint, et cetera. I think that, yeah, I could speculate as to why it's like taking longer for Ethereum to make this switch than some of the chains that started out with proof of stake. But at a high level, I think, yeah. similar to what you're seeing in other projects.

[00:08:44] JM: Well, we don't need to focus too much on Celo itself. But I would like to just discuss Celo as a platform. So, when you build an app on top of Celo, when you build Valora, can you talk about the interface that you need to deal with? I guess, what are the places where you're actually communicating with the blockchain itself?

[00:09:07] CAJ: Yeah, that's a good question. So, I guess there's a few special considerations for a wallet, dApp in particular, and especially a noncustodial wallet, right? Because your system probably looks a lot different if you're customizing the user's funds. You can maybe offer kind of a web to like experience in a lot of ways. But for a noncustodial wallet, the user is really in charge of their own funds. We don't have some database with user's private keys. It's all on the user's device.

So, there's some interesting practical considerations to keep in mind there. One of which is that users like actually submit information directly to the blockchain, whenever they are trying to complete a transaction or they're like sending money to a friend or interacting with another dApp. We started off by extending the Go Ethereum light client. That has been pretty useful for securing the user's private keys, for instance, and then we've kind of built around that some additional features that we would like to see, interaction with Celo's ODIS protocol, which stands – I think, I actually don't need to unpack the acronym very often. I think it stands for Oblivious Decentralized Identity Service. So, that's essentially what allows you to query wallet addresses from users like contact phone numbers.

That's a smart contract that has a built-in integration with our app. There are a few others, for instance. Mento and other Celo specific smart contracts that offers exchanges between Celo, the native currency, and stable coins, C-USD and C-Euro, or C-Real, just the native currency in Brazil. So, there's this kind of interesting mix of trying to always allow the user to self-custody their funds while offering functionality by like letting them interact natively with smart contracts.

[00:11:15] JM: Let's go a little bit deeper into currency conversion stuff. So, if you want to build a Venmo app that works across the world, then you obviously need to be able to convert Celo to all these different other currencies. If I want to, for example, send, let's say, I have USD, and I want to send money to somebody in Nigeria, presumably there has to be some conversion of USD to Celo – well, actually, I guess we should ask upfront, to what extent do you offer the currency conversion yourself? Do you have the fiat to crypto currency conversion built in?

[00:11:59] CAJ: Yeah, so fiat to crypto and the other way around crypto to fiat is really important for practical and user use cases. The simple process of bringing value on and off chain means a great deal to people. Whether you're just trying to invest in DeFi, or you're trying to send money to someone who then needs to go pay rent or pay for their groceries. So, there is a lot of effort separately in the Celo ecosystem to promote payments and make it really easy for businesses to take payments directly in crypto. But for now, pretty much, the main expenditures that people have are done in fiat currencies, ones that are kind of centralized, run by a government, and accepted as legal tender throughout that country.

That is something that we care a great deal about is like facilitating that conversion and we've seen that in geographies where there are better options, there's a lot more user activity, which is exactly what you'd expect. So, yeah, we do offer that. Currently, Celo in general offers on ramps in 150 countries, actually a lot fewer of those, I think something around 23 of those have both on ramps and off ramps. It's a big area investment for us. So, one projects that I've helped lead is called fiat Connect, which has been a project to create a universal standard interface for fiat to crypto exchanges, and vice versa, and crypto to fiat. What we've tried to do is enable integrations with payment providers that facilitate this exchange of fiat and crypto to be able to add more regional availability more quickly.

[00:13:56] JM: Can you describe some of the engineering around managing fiat to crypto mutations?

[00:14:03] CAJ: Yeah, sure. So, I can speak to this from kind of an integration standpoint. I can also explain why an integration is usually necessary for offering this kind of exchange. So, the reason that integration is usually necessary is because it takes a long time to get licenses to handle money in a particular geography, right? Like in New York, it takes literally years to establish a license to be able to exchange fiat and crypto. So, as Valora, Valora aims to have global reach, so we could spend literally all of our time just trying to get licenses and playing this turf war going country by country. Or we could

use integrations to offer regional availability more quickly. So, that's the route that we've taken is kind of separate concerns in a way, integrate with businesses that offer this as their main product. That's enabled us to grow a lot more quickly.

