



Lowenstein's Tech Group Podcast: Crypto Innovators

Episode 13 – Quai Network – A Revolutionary Proof of Work Blockchain

By [Ethan L. Silver](#), [Eric Swartz](#), Alan Orwick

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Eric Swartz: Welcome to the Crypto Innovators podcast, presented by Lowenstein Crypto. I'm your host, Eric Swartz, vice chair of Lowenstein Crypto, and I'm joined by our other host, Ethan Silver, chair of Lowenstein Crypto. We're speaking with the most innovative investors, founders, and operators in Web3 to shine light on the technologies that fascinate us all.

Ethan Silver: Today we welcome Alan Orwick, CEO of Dominant Strategies, the developer of Quai Network.

Alan Orwick: Hey everyone. Alan Orwick here. Glad to be joining you on the Crypto Innovators podcast. I'm joining you from Austin, Texas, and I look forward to talking about blockchain innovation and the future of cryptocurrencies.

Ethan Silver: Yeah, it's great to have you, Alan. Really excited about what Quai is doing. I thought it'd be a good place to start if you can tell the listeners a little about yourself and your journey leading up to finding Quai.

Alan Orwick: Yeah, it really did feel like a discovery of sorts. So when you say finding, I really like the way that was phrased. My crypto journey started in 2016 with Bitcoin. Was actually in high school at the time and was just interested in it from a high-level standpoint of what this thing does, how does cryptocurrency work and what are the impacts that this technology has. Didn't really dive too deep into it at the time until I started my career, or more so of my career, at University of Texas at Austin where I was studying computer science. There I had the ability to dive into blockchain technology at a deeper level between internships on campus work and research at UT. I founded Texas blockchain, which is the undergraduate blockchain group at UT, I was a founding president and grew that organization up to 250 people and through that effort I was actually able to collaborate with researchers both on and off campus as well as professors and create curriculum for the students at UT.

It was a really fun effort just being able to get a grassroots effort going at the university and also in Austin and then collaborate with other great minds. That's really where the concept of Quai started to originate and those different connections and off the cuff ideas of spreading that knowledge and information really took place. We started a research group out of that same initiative and that's where I got to meet some of my other co-founders. So my three or four other co-founders are all primarily in Austin as well. We have Dr. Vishwanath who's the ECE professor that allowed me to meet Dr. Karl Kreder, who is the actual inventor of Quai Network. I'm more of the at the time student driving a lot of the low level code and testing out and toying with different ideas. In 2018, we had a grant from the NSF and that allowed us to kickstart some of that research into actual practice.

And then between that time from, 2018 to up about 2020, I was still doing research but also had several other internships and jobs, just working in between various industries, growing my own knowledge of cryptocurrency and just software as a whole. And then I had the great opportunity to work at Apple following my schoolwork and then going from Apple and seeing what the rest of the world looks like outside of just crypto. So going from a very small, targeted research area to suddenly looking at a global impact and what technology can do for the world and how the world generally works from, not only just technology, but also supply chain operations, large scale economies. So that was really fun and also really interesting to just get a practical sense of technology there.

And beyond that, just meet different people outside of crypto. Because crypto is a very specific niche group. We want to grow the group of people as we go over time, but you know a crypto person when you see one and at Apple there wasn't as many crypto people, so felt like a bit of a black sheep at times. And then going back to crypto after my time at Apple was refreshing. I think we're going to touch on more of that story soon, but it was just a really fun journey getting back into the roots of research and starting something from the ground up.

Ethan Silver: And before we dig into some of those specifics, I think maybe it's helpful just to give the listeners an understanding of really what is Quai.

Alan Orwick: Sure. So going back to that research in 2018, that's when we started to analyze what the combination of sharding, so blockchain sharding, which is the idea of taking one blockchain and breaking them up into many different blockchains. And then merged mining, which is the idea of mining mini blockchains at once. So both of those ideas on their own have their own merit and have been studied for a long time. Sharding I think dates back to about 2014 and some of the early days of Ethereum and when they projected their long-term roadmap and then merge mining actually dates back to 2012 with BitDNS being merge mined into Bitcoin. So those are some of the earliest forms of both of those ideas on their own, but they weren't really studied together. So how can we combine those? And if you think about them separately, they kind of make sense.

