EPISODE 1242

[00:00:00] JM: A decentralized exchange is a platform for exchanging cryptocurrencies. Depending on trading volume for different coins, some DEXes are more liquid than others. On one hand, you can freely swap unlisted tokens and maintain fully controlled experiences over your private keys and wallet information. On the other hand, without the right supply and demand, it's difficult to swap one particular coin at the right price. 1inch Exchange is a decentralized exchange aggregator that can split a single trade transaction across multiple DEXes. Their pathfinder API ensures users get the best price by using a discovery and routing algorithm to find the best possible paths for token swaps and then splits the swap across multiple exchanges and market depths of the same exchange.

1inch uses multiple liquidity sources including private liquidity providers to ensure there is sufficient liquidity for all swaps on the platform. If the rate of a trade becomes more expensive than the user has confirmed from the UI, the algorithm can cancel part of the route and simply return the unswapped tokens to the user's wallet.

In today's episode we talk with Anton Bukov, co-founder of 1inch. Anton was previously a senior smart contract engineer at NEAR Protocol and a chief blockchain engineer consensus researcher at MultiToken. We talk about decentralized exchanges, aggregators and currency swaps and the growth of decentralized finance.

[INTERVIEW]

[00:01:19] JM: Anton, welcome to the show.

[00:01:20] AB: Hi, Jeffrey.

[00:01:22] JM: You work on 1inch Exchange, and I'd like to get into 1inch Exchange momentarily, but let's start with the subject of DEXes, decentralized exchanges. Explain what a DEX is and why there are different DEXes in the world.

[00:01:39] AB: Yeah. It's really a great question. Sometimes I do present some slides about this. Yeah, I will be glad to tell you about different DEXes and maybe a little bit history about like which DEXes appeared in which order. The very first DEXes appeared maybe in 2016 or maybe even earlier. I can't remember, because I joined Ethereum development in 2017. They were all order book based. The same way as centralized exchanges works. There are like two kinds of actors there, makers and takers. Makers, they create orders for being filled – Fill it with exact prices. And takers, they do fill these orders. They execute their swaps immediately, but they have some potential slippage because they fill a bunch of orders with different prices. Those who create orders, makers, they always execute with exact price, which was like in order.

And one of the significant improvements in terms of gas costs was allowing people to create orders off-chain. You can approve some tokens to decentralized exchange smart contract and you can give your digital signature, which will sign some order, and anyone can use this order to go to this decentralized exchange and perform swap with you. Decentralized exchange will check that you signed this exact order and this means that you allowed this trade to happen. This allowed people to create orders off-chain without execution of transactions. It's like cheap way and really convenient. Creating signature happens instantly and you don't need to wait for transaction to pay for transaction.

But really interesting is what happened to DEXes in 2017 and 2019. As far as I remember, the first one who started this topic was Alan Lu from Gnosis. He wrote about this concept in March of 2017. I know that Gnosis worked on their own DEX at this moment, but for some reason they never released it. I don't know why. And interesting thing that Alan described formula for Uniswap and for Balancer. And Uniswap was implemented only in 2019, and Balancer was launched in early 2020. It took almost three years when implementation achieved like described formula.

And why this is so different from order book based DEXes, that on order book based DEXes, like the main problem is market making. If you will try to trade on any DEX, order book based DEX like three or four years ago, you would notice there is like a super huge spread between buyers and sellers. It could be like five three percentages. Imagine you can buy something and sell immediately with three percentages loss. That's not really good. Yeah, working with order books required to have really market makers. But AMMs, this is automated market makers, this

is a piece of software which works on blockchain, and some people can put their assets into this AMM and this am will trade these assets for them earning some fees. And the first member was Banker, like initially implemented this concept. First who described it was Alan Lu, then Vitalik Buterin wrote blog post proposing to implement this kind of AMM. Then Benter was launched, and later Uniswap was launched and many, many others like either AMM, like Balancer, like and Finance and many others.