On the other hand, managing a bunch of bespoke integrations in an app is extremely difficult. In fact, it sort of has this like pathological super linear relationship, in terms of effort required versus geo supported. So, every time you want to add a new geo, or maybe like a set of geos, if a partner is particularly good, maybe they have licenses and five, six countries, you need to integrate with the new API. That's why we launched this fiat connect project, where we've gotten several providers together and looked at several others that we've already integrated with, or tried to innovate with in the past, and we've we thought, is there anything that we can thread the needle through here? Is there a universal interface that we can propose? And we found that actually, there is.

So, we launched an open source project that establishes an open API specification for fiat to crypto exchange providers. What we found is that providers are typically very excited about this, because it enables them to sort of jump the line, and not have to wait for us to go, bespoke integration by bespoke integration until it's finally highest priority to add whatever region that they were trying to support from the get go, because they can just implement this one interface, and we can add them in a more like configuration driven way.

[00:16:29] JM: So, the fiat connect project you're describing, does that make it simpler for any potential app that wants to have fiat to crypto conversion, rather than having to go through all these jurisdiction by jurisdiction legality. It just it simplifies it for a bulk set of currencies?

[00:16:51] CAJ: That's right. So, there's kind of two large benefits here. It's sort of systematizes the process of performing an integration, because in terms of engineering effort, you only have to worry about integrating with one API, and you get many providers out of the box. That's a big benefit. And then, as you were saying, it kind of removes the urgency of getting licenses yourself in these countries. Because, at a certain point, we started wondering some of these API's are so difficult to integrate with, what if we just tried to get the licenses ourselves? But that, I think, posed a major distraction in terms of product focus, and kind of logistical hassle. So, I think it's much better to have this like separation of concerns, to be able to operate as a noncustodial, wallet in many different geos.

[00:17:44] JM: When you look at the range of things that people can do with Valora, there's not just money transfer, there's also purchasing NFT's or just buying and holding crypto. What's the most popular application? And maybe we can go into the engineering behind some of the most popular stuff.

[00:18:04] CAJ: So, what's kind of interesting is that, that's actually a very difficult question to answer, because it kind of depends on what your metric is for popularity. One thing that we did at Valora is we wanted to be data driven about the kind of features that we support in our app, and we also wanted to add value to our users as fast as possible. So, what we did is we launched a dApps page, and in the dApps page we listed any dApp on Celo, can apply to be listed on the dApps page just by submitting a pull request, because Valora is entirely open source. So, we essentially expose a configuration file where you could add your dApp, and if you pass basic usability reviews, you can be listed there and Valora users can interact without leaving the Valora app, just by opening up a web view.

What's been really interesting from that is we've been able to gather data on what you're asking about, which is like what are some of the most popular ways of interacting with the blockchain once you created a wallet. But what we found is that typically, the most popular ways are whatever the user sees first. So, the top viewed dApps got the most traffic. What was also interesting, and I'm totally going to flatter myself here, but is that when we spotlighted dApps, and we measured when a dApp is spotlighted, how often was it clicked that a couple of dApps did better than the others. Those dApps were particularly for investing in DeFi, with low effort, which is kind of what you'd expect, right? Someone heard about cryptocurrency is a great way to earn and they go in and create this wallet, they want to be able to make some money.

Especially, in this like single player mode, where they're not like transacting with peers and activating those use cases, they're just going on dApps like they're interested in the Fi part of DeFi, the financial opportunity. I actually wrote one of these dApps that we added on side, and it's called Revo. And Revo makes it very easy to invest in DeFi with high yields. So, Revo had the good fortune of winning this contest that we launched, of which dApps could perform the best, in particular, be the most popular when they were featured in that top spot to sort of debias the dataset from some of the order effects that we saw with the first dApps being the most popular. So, I think Revo, in some ways is an archetype of a type of dApp that's very popular right now, from the data we have.

[00:20:43] JM: Maybe we could dive into the engineering of Revo. Can you talk through some of the most difficult engineering problems that you've had to solve when building it?

[00:20:53] CAJ: Yeah, sure. So, I can also say a little bit more about like what Revo is to give people some context. So, Revo is a dApp or decentralized app that makes it easy to get started with yield farming and earned compound rewards. So, yield farming is essentially a way of incentivizing people to provide liquidity for a token. And so, that's very useful if you're launching a new token on the blockchain, because blockchain can consist of many, many tokens, you want people to be able to acquire and sell your token. Typically, you list it on a decentralized exchange, like Uniswap, or on Celo, there's a couple of exchanges. Uniswap is actually coming soon to Celo. But there's also eBay swap, which is a fork, as well as Sushi, which is also a fork, as people probably know.