Sharding is picking one, blockchain making many, but then they operate on their own and you have to figure out how to put them back together. And then

merge mining is already the idea of having different blockchains but combining them to then create a more decentralized and secure version of those two blockchains or a more accessible and interoperable form of those two blockchains. And that research in 2018 was the start of us looking at those two technologies in tandem together. That core paper is actually called BlockReduce, and that's shared in our documents and that's the initial publication that we put out from that research group of our co-founders that I had talked about. It's IEEE reviewed and it's been in several journals, so that's the precipice of Quai. And then BlockReduce has evolved over time to include different features and other benefits of blockchain technology. So if you think of Bitcoin, you don't say, "Oh, this is Satoshi Nakamoto proof-of-work coin," you just say, "It's Bitcoin." Right? So BlockReduce is the essence of what the Quai protocol has evolved to being.

Ethan Silver: Great. That's really a great explanation. Many of those in the Bitcoin community share this single mantra that proof-of-work is a feature, not a bug. Perhaps you can explain for the audience the benefit of Quai's proof-of-work 2.0 from an energy efficiency perspective.

Alan Orwick: Yeah, that's a really good question and I think the Bitcoin community definitely has great merit when they say it is a feature, not a bug. Because if you look at first principle basis of what proof-of-work does, it allows anyone with access to internet and electricity to mine this currency and you get access to this currency. And when you talk about defending proof-of-work, I'll start there in saying that's something that I think is a fundamental right and a fundamental way of transacting in a permissionless protocol. And there are certain trade-offs between different consensus mechanisms that don't allow that.

When you look at proof-of-work 2.0 and our evolution of it, essentially merged mining allows you to create better economic alignment and also have better scalability and throughput when you create those merged mine chains. So instead of taking just chain A and mining it to, say, Bitcoin, I'm only mining Bitcoin and I'm mining that monolithic chain as it's called, and I'm providing security to that one chain. With Quai, many different chains being mined together allows you to then share that security and then imbue that throughput from the many different chains at once.

And so you're actually providing greater throughput, so more transaction capability, on the network for the same amount of electricity and the same cost hardware, both CapEx and OpEx, into that system. So energy efficiency is sort of amortized across that horizontal scalability and across that horizontal network of chains. So we consider it more efficient from that point. I think proof-of-work energy gets a bad rap in general, and you had Pomp on this podcast and I think you guys talked about it then, even referencing just the way proof-of-work evolves over time to find the cheapest energy source and then also just create that redundancy in the grid. We see that here in Texas, we see that in Wyoming, we see that in just places that have that excess energy, that have that stranded resource. And so taking proof-of-work 2.0 out of, it had its own merit, but looking at proof-of-work on its own, there's a lot to be said about what this technology is doing for our grid and for our economies of scale from an energy perspective.

Eric Swartz:

Absolutely. And as we've discussed many times, Alan, I think an important feature of a proof-of-work blockchain is that voting, and the parties who vote, are not determined by token ownership. And I think as folks learn how to develop these ecosystems and how to create systems that might actually one day not look like securities, they'll realize very quickly that proof-of-work is a very important part of why Bitcoin and other proof-of-work chains could potentially look more like commodities than they do look like securities. Because at the end of the day, when you associate voting with an asset, it looks a lot more like a security than a situation where providers of hash rate essentially are determining the voting and governance related decisions of an ecosystem while token holders are receiving a completely different economic benefit via utility in the network.

Alan Orwick:

Yeah, absolutely. I was going to say security or commodity aside, you have both of these regulatory entities fighting for control of both, and I think that will get figured out in the courts and it'll be an interesting journey for all of cryptocurrency to go on for the next five years. But the alignment of incentive in the system is the most important fundamental feature of a blockchain. Because a blockchain is trying to create a system that has fair rules and predictability. And so Bitcoin was the first iteration of this where they just said, "All right, we're going to do a halvening and miners will get coins, and that's just the projected output and we're all going to agree to it and it's predictable." So whether it's optimal or not, the fact that it is predictable gives people that reliance on the system. If you look at the Fed, the Fed isn't predictable. And so in five years, I can't tell you what the rate will be.

In a similar way in which SVB got put down or went down under is because they didn't know what the rate was going to be. The Fed predicted one thing. They said, "Terminal rate's going to be at max 2.5% come, say, 2024," but the guidance was completely off. And then you had all these banks holding these HTM bonds that suddenly the Fed turned around and said, "All right, rate's going to be now 4.5%." And so if you look at a cryptocurrency like Bitcoin, we can't just say, "All right, inflation's going to be 8% in 10 years," because we know it's on a schedule and it has that predictability and it has that alignment. And the disparate incentives of the token holders to the people securing the network essentially ensures that that will remain the case.