And the most interesting thing about these AMMs and why they are so popular, that they provide supply and demand for any possible amount. You can come to AMM and try to trade and this AMM can sell you any amount of any token, can buy any amount of any token you have if it's listed for sure on this pool. And the price is pretty cool, but the more you swap, the worse is the rate. AMMs, usually, they are trying to trade with you, but they also trying to keep their balances, to not give away all the balance. If some AMM have, for example, USDC and other on its balance and you're trying to buy all other good AMM, like usually AMMs, are trying not to allow you to do this because if AMM will sell you all other, it will not be able to trade in this direction anymore. That's why Uniswap concept was pretty cool. The formula of Uniswap do not allows you to buy all the amount, and it's pretty simple. It's like a pool is trying to perform exchanges with anyone who came and he is trying to maintain multiplication of its balances equal to constant. If you bring some USDC, pool pull will easily compute how much other it should give you to keep multiplication of its balances the same as it was before swap.

[00:07:56] JM: So let's go through like a simple example of using a decentralized exchange, and maybe we could compare it to a centralized exchange. Let's say I have ten thousand dollars in Ether and I want to convert that to Dai, a stablecoin. What goes on when I execute that trade?

[00:08:21] AB: What would happen on centralized exchange, you have to look on order book and see how much liquidity is concentrated close to the center, and you can estimate how much token, how much Dai you would have if you sell your Ether, and you will see that you will sell some small amount with a super cool price. Then you will feel next orders, which have not so good price. And then you will have to fill next and next orders. And the more orders you fill, the more volume you have, the worse is the exchange rate for sure. It depends on how much

affiliate this order books, how much volume are you trying to swap, because it could be like a super small exchange, and 10k USD is super huge amount. You can lose a lot of money.

You can also try to put limit order close to swap rate and it will be eventually filled, but it's not like guaranteed. You can have like a partially filled order and wait, wait and wait until someone will fill it. But, yeah, the same could be achieved on DEXes. You can put limit order and wait until someone will fill it. This could be arbitrage traders or any traders who trade in different direction, and you can execute also a market order. You can just swap your liquidity, your Ether. And the thing is that there are many, many DEXes. Right now, 1inch, DEX aggregator, have more than 49 sources, 49 DEXes aggregated into it. This means that if you swap on any regular DEX, the more you swap, the worse is the rate. When you're swapping one Ether, it's one price. But if you are swapping 50 Ether, it's 10k. It's more than 10k, yeah. Yeah, it's 100k. Okay. If you're swapping huge amount, price will be much worse. But the thing why DEX aggregators appeared, they combined all these small DEXes – not small, into huge high-liquid DEX.

For example, you could achieve like a price better than on any DEX. For example, if you have like 10k volume and every DEX price is dropping on this volume, if this volume will be distributed among five DEXes, you will get better rate. But just distribution of volume is what 1inch started with on Hackathon in 2019. It was initially just, “Let's distribute user volume among different DEXes and improve price,” because the more you swap, the worse is the rate. But like more than half year ago, we came up a new vision. We built much more complex roles. For example, if you are selling Ether to Dai, we can sell part of your Ether to USDC, part of to USTC, and the rest to Dai, and this USDC and USDT could be swapped to Dai using any stable token optimizer pools like Curve or any other. Right now DEX aggregators on the market, they are looking for really crazy roads to provide you the best possible price.

[00:11:57] JM: Essentially, a DEX aggregator is going to sweep through the different decentralized exchanges and aggregate your order at the best total price. Is that correct?

[00:12:12] AB: Yeah. And also is interesting that this happens taking gas costs into account. This means if you are swapping low amount, like tens of bucks or hundreds of bucks right now on Ethereum, gas costs pretty high and it makes no sense to use any splitting, and 1inch algorithm will find the simplest path for you like swapping on Uniswap. But if you are swapping

some significant amount like tens, hundreds or K of bucks or even millions of bucks, it will find more sophisticated way for you and transaction will cost more definitely more than on Uniswap. But it makes sense to spend additional 100 bucks on gas if you would get few hundred bucks or even few thousand bucks more in the result.