So, you can stake the token in a pair on Uni or eBay swab or Sushi. And then people are able to trade for that token, from whatever token we start with, maybe somebody cashed into a stable coin, which is typically user's preference for cashing in. When you're first launching one of these pairs, though, typically people don't want to get started right away until you give them an extra boost. There are these contracts are called staking rewards contracts or yield farms, and those give you essentially free money for staking liquidity. That can be very popular. But yield farming is actually kind of a pain from a UX standpoint, because it's hard to get started. There's like, I think, 10 or 12, different transactions that you need to post to the blockchain to get started, and it is very difficult to earn compound rewards.

The rewards that you get need to be claimed manually. And then those 10 or 12 transactions need to be repeated every single time you want to reinvest in the original investment to get compounding on the rewards that you're in. So, I feel that when I first started yield farming and checking it out, I was very disappointed by this. Because I'm not an expert in terms of investment, but I feel one of the first things that you learn, like in high school people tell you, invest now, because compound interest is going to save your life. Like, I should have invested younger. Of course, we had no money at that point. But besides the point – yeah, so I thought like, “Well, what a mistake to have to settle for this non-compounding rewards status quo. So, I wanted to build something better, so I got together with a couple of teammates to do that and we came out with Revo.

Your original question, though, is what are some of the technical challenges involved with building Revo and there's a lot there. What we wanted to accomplish was a system that offered negligible fees,

because what we found is that there's a couple of auto compounding platforms out there that already exist. For instance, on Celo, there's Auto Farm, there's also Beefy, these are multichain projects that are like very established, but they offered performance fees that were like 3% or 4%, which I thought was outrageous. I mean, if you invest in traditional finance, even if you use a Robo Advisor, like Betterment, or Wealthfront, the fees are like 1/10 of that. They're like, 0.2%, 0.3%. So, I didn't think that was really the best that could be done, and so we wanted to improve on that.

I guess the challenge there was coming up with a way of gas efficiently keeping track of user balances. Essentially, what we ended up doing was we pulled together all user investments so that they can all be reinvested together. One really cool thing that came out of that was to keep track of how much a user had invested, we essentially issued a token to them at the investment time at a certain exchange rate of liquidity provider tokens, which represent your share in a liquidity pool, to the current value of this, like farm point token is what we called it.

One thing that was really cool that we actually didn't expect, as we were working on this auto compounding feature is that by issuing this token to gas efficiently, like reinvest the users rewards, and keep track of their stake in the yield farm, it's very being a token meant, it's something that we can actually then stake in another liquidity pool, which we started talking about as like meta liquidity, because the token itself, can be exchanged for an LP token, which lives on one liquidity pool on one level, right? But then there's this higher level, where your share in the yield farm is tokenized, and can best be put in its own liquidity pool.

So, in some ways, you start to see a little bit of scary situation where it's like, "It's turtles all the way down." But on the other, there's a real opportunity there, where if that farm point token is itself staked in a liquidity pool, that means you can cut out that getting started process of 10 to 12 transactions. That takes forever, even on a fast block time, that low gas chain like Celo, still takes forever, like 50 seconds is a long time. If you know exactly what you're doing and the UI updates instantly, which never does. We brought all of that down to only two transactions needed to get started. There's an approve, and then there's swap. So, that was the second innovation that we sort of came across as we're building out this auto compounding platform, is we also made it lightning fast to get started. That's why we chose this like goofy lightning bolts for our icon. We call the zap ends. And we're very excited about the UX that we are able to offer in today's product with Revo.

[00:27:01] JM: The mechanics of staking and basically farming your liquidity, those are not easy for a lot of novice crypto users. So, as that capability becomes more and more available to the retail investor, how does that change interest rates on accounts that would previously be thought of as like savings accounts? I mean, how does the average interest-bearing account change?

[00:27:34] CAJ: It sounds like there's two points you kind of making there on like, a usability point where yield farms are kind of complicated, maybe difficult to use. And then there's a point on like, is there maybe financial opportunity there? Is that kind of how you're thinking about it?