And if you look at something, say more in a proof-of-stake system, well now the people securing the network are the token holders and so they have more rights and they have more ownership control in the system. So they're going to be able to say, "Well, maybe this emission schedule doesn't make the most sense for token holders or the way we are accruing fees or the way we're accruing value doesn't make sense for the token holders." So now they have the actual power and the mantra and the motive to make that protocol change versus a completely disaligned group or a separate group.

So I think there's a lot of power in separating those two economic incentives, creating that boundary between the people that secure it and the people that use it or hold it. And there's a lot to be said there. I think generally there's a lot of battle, we've been through bit of a proof-of-stake mainstream push, and that's been a really big thing in terms of every single protocol having to

default to being proof-of-stake. But I think soon we'll see a proof-of-work renaissance and I think it's going to be beautiful.

Eric Swartz:

I agree, and I think you guys will be a big part of that renaissance to come. So I'm really excited to hear and to get the word out because I know what you guys are working on is incredible and obviously working closely with the project and also just being generally intrigued by everything you guys produce from an article's perspective. I think people really need to know what you guys are working on. Relatedly, can you talk the audience through how Quai's dynamic sharding tech will enable Quai to provide nearly infinite scalability?

Alan Orwick:

Sure. So when you think about sharding, there's a lot of different terms. I briefly touched on sharding earlier from a super high level. Again, one blockchain into many blockchains. Many blockchains have the ability to process more transactions because you're not fighting for that same block space. You look at Ethereum, since Ethereum is one blockchain, if suddenly everyone in the world wants to use Ethereum, fees are going to skyrocket because the chain itself cannot process that many transactions. From a network perspective, there are too many computers, so too many computers being decentralized, and there are only so many ways in which a transaction can be processed and there's only so much bandwidth and so minimal amount of latency to process said transactions. And those are the kind of bounds of the world we live in with blockchain.

So historically that trade off has been referred to as the trilemma where you have to pick between decentralization; so how many computers are there securing the network that can efficiently process and download everything to stay most up-to-date. Security; which is how secure is the network, how resilient is it to censorship, how secure is it to nation state attacks? How accessible is it if I need to send a transaction? And then throughputs; so how many of those transactions can we process keeping those other two features in mind? And when we analyze that, if in an emergent property, that blockchains don't actually fit under that trilemma, they fit more under what we call a tetralemma. And we have an article about this, I won't dive super deep into it now, but at its essence, the tetralemma actually mirrors something closer to the CAP theorem, which is a more fundamental approach to distributed databases in the classical computer science sense.

And what we found out of that emergent tetralemma is that blockchains can actually delay consensus for consistency and consensus is that point in which all of the computers on that decentralized network agree on what they should be considering true or canonical. And the consistency piece is, "What does that data look like from my node perspective?" So every single time in Bitcoin, both consistency and consensus are matched together because every Bitcoin block is the canonical block and every single node that has that block views it as what's true in their computer. Same with Ethereum. In Quai, when we shard those blockchains, each of those blockchains come to consensus individually. And so we are delaying global consensus for local consistency, meaning each blockchain has its own view of the world and will eventually get tied into the other blockchains from a top-down perspective. And that's very powerful.

And when you consider how you can create more of those blockchains horizontally, well that just means more chains are going to be slowly woven into each other over time. And that, from a security standpoint, is essentially just allowing you to say, "Okay, if I send a transaction, I might wait a little longer if I'm buying a house with Quai," or, "I'm buying a car with Quai," or, "I'm accepting Quai for a house that I sell," right? That's the more traditional attack vector and say, I can then analyze whenever I accept that Quai how long and how many blocks they need to wait for based off of the global consensus that is eventually achieved. And then from the throughput standpoint, all you need to do is add more chains to create more scalability. It's not that simple because there's always a trade-off. If you talk to somebody and they're like, "There's no trade-off, there's no things, we just achieved it all," then they're wrong.

So to elaborate more on the exact thing that we're giving up for that scalability and that throughput is it's that it takes longer for those chains to come to global consensus when there's more chains to be woven in. Because each of them has to get data from the other ones, it has to process other transactions from those chains, and then it has to actually slot into a various time from a top-down perspective.