For users, it's not usually obvious why aggregators could cost much more than Uniswap. But the thing is that aggregators are trying to improve price for you in that manner that you will benefit by paying more gas. Spend 100 bucks more on gas and get 500 bucks more on result.

[00:13:28] JM: What are the points of integration between you and these different exchanges? Like how are you sweeping through them? How are you getting the pricing information? Give me a little bit about the API infrastructure between different decentralized exchanges.

[00:13:45] AB: Yeah, sure. This is one of the most interesting things which we recently also mentioned, that aggregators on centralized markets. Aggregators of information like Google is information aggregator. They are aggregating whole Internet, but they can't aggregate for example Twitter, or Facebook, or some other social networks because these social networks do not allow aggregator to aggregate them.

But what happens on decentralized markets DeFi DEXes, that all these DEXes, they have two parts. One part is frontend part, which every user see. It's webpages, mobile applications. And the other part is Spark contracts. It's protocol part. And the thing is that developers who develop this decentralized Spark, smart contract Spark, they ship this part and this part works unpermissionless on blockchain, and access to it is not restricted and potentially couldn't be restricted. This means that anyone can build user interface to existing protocols.

For example, any protocol, like Uniswap, Balancer, you can build separate website for swapping on these DEXes. This would work. What we actually build is a sophisticated user interface which could interact with all the DEXes on Ethereum. And since access to this DEXes is permissionless, we have own smart contract which helps us to distribute your volume to make this super complex trades in one transaction. This means that we interact with our smart contract and our smart contract interact with all these DEXes. And all these DEXes in that manner that they can't be stretched, and that's why aggregators on decentralized market, they

will definitely win and they can't be restricted the same way as, for example, Facebook restrict Google indexing.

[00:16:02] JM: And when you sweep through these markets, what kind of guarantees do you have that you are actually aggregating the best price? Is there some sort of inefficient or curve of efficiency that you're working on where it's like how much time you spend executing the trade versus how low you can get the cost to like some frontier of efficiency?

[00:16:28] AB: Yeah. Right now, 1inch user interface is interacting with 1inch API, and user interface is not like just boilerplate, its application, and it can interact, do actions. And right now it can estimate the result amount. How much gas will be spent on this trade? And potentially it can also utilize multiple APIs. Not exactly a 1inch API, any other aggregator API. And this would allow application to be more decentralized and it will query multiple APIs. Compare results. Do not compare what was promised by API, but compare what will be the result of execution of the transaction. That's possible to estimate.

And then smart contract of 1inch, it will guarantee that you will get at least some amount of resulting token or transaction will be reverted. User can configure how much the price could be affected. For example, you can set up is as, for example, 0.3 percentages potential price slippage. And if price will became worse for more than 0.3 percentages, then you saw on user interface transaction will be reverted. Smart control guarantees are the following that you will be charged for exact amount of tokens and you will receive at least some amount of other token, or else your transaction will be reverted and you will pay gas for the transaction. But what I can say about reverted transactions, since we shipped version two of 1inch, it was in December of previous year. We dramatically reduced number of failed transactions. It's like so small amount that I can't even remember how much because we have like three to five K transactions a day and we have less than 10 failure transactions every day.

[00:18:41] JM: Can you define the term liquidity farming?