[00:27:52] JM: Yeah. I'm just trying to understand the overall impact of accessible yield farming to the average retail investor.

[00:28:01] CAJ: I think that's a very good point. So, one thing that's been cool with Revo, is that we've seen like very concrete examples of this low cost auto compounding service, making a big difference. And that was when we launched a PACT Celo farm. PACT is a governance token for impact market, that UBI protocol on Celo, and Celo is the native token. So, the staking rewards contract was loaded up with pretty large number of rewards that offers like pretty good APY. So, an eBay swap the decentralized exchange where this pair is listed, you get about 120% APY, and that assumes compounding very infrequently, which I think is accurate for people have to manually compounds the rewards.

What we found is that when we listed this pair on Revo, with auto compounding, that's done several times a day, the APY shot up to 160%. So, I think the practical user impact there is very large, right? I think, to me, it seems obvious that you would want the 160% APY over the 120, provided that certain guarantees are met like reliability. I think that the user impact is there. When it comes to usability, I think that's a good thing to focus on when it comes to yield farming, right? Because when I have to explain yield farming to a new person, it's very difficult. Particularly someone who hasn't done anything in DeFi. I wrote an entire blog post to try to bridge this gap that I can just link people to, but that's not really – we can't expect that from your average retail investor. So, I think we need more innovation to simplify this with the explicit goal of making the UX more reasonable, so you don't need to become this expert in the system of smart contracts in order to interact with it.

[00:29:55] JM: I mean, I'm somebody that doesn't understand yield farming super well myself. Is there a risk in yield farming? When I stake my currency, is there some actual risk of losing it?

[00:30:07] CAJ: Yes and no. There are a few different types of risk involved. And yeah, I should probably say here like, I'm not a financial advisor so this is not financial advice. But this is one enthusiast to another. I can tell you what I've learned. So, there are a few different types of risk involved. One risk is smart contract risk. There are certain scam tokens out there, or the tokens with accidental vulnerabilities that can result in the loss of funds. There was a token I invested in a few months back that was getting these like consistently 400% APY. It was so consistently 400%, I wondered like, how on earth are they keeping that? It turned out the way they were able to keep that, this was called Lapis, by the way, it was just a scam token. They offered sort of a backdoor in the smart contract, where they could burn anybody's token if they were an admin.

So, they could just artificially reduce the supply and keep the apparent APY in the yield farm really high. So, doing your own research is really important with these projects, and making sure there's a serious development crew. Actually, just looking at the smart contract, I was so embarrassed when someone showed a screenshot of the code where this was there, because it was plain as day that this was a scam token yet, I, like many other people had been duped.

Yeah, that's definitely something to look out for. There are definitely still scams out there that are worthy of some attention. And then there's accidental vulnerabilities which can take place from time to time, which is why Revo has gone through smart contract on its – to reassure users on both fronts, that we're not a scam ourselves, that there's a third-party group that also believes we're not scams, and also to look for some of the vulnerabilities that we may have missed. So, beyond the kind of world of like hacks and scams, though, there's also with yield farming a risk of impermanent loss. Even without losing any tokens, you could lose value, if the tokens you happen to have invested in plummet in value, for whatever reason, it can happen. It happens from time to time.

So, if you're investing in stable coins, this is very unlikely. The stable coins, the whole point of their existing is that they don't lose their peg. It can still happen, but it's very unlikely. On the other hand, there's variable value tokens, even Celo's native currency can sometimes two weeks later be worth half the amount. It's something worth thinking about and building into your risk profile and not investing more than you can afford to lose. So anyway, taken off my like advice hat there. But those are some main types of risks to like be aware of there.

[00:32:56] JM: Coming back to Valora, there's obviously a lot of decentralized applications at this point, a lot of various, mostly financial applications. The apps that are wallets plus some functionality, like Valora, you have the ability to not only buy crypto, but you also have NFT's and other applications. It's something like a modern browser. I'd like to get your perspective on what that means, from an engineering perspective, because dApps don't really have as straightforward of a universal interface as like web applications, where you can just access them through the browser. So, how does that lead to how you design your interface and think about a future proofing Valora?