And so we think we've cracked a nut on this blockchain thing from a high level, and we think that this is really going to enable a lot of fixes and improve a lot of the UX in the blockchain space. So the biggest area we see that's ripe for innovation is the bridge space. Bridges are very risky. We've seen \$2.2 billion stolen out of bridges in 2022 alone. That number is continuing to grow. And if we don't fix the bridge ecosystem, then I don't know how we're going to get to a billion users by 2030. So getting that number essentially as low as possible in terms of funds stolen and to be as secure as possible is one of our main goals. And with that same solution, we've targeted that.

Eric Swartz:

That's so what we need. We can't stress enough the reality of the amount of economics that have been lost in these bridge attacks. And I think because we've seen so many that folks have almost become numb to it, but we're not going to replace traditional finance if we're losing \$500 million in a bridge attack on a regular basis. It's just large financial institutions can't absorb those kinds of costs. And frankly, users generally shouldn't have to. And I think it's really important for folks to understand that there are ways to bridge assets and to bring safely assets to other ecosystems, but they are not all equal. And I think it's really important to understand that what Quai is bringing to the table truly is unparalleled in security terms. And although you may not get to global consensus as quickly, I think it's really important to understand the trade-off of having secure bridges. You just can't build a successful interchain ecosystem without it. And I don't know how anyone will ever want to work within our financial system that we're building unless we achieve it.

Alan Orwick:

Yeah. And to compare it to other projects, because I know people probably have more familiarity with things like Polkadot, Cosmos, Avalanche, Ethereum L2s. I mean, that's all the rage right now. Everyone wants to be L2 season so bad and recent Arbitrum airdrops and other launches of newer L2s and put a lot of scrutiny on those. To compare it to that, those are all very heterogeneous scaling attempts. So Ethereum, as a base chain and base layer, just created the one blockchain that everyone says, "Okay, I'm going to

put my L2 on top of it and I'm going to create an Optimism. I'm going to create a zkSync, I'm going to create all these other things that tie into Ethereum." But Ethereum has no guarantees on those L2s. And so you have a decentralized Ethereum with 250,000 nodes, but then you have an Arbitrum with a single sequencer, and the sequencer doesn't even have fraud proofs at that.

And so now it's a matter of, "All right, we're going to go to this L2, we're going to sacrifice all of that decentralization we get from the base layer Ethereum, and then we're just going to throw our hands in the air because it's cheaper fees." And then, whenever Arbitrum gets more transactions, it goes down and the sequencer goes down or the RPCs don't work, and then those fees skyrocket as well. So we're back to the same solution that was on the base chain Ethereum, but then we've also sacrificed our decentralization and you can see that with other heterogeneous scaling attempts too. And so the list goes on and on and on at what these blockchains are trying to attempt and everyone eventually is getting into... If they're taking the modular approach, so they're taking that multi-chain thesis, then they all end up in that same place, is "We're going to have these different blockchains that are all tied together, they reference one thing, and we'll do it with proof-of-stake and we're going to have weak subjectivity and we'll call it a day." As opposed to with us in that multi-chain thesis, we have a very objective system. I like thinking where if you threw a bunch of puzzle pieces on a table, you could always reconstruct it because it's proof-of-work and it would all link across properly. But with proof-of-stake, you can't do that because there's no objective references in proof-of-stake.

And then to contrast both of those camps with the monolithic thesis, you have platforms like Aptos, Sweet and Solana that are all just going to say, "We're going to pack as much compute into one blockchain and we'll call it a day there because we're sufficiently happy with that. And if we don't scale to 50,000 TPSs, we only get to 2000, that's okay." And so there's a lot of trade-offs to consider. Quai definitely falls into the multi-chain, multi-threaded approach, but we want to do it as homogeneously as possible, so all shards look the same and they're also all completely interoperable.

Eric Swartz:

Amazing. And I think understanding that and appreciating that is so important because, at the end of the day, we need an ecosystem where all these pieces can fit together in a way that can be mapped back without votes of honestly, essentially a trusted third party. That's really what proof-of-stake is, at least delegated proof-of-stake. We haven't really achieved any of the goals of blockchain if we do it that way. So if we can't achieve speed and scale with a true mathematical and scientific approach like what Quai has done and will effectuate, I really don't think that we've actually changed finance at all. And really what we've done is just wrap it in a different technological format. So what I find most exciting is what you guys have done, and I want to speak to our Bitcoin maximalist friends right now when I ask you this question; how hard is it on Testnet to run a Quai node? What kind of technological parameters do folks need? Can they do so with a regular computer?