[00:18:48] AB: Yeah, sure. The interesting thing is that liquidity farming, incentives, rewards, how it was called previously, first time it appeared in the mid of 2019. Project Synthetics, they had their SETH token, which is stable to Ether, and they were not happy because it was a little

bit unstable and they decided to organize Ethereum – or Uniswap pool SETH, ETH. And potentially this was targeted to help to repair SETH to ETH and also create market to allow people easily get this synth SETH and they tried to incentivize people to put their liquidity into this pool and they came up to idea to send some rewards to liquidity providers of Uniswap pool. Some people put it Ether and SETH into this pool and they have to wait, and synthetics send them rewards once a week for – It was like not really comfortable because people had to not move their liquidity for a whole week, else they will not get the reward.

And it was in September as far as I remember. And in December of 29, I proposed the team to improve this scheme since liquidity providers have LP token in their hands. LP token of Uniswap pool means your share in this pool, if you have some amount of tokens, and this pool have some total supply of this tokens, this means that you have share in this pool. And I proposed them to create Taken smart contract where liquidity providers can just take their pool token to earn rewards proportionally and like in a fair manner and use like pull model instead of push model. Do not send rewards wasting gas. Allow people to earn rewards and fetch them when they decide to do this.

And I wrote this smart contract for Synthetics. I got some bounty on Bitcoin for it. They also paid for audience. And in January or February, I do not remember, of 2020, they switched to this model and this was like a huge start of farming because in 2020 a lot of different projects started to utilize this contract to incentivize liquidity. From my point of view, the APRs which appeared in this farming in 2020, this was one of the huge stimulus which pushed market forward.

[00:21:54] JM: And can you tell me more about how the market has evolved since the introduction of DEX aggregators like 1inch? Just tell me about what your experience has been. What you've witnessed and how the market has evolved.

[00:22:10] AB: Oh, yeah. When we started 1inch, I remember that I had my own pain. When I had to sell some tokens, even if I had like few hundreds of bucks of some token, I tried to sell it on DEXes. I checked it price on 3 DEXes, on Banker, on Uniswap, on Kyber. And checking this price and swapping on the right DEX could give you like few tens of bucks more. Even if you're swapping like 200 bucks, you can get 10 bucks more if you select the proper DEX. And on the

Hackathon in 2019, we built first version of 1inch index aggregator, which just showed prices on different DEXes and allowed you to interact with them.

Later on the same Hackathon, we also found a way to aggregate and split your volume inside single transaction. And what we saw in 2019, there were like maybe five to six different DEXes in the wild on Ethereum and maybe two DEXes were like layer two DEXes. They were separate DEXes. Their liquidity was not accessible from layer one and was not possible to aggregate. And what we saw that in 2020 people started actively to use aggregators. And we saw that all these separate layer 2 solutions, they're almost dead, or right now they're all dead because they all have chicken-egg problem. They do not have high-liquidity, do not have many users because of this. And since they don't have many users, they do not have high-liquidity. Bad prices, small amount of users is like a chicken-egg problem.

On opposite side, on layer one, all DEXes had almost the same problem, but what aggregation did to them that we combined all layer one liquidity into single huge high-liquid DEX. And what we saw happened in 2020 and in early 2021 that a lot of new DEXes AMMs appeared and most of them were aggregated. Right now we have 49 aggregations, 49 different DEXes aggregated on 1inch on Ethereum and 12 DEXes aggregated on Binance Smart Chain. So I believe that aggregation allowed most of the new DEXes to survive, because if you build some DEX, you build protocols, smart contracts, and you build some user interface. And if you will not have enough users on your user interface, your DEX may fail. No one will put liquidity if you do not have enough volumes. You are not earning. And this may kill projects.

But since aggregators started to dominate in 2020, all the projects became popular. They got their fair part of volume. Fair in terms of proportional to the prices and liquidity they could offer. This is really amazing that almost no one of DEXes appeared in 2020 is dead right now. I'm talking on those who were able to aggregate level one DEXes. I believe it's a pretty good idea to have aggregators to have all this composibility and permissionless access. So if some projects ship some protocols and they do not succeed in terms of user acquisition in terms of user interfaces, UX, they still can be functioning. They still can live because other projects could utilize them. Other wallets, other defy one-stop shops like Xero. Other aggregators like 1inch. They can utilize them. Provide like stable volume, stable users. And this is one of the most interesting parts of DeFi that projects helps each other to survive.