[00:33:51] CAJ: Yeah, that's a really excellent question. I think, if I perfectly solved that, Valora would have already won, right? It's one that we're like paying pretty close attention to, is like, how is the very concept of a wallet evolving? What should it do? How can we stay on top of the latest and greatest, like new blockchain tech that's coming out and make sure users have easy access to it and kind of route them to it right away?

The approach that we've kind of taken is, we have published this dApps page that has 20 or 30 dApps that anyone can easily add to, and instantly get access to all Valora users, which is a large number. It's the largest wallet on the Celo blockchain. What we've been able to do from that is keep track of where the tides are turning, right? What kinds of daps are people using? What do they want? So, I'm very excited by this, because I think that like my gut instinct for what wallets should do and how blockchains, DeFi in general can add value for people is pretty bad when it comes to global scale. I think I'm a pretty decent product thinker when it comes to anticipating people's needs that are like pretty similar to me.

But the drop off is huge, especially when you are thinking about some of the like global use cases. There are some features that don't even show up on Valora for me, because I just don't live in a place where that particular off ramp is available, for instance. So, I don't interact with even the same app that some other people are. Anyway, I think, really my answers maybe going to sound a little bit of a non-answer, but I think it's just to be a hawk, not in terms of some like aggression. That sounds weird. But like, yeah, an eagle, some sort of well sighted bird that is paying very close attention to the data and user behavior. One thing that, as an aside, you don't need a dApps page like Valora. I think it's very valuable. But you don't necessarily need that to see where the tides are shifting because in DeFi, particularly on public blockchains, where you can see every transaction, that's something, that's a privacy coins, probably a different story. But typically, on a public blockchain, you can see every transaction that every single person on it is doing. So, it may be hard to see what wallets are owned by

the same person, but you can get a general sense of what dApps are taking off. I think that's like a huge opportunity, and one that should absolutely be taken advantage of to get a sense of where the winds are turning.

[00:36:31] JM: So, dApps that I've seen today, mostly things relating to buying and selling currency or financial abstractions, complex securities. Is that kind of the end state of the decentralized app ecosystem? Or does it get into – you think this actually evolves into – or I guess, what I should ask is more, what does it take to move beyond just sort of the narrow scope of dApps that we've seen thus far?

[00:37:08] CAJ: I love that question, and I wish more people were asking that. I think there's a lot of attention paid to this, like virtual casino. That is cryptocurrency and blockchain tech and DeFi to an extent right now. But I also believe in the promise of blockchain. The social vision is beautiful. It's the censorship resistant, globally accessible, anyone with enough compute, which is hopefully vast majority of people can participate, even if they don't have some state sponsor to give them recognition or bank accounts or like big institutions give them account. I think, there's so much opportunity there, when it comes to, even just the simple process of peer to peer payments. Improved a great deal with cross border payments in particular.

So, I think that, what will it take to get us past this virtual casino? I probably can't give an exact answer. But I think that it's going to take the same kind of real user driven design thinking that it's taken to solve some of the bigger problems in Web2. There's nothing special about blockchain tech in terms of how we can go about designing amazing products. We need to just be obsessed with the end user and actually learn what a greater set of people's problems are beyond just the kind of initial few things that we've thought of as low hanging fruit that largely replicate existing systems in the financial system.

Now, I say all that and kind of bash the virtual casino for a bit, but also just want to say that, I really think there's opportunity there as well, right? If you can just invest in some like Betterment, Robo Advisor, pay low fees, and expect your earnings to grow over time, be able to retire safely, that's really great for you. But not everyone in the world can do that. So, having some more financial periods exist, it's not a bad thing. I think it's a really good thing, actually, as long as there are things that people can rely on, and serious projects. I think there's a lot of potential there. But I agree with you that or I don't

know if you're stating this opinion, but I believe that there's more that can be done and I look forward to a future where our cryptocurrencies can be put to work to do more than just transact and invest.

[00:39:25] JM: We've been talking at a pretty high level. So, as we wind down, I'd like to at least get closer to the metal engineering question. Can you walk me through the lifecycle of a payment on Celo?