Alan Orwick:

Yeah, a regular computer is definitely possible. So we do a lot of stress testing right now with our dev nets, and I'm running them just on my MacBook. I have an M1, so it's more of the latest ones. I think this is a two-

year-old computer, but generally we try to target 16 gigabytes of RAM, 250 gigabytes of storage required for everything. And given this is a new network, so eventually the specs will change over time just as you need more storage, but right now it's pretty lightweight. Anticipation for Testnet will be a pretty lightweight computer. Ultimately from a decentralization standpoint, we see a future where Quai is running on mobile phones, it's running in satellites, it's running everywhere you can run it. My favorite analogy is Quai is really the only blockchain that can scale to be multi-planetary given the shards. We have three levels right now, but I always think it'd be cool if there's like a fourth interstellar highway of all blockchains connecting them.

And I think that's always a good goal, right? Because if we want to target the real crypto use cases, in our planetary blockchain system aside, we need to have a lightweight system that can be used in remote and rural places like Africa, Venezuela, Turkey, places that have feeble infrastructure and places that can't rely on the payments today. And there hasn't really been a crypto that can meet that use case. BC Bitcoin, Bitcoin right now, they'll just say Lightning is going to solve everything, but if we have everyone in the world try to queue up for a Lightning channel, it's going to take 400 years. And that isn't something that can be done very easily as well. So we don't have that UX from a Bitcoin perspective. And other things like Ethereum or Solana, they're just too expensive or they don't have the right approach to encompass that usage.

So targeting money, and being cryptocurrency that can be used as money, because that's the real use case right now. Traditional finance has 700 million users, people that hold stocks, bonds interact with that sort of trading, but there's 8 billion people last I checked that used money from that global standpoint. And I think otherwise crypto has had its scrutiny. We're getting challenged every day in terms of the use case and what there is to actually accomplish. But with Quai, we want to take it as we've seen what cryptocurrency is supposed to do and where it thrives and we're targeting that and building to that future.

Eric Swartz:

I couldn't be more excited about Quai and the future that we see for you guys that you guys will bring when Mainnet launches. As one of the very few projects that have elected to have a U.S. law compliant legal framework, what excites you most about being able to compliantly host U.S. users in the ecosystem on day one? What change in law do you think would help the U.S. keep crypto innovation and innovators like yourself here?

Alan Orwick:

Great question. We should rename this podcast to the Crypto Defenders podcast, because that's a perfect job up for where we're at with today's regulation. I talked about it earlier. We have both of these committees trying to reign in crypto and attack it every day. I think Senator Warren even put out her latest campaign slogan, she's creating a crypto army. So we're getting more and more challengers here in the U.S. and I think being compliant is very hard. Spend a lot of time on our approach, what we need to do as a crypto project, but ultimately, I hate to say I see where the regulators are coming from. But as a crypto native, I don't think we've put ourselves in the best light. We don't have our best soldiers on the front line. When our people that represent us are the 3AC, Do Kwon, SBFs of the world, of course we're going to get a bunch of regulators breathing down our necks and of course

we're going to get people that are trying to sanction crypto and kick it out of the U.S.

So being compliant isn't more so of doing it from a place of malintent or trying to be anti-crypto. It's just trying to be the most welcoming and encompassing project we can be, right? We want to be able to create free speech, we want to be able to create free software, and we want to really promote the values that represent constitution of ownership and allowing people to cooperate in this capitalist society. Unfortunately, the government feels extremely threatened by crypto because they'll go from saying it has no value or just don't use it because it's insecure, "Come use our FedNow system and come use our safe CBDC." But those are battles are going to be fought out for the next decade. And for us to be a part of that, we have to be working within the realm and the systems that are in place. Because it's always like you're the new kid on the block and you're going to be the one changing all the prior rules.

And of course the OGs are going to be looking at you like, "What is this? You're wrong. We want to get this out of here as quick as possible." So from that part of a project, of course globally there is more structure. So Switzerland, Singapore, China's even evolving a lot of the regulation, Japan is becoming more crypto-friendly and other places that just don't have regulations, you can operate in ambiguity like The Bahamas and other places like that. So from an outsider perspective to those crypto-friendly places, it's tough because U.S. has always had a hard time with that. And you see that in crypto Twitter just in regards to just general animosity to regulation today. But also we need people that can step up and be those champions of crypto rather than just getting bullied and rolled over. I think Coinbase is doing a really good job of that right now.