[00:26:28] JM: So you mentioned this chicken and egg problem that some of the DEX aggregators would have. Can you remind me or explain again how did you avoid the chicken and egg problem? How did you solve getting both sides of the market for your DEX aggregator?

[00:26:46] AB: Yeah, sure. The chicken egg problem I was talking about was about if you don't have users, you don't have liquidity and prices. And if you don't have liquidity and prices, you can't get more users. The thing is that aggregators do not have such a problem. There are 49 DEXes to aggregate on Ethereum, and we already did this. We have super cool prices, because having 49 DEXes aggregated into one single like high-liquid DEX allows you to have super cool prices. W we can just bring more users to our user interface and they will get super cool prices. We don't have a chicken-egg problem actually.

[00:27:32] JM: All right. Okay. Yeah. Because you don't have to have buyers and sellers on your platform. You just have a single buyer or a single seller that might come and then you just give them a quote based on the aggregation of the different exchanges that you're surfing over.

[00:27:48] AB: Yeah. Yeah. That's correct.

[00:27:50] JM: What are the technical problems that you have to tackle in building 1inch?

[00:27:59] AB: One of the most significant problems were to build reliable DEX and to find all these amazing roles. Initially when we started, our task was pretty simple. We just splitted user volume among multiple DEXes. If user brings some Ether, we split it. Just some percentages to one DEX and some percentage to another DEX and price will became better. But for now task is more complex because we are trying to utilize all the possible liquidity on the market to improve price, because some people are swapping even millions of bucks, hundreds, thousands of bucks, and were trying to find the best possible rate. And this task now works as we have a graph where nodes are different tokens and the edges are different DEXes and we're looking for the best possible path, multi-path from one node, from one token to another token over all these possible DEXes, all these possible edges. And this, in math, it's called as an NP problem. There is no like super-efficient solution for the best result. But we are like achieving to get better and

better result with every iteration. We are finding some heuristics to improve result, and this is something which could be improved for many, many months I believe.

And right now on the market I believe no one other competitor can build such a cool roads as 1inch. You can see them easily if you will open 1inch exchange website and put huge amount of money, like millions of bucks. You will see pretty cool roads. Because if you small amount, like hundreds of bucks, thousands of bucks, right now it's small amount because of gas costs for sure. It makes less sense to swap on super complex roads because it would be super costly in terms of gas. And we're optimizing roads, taking gas costs into account. This means that super small amounts like hundreds tens of bucks, it will be just swapping on single pulse Uniswap swap pools, something like this.

But if you would check for example Binance Smart Chain, transaction costs super cheap right now. You can even trade with one grey if you would use 1inch exchange node. It's bc-node.1inch.exchange. Our node would allow you to send transaction with price as low as one gray, not 10 gray. And you can pay like super cheap amount for swaps, and we will build really cool roads even for a few hundreds of bucks. If you're swapping five hundred of bucks, two hundreds of bucks, we will build nice roads because transaction will cost you a few cents, like 10, 15 cents.

[00:31:24] JM: One thing I'm unclear about, is 1inch itself a DEX. You are a centralized exchange, correct, technically?

[00:31:34] AB: Not really. I would say that since we are not custodial and never touch user assets, 1inch actually from legal perspective, it's informational service. 1inch provides you information how you should execute swap on different DEXes to achieve the best possible price. And you sign transaction and send it to blockchain with your own wallet. This happens without 1inch. 1inch is not like a broker. It's not like a middleware. It's an informational service which gives you cool information how you should compose your transaction and how you should compose all these swaps on different DEXes to achieve the best possible rate. But you sign transaction on your own wallet no matter which wallet, Connect, MetaMask, Ledger, and you send it to blockchain with your own connection. You send your transaction to Ethereum

blockchain, BSC blockchain. 1inch is not like a custodian, is not a middle layer here. It's not like centralized.