[00:39:38] CAJ: Yeah, sure. Oh, gosh, that sounds like interview questions. So, a payment on Celo, essentially, is a message, and this is true of all blockchains. Celo was actually a fork of Ethereum at the very beginning in terms of the codebase, not of the blockchain itself. So, there's no like shared history in terms of blocks, but the codebase was a fork. The way people think about Ethereum is a very like valid way to think about Celo to a large extent. So, in terms of what it means to transact on Celo, it essentially means to publish a message to the blockchain, which at an even lower level means to designate it from address to address, to sign the transaction, and cryptographically with the user's private key to say, this sender like really does have permission to use funds from the from address, and to designate a gas currency, so that validators can take a reward for publishing this to the blockchain, kind of using the compute.

One thing actually, I forgot to mention about Celo that's really cool is that you can also designate in addition to a gas fee, you can designate a gas currency. You can pay for gas and stable coins, and it's actually really cool because that means that a user can kind of hit the ground running once they've been able to cash in. Most users, in fact, rounds like nine to one, prefer to cash in with stable currencies. I can't blame them, like hashing straight into a variable value token, that's a little scary. You immediately see your funds begin to move. So, it's nice to cash into C-USD, for instance, which is what I prefer to cash into, because I live in the United States. And to know that before, I've really like pulled the trigger on an investment, that I have approximately the same value that I started out with from my bank account.

Anyway, that's just an aside, then kind of a nifty benefit of Celo, is that you're able to designate a gas currency as well. And then from there, you send this information to a node. You can either use like a peer to peer strategy for that and publish to whatever nodes in your area or designate one node, which can be more data efficient, but it takes certain amount of trust in terms of censorship resistance. And then that node, that full node passes it along to a validator, which then publishes it to the chain. It's still

a little bit high level, but a little more – hopefully the detail that you were looking for in terms of how a transaction gets published.

[00:42:16] JM: Is there any way to send money from person to person without hitting the blockchain?

[00:42:25] CAJ: Not crypto. I suppose you could share private keys. I wouldn't advise it. But I suppose if you first send money to some dummy account that you didn't care to use any more, then you could just provide the private key, then both of you would be able to spend the funds, at least until one of you takes them out. A nicer – one nice thing that Celo offers is an escrow contract that allows you to send money to someone who doesn't have an account yet, by just sending it in designating a phone number for someone who should be able to claim it. So then, someone can actually in a decentralized way, verify their phone number, and claim the money that you sent to invite them to start using Celo. Actually, I think that's really cool and it's like kind of a cool growth mechanism as well, that is built into Valora. That's still interacting with the blockchain, but it's not requiring someone to set up a wallet in advance, which may be like one part of that question is like, does someone need a wallet? And the answer is actually no, not on Celo.

[00:43:29] JM: Got it. Yeah, I was just curious if there was kind of a way to just use the private ledger of Valora itself. But I guess that would some extent defeat the purpose. Anyway, to close off, I just like to get a perspective on the future. How do you see Valora looking differently in five years?

[00:43:52] CAJ: I think Valora would probably look completely different in five years. I think that there's a bit of some context, I think there is a choice to be made, and soon for Valora, on whether Valora will continue to optimize on a peer to peer user experience, or whether Valora will lean into this DeFi wallet vision of kind of focusing on – sometimes we call it like a single player mode, where like maybe we don't have the network effects that are going to be necessary to bootstrap like a really effective and vibrant peer to peer network just yet.

Maybe this is something that, in the future that – it reminds me of this saying that I've heard that if you have the right idea, but it's too early, it's the wrong idea. I think it's possible that peer to peer payments might be that for us, and that this like single player mode and focusing on like, well, how do I give a user a ton of value on things they can do entirely on their own, even if all of their friends don't have Valora and won't accept that their invite. I think it's possible that Valora will become more like that. On

the other hand, we could pivot in the opposite direction and double down on a peer to peer payment system and try to get more businesses to adopt Celo as a form of paying for goods. There's some exciting stuff being done there. But sort of as an aside by the sea labs in the Celo foundation, and building out technology to do sort of an under the hood, at time of purchase, transfer of crypto to fiat, that businesses can rely on. So, they don't actually even need to accept Celo for someone to be able to pay with Valora. I think that's a little bit of a choice that we need to make, though, right? Optimizing in one direction or the other, and I think that will greatly impact this outcome of what Valora will look like in five years.

[00:45:51] JM: Awesome. Thanks for coming on the show. It's been a real pleasure talking to you and congrats on the success.

[00:45:56] CAJ: Thanks. Yeah, I enjoyed talking with you as well, Jeffrey. I hope you have a great weekend.

[END]