They're sort of taking the SEC head on with their Wells notice, and I know Brian Armstrong has a stacked team of litigators on his side to go and take them on as well as Kraken and other exchanges that have been under scrutiny as of late. Binance being ones in the headline. So I think overall it's important that we stack our cards right so that we can be ready for anything. And then in terms of change, I think getting more of those people that can be active in policy. So how many people, obviously crypto's a very young space. I don't see a lot of people my age running for office or going and doing a whole lot of sorts from that side.

But I think putting ourselves in a way that we can make change is important. Locally, we have something in Austin called ATX DAO, and they even proposed legislation with a16z in regards to DAO frameworks. So seeing how we can collaborate in those sort of areas with innovators from a youthful and just progressive crypto framework where that we can all collaborate and improve the system I think will be important. And then also just trying to forecast and predict what changes we see from a U.S. economic standpoint.

Eric Swartz:

A hundred percent. And, I mean, I think it's so important and a big part of my practice and then just generally of Lowenstein Crypto is being thoughtful about policy initiatives and being really, really helpful in connection with that process. Because what we want to do is be as facilitative of this industry that

we're excited about, that we clamor for, that we really love. And the only way to do that is to get out there on the front lines and tell, for instance, senators that are more open-minded. We're not going to change Senator Warren's mind. There are senators out there, and I hope that they listen to podcasts like this, and I hope that they think really carefully about the need for innovation in this country and what it has brought to this country in sheer terms of economic dominance. Since its establishment, frankly.

We need to be really thoughtful about the fact that we need technologists and we need them for everything that is America, that is the United States, that we're all proud to live here because of. I think at the end of the day, we just want to bring that message forward. And I know that Quai Network wants to bring that message forward, and it's a very bipartisan effort. Frankly, I know Alan and I and Ethan, we just want this industry to succeed. We don't necessarily care too much about who is wearing the right shirt at the time and which party they may be associated with. We just want everyone to be supportive of technology again and to remember that we're the innovators. We need to be.

Alan Orwick:

Well, it's just so tough because we start this whole first half of the podcast, we're talking about all these advanced tech features and impacts of sharding, merge mining, transaction throughput, and then we go to like, "Okay, how are we going to get this to regulators and how are we going to have them understand this?" It's such a wide gap that it's just impossible. And it even reminds me of the congressional hearing with TikTok. It's like, "All right, you're completely out of your realm in regards to scrutiny on these projects." And it's hard because all this stuff is so new from a tech perspective. So you have all these new advanced features like AI, data privacy, blockchain technology, all of these emergent things and our regulators need to be at the front of the curve on that rather than lagging.

And if we don't create the rails and guidelines for all of this technology to drive and shape our future and then also get America to lead in that charge, as you teed up earlier, it might go offshore. And I think we're already starting to lose developers. And obviously I'm very passionate about America. I'm very passionate about the United States. I think we live one of the freest societies and we have the ability to create this kind of stuff and publish it freely. And I want to make sure we retain that right, but if we don't get the right education out there, and if we don't get the right people in the right places, we're going to have a very tough time for crypto.

Eric Swartz:

Agreed. And I'm glad to call you a friend and to say that at the end of the day, this is the type of voice, Alan's voice. These are the types of technologists that really matter and that we need to keep here in the United States. And I remember not too long ago talking to the Quai team and at the very, very earliest conversations, and that was something that you guys were considering at the time and for good reason. And I would've hated to see that. And I'm just glad that we have projects that are building here in the States, for users here in the States.

And I just want to keep that message going because for Congress people, remember that although there may be some in-fighting amongst very, very

powerful communities within Congress, at the end of the day, we all care about the success of this nation as a whole. And I think if we don't keep founders here, if we don't keep projects like Quai here, we just have no chance. And I just want to say thank you so much, Alan, for all you're doing for this industry, for this community. Thank you again, Alan, for joining us.

Alan Orwick: Yeah, glad to be here and I've had a great conversation. Always feel free to reach me on Twitter @alanorwick. Always reachable via DM or in our Discord for Quai network. You can find more about Quai at qu.ai. I look forward to being in touch.

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