[00:32:46] JM: Do you deploy your infrastructure to – Is it just on AWS?

[00:32:52] AB: No. We have our frontend. It's pretty simple. It's on IPFS and on some CDNs, and Cloudflare. And we have our API. We run it on bare metal machines. It's not AWS. It's much more performant. We have more than 300 machines with 64 cores each because we have pretty huge load. A lot of people are checking prices, and small part of them are executing trades right now because of gas costs. Right now an Ethereum transaction could cost you from like 30 to 100 bucks easily, and this stops a lot of people from trading. This prevent these trades to happen. But a lot of people are checking prices from mobile phones, from other computers.

[00:33:45] JM: Got it. And is there a token associated with 1inch?

[00:33:51] AB: Yeah. 1inch launched token in December of 2020. It was launched as well with a governance system and a 1inch liquidity protocol. And 1inch token right now have a governance function. And soon this year we hope to reveal its utility function fully. It was not yet announced how it would work in utility manner. But right now 1inch token could be used for governance, and those who vote in governments, those who participate in governance, they also get rewards. Liquidity pools and aggregation protocol, they earn some rewards from different sources. And all these rewards are forwarded to governments. Those who stake their 1inch tokens and vote for something, they earn some stable APY. All these rewards are being distributed each week gradually over one week. Once a week new rewards comes to 1inch down DAO and been distributed for the whole week gradually with almost the same smart contract which was used for farming with so many projects.

[00:35:12] JM: What would be a situation where a governance decision would be made using the 1inch token?

[00:35:20] AB: What would you mean governor's decision?

[00:35:23] JM: The 1inch token, if I understand correctly, it helps with governance of the protocol?

[00:35:29] AB: Yeah.

[00:35:30] JM: Explain how the token actually influences the protocol.

[00:35:35] AB: Oh, yeah. Okay. Yeah. We have number of options to be voted for in our 1inch liquidity protocol, 1inch aggregation protocol. And each liquidity pool is also governed by liquidity providers. Liquidity providers of the pool, they can vote for different parameters, and their votes will be applied in average-weighted way. If I have twice bigger liquidity than you for example, my vote in this pool will be twice more important for the result. And those who not voted in the pools, those liquidity providers who did not voted, they will effectively delegate, automatically delegate their votes to 1inch tokes takers. 1inch tokens takers, they can vote for non-voters or providers, and they can also vote on some other parameters like aggregation protocol, reverse distribution, proportions and some others.

What happened initially that this DAO, people who take 1inch token, they voted to get some part of the rewards as governance reward, and that's what's happening every week. They are getting this earnings and its earnings are distributed to 1inch takers once a week gradually over the whole week. Yeah. It was one of the parameters which they voted for. It was how 1inch protocol rewards should be distributed. How much share should referrals get? How much should governance get? And they voted to have almost 80 percentages and give 20 percentages to referrals. 1inch have some referral system. Every user have a referral link, and if give this link to anyone and this person will make a trade, eventually some part of the liquidity provider profits will be forwarded to referral. And how much amount will be forwarded to like what share will be forwarded. It depends on how DAO, 1inch DAO would work about this.

[00:37:57] JM: Do people use exchanges in – like exchange like 1inch. Do they use them in their smart contracts? Like do they program smart contracts against the exchanges to make programmatic buying and selling?

[00:38:13] AB: Yeah. Yeah. We have a number of integrations of projects who do their swaps using 1inch. It makes sense to use 1inch, because since we used version 3, our main smart contract is more gas efficient even than Uniswap router. If you will make the same trade on Uniswap and 1inch, on 1inch you will pay 10 percentage gas less. But it also depends on which token you are swapping, because different tokens have different costs of transfers. Percentages may vary because of this. Some tokens have super costed transfer methods. And relative share of optimization will decrease in this case for sure. Yeah, a lot of people integrate. And also one more thing why aggregators matter. It's sufficient. Because if you would use multiple DEXes, you will have multiple approves on multiple protocols. And if new DEX appears, like imagine some DEX was released yesterday. If you will try to use it and if it will, for example, ask you to make an approve of Dai token to its own smart contract and you will be inaccurate and make infinite approve, if this contract will be exploited, you may lose all your Dai on your balance.

But what happens with aggregator, we like have number one priority to integrate new DEXes. And each DEX, once it appears, is being integrated in 1inch in like a few hours or few days. And the thing is all our users, they are staying behind our own smart contract for aggregation protocol. And this means that even if some of these DEXes are not audited enough, even they have bugs, back doors, anything, our users are still safe because they do not interact with all these DEXes directly. They interact with 1inch contract, and 1inch contract interact with all these DEXes, and 1inch contract provides security guarantees to all 1inch users that even if some DEXes are really bad or hacked or something like this, they can't cheat on users.

[00:40:38] JM: How do you see your business changing in the next few years?

[00:40:44] AB: It was amazing to see what happens to 1inch, because since we started, we dramatically increased our volume since May of 2019. We multiple times saw situation when our volume for the last month was half of total volume, and it was amazing. First time I saw it in January of 2020. It was repeated for two months as far as I remember. Then volumes were a little bit lower. But in the mid of 2020 we again reached this exponential growth. This means that – I do not remember the exact month, but maybe July. July volume was half of total volume. And then in January of 2021 we again reached almost the half. It was 40 percentages of total volume made in one month alone. And I'm just wondering if this would happen again, because Ethereum blockchain growth is still limited by gas limit. Because blocks are limited, each block

have only 12 millions of gas. Each block happens once per 12 minutes. This means we have 1 million of gas per second. And this limits Ethereum growth of user base of number of transactions. I would be really wondering if I would see this exponential scale again. But what I see that we have to get more users and we have to get more integrations. Maybe some banks will decide to join DeFi and provide some services using aggregators. Maybe some centralized exchanges would decide to have this kind of aggregation. I would love to see what would happen.

[00:42:47] JM: Well, zooming out, can you tell me how do you see the space as a whole evolving over the next several years? What kinds of new DeFi contract types do you predict and how do you see DeFi changing and perhaps colliding with traditional finance?

[00:43:08] AB: Okay. Cool. Before talking of the future, I would shortly remind the past. What I saw in 2017, a lot of projects found a way to raise funds and make an ICO. And at the end of 2017 it was like most of the projects were raising funds without having any prototype and without having any user's real traction. But what I saw in 2020 that most of the projects they initially had some service and then they tried to write some funds, make some token, governance, and everything else. And what I see in 2021, the more and more projects arising funds when they have some kind of – And I think that more and more projects will appear and try to raise funds, launch token, even without having any MVP. That's a little bit sad because we are returning to 2017 and something similar could happen to the market again, and maybe it should happen because all these huge market movements. To up and to down, it helps market to be agile. This means that weak and projects without traction, they should die. Projects which get traction, they should became stronger on bearish market.

What I see and hope to see in 2021, it's about derivatives, because we have here DEXes. We have lending protocols, a.k.a., market makers, but we don't have enough derivatives. We have few of them, for example, Opium Network, but it's not enough. I believe they should ship more and more different products. And I also hope to see real decentralized storage protocols, incentivized storage protocols, because right now on the market we have just a few of them and they do not got enough traction. They do not have any traction really. No one is storing data on digitalized storage. And I would love this to be changed. And I hope this could happen in coming years.

[00:45:33] JM: Okay. Great. Well, Anton, thank you for such a lively conversation about decentralized exchanges.

[00:45:40] AB: Yeah, it was interesting. Thank you for hosting me.

[END]