EPISODE 311

[INTRODUCTION]

[0:00:00.5] JM: Online advertising is a system of transactions that involve many different players. The user visits a publisher's website, the publisher notifies an exchange that the user is on the website. The exchange presents an opportunity to a market place that can buy that opportunity to show the end user the ad. This is a simple example. It's probably even less simple than the most simple realistic example.

The transactions in online advertising are as opaque and rife with fraud as Wall Street, but it's even less regulated. Blockchain technology presents an opportunity to bring more transparency to the advertising ecosystem using a shared ledger. Ken Brook is the CEO of VidRoll, a video advertising company. Using his experience in the adtech business, Ken is working on adChain, a shared ledger for adtech. In this episode we explore adtech, blockchains, and adChain.

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[INTERVIEW]

[0:02:32.5] JM: Ken Brook is the CEO of VidRoll. Ken, welcome to Software Engineering Daily.

[0:02:36.6] KB: Yeah, thanks for having me.

[0:02:37.9] JM: Today we're going to talk about advertising, and the blockchain, and adChain, which is a advertising solution on the blockchain, and we'll get into all of those things. I think the place to start is the advertising ecosystem. We've done a bunch of shows about advertising fraud, which can mean a verity of things. What are the biggest problems in the advertising ecosystem?

[0:03:02.8] KB: I think the biggest problem at the highest level is I think we have a serious coordination issue in the industry. The ecosystem that makes up the online advertising industry consists of many different entities, and each entity provides product and services and they're all necessary and they all make up the supply chain.

The underlying problem is the inability to coronate and it's an interoperability in open access problem. As a result, there's opaqueness, lack of transparency in the supply chain, there's discrepancies. There're a lot of issues that come out of the complexities of our industry.

[0:03:43.2] JM: There are lots of industries that are complex. Like I think of finance, or perhaps the hospital industry where you have all these different players that all have their own interests. Some of these industries end up working out, they function well enough. Some of them just have persistent problems, and so I guess all of them have persistent problems that are hard to solve. Why are these problems so hard to solve, the ones that exist in the advertising ecosystem?

[0:04:11.5] KB: I think all industries have their own sets of problems, and you could argue there's fraud in finance, healthcare. There're a lot of issues. Anywhere we see a supply chain with demand and supply and this digital marketplace, you can see that the supply chain itself might be just an antiquated logistical model.

[0:04:32.4] JM: When you talk about the supply chain and you talk about the auditing process, when an ad gets displayed to somebody, what goes on in the back-end is a complex web of exchanges, there's a lot of different transactions, there's selling, there's reselling. It is somewhat similar to finance in certain ways, but it's all digital. You would think that, "Oh! We can just audit all of this, because we have a log of the entire digital transaction stream." Why is it so hard to audit this system and estimate what's going on?

[0:05:08.8] KB: That's right, because it is digital you think that, "Okay. Well, we can just audit this. There're the raw logs. We can just access the logs."

[0:05:15.4] JM: It's not like billboards.

[0:05:16.7] KB: Right. Billboards is how do you measure awareness. I guess it does come down to measurement. It's impossible to audit digital advertising supply chain because you're working with such a limited dataset. If you're acquiring data from each independent and self-interested entity in the supply chain, they're going to provide their data reconciled with their partner's data with their partner's data and there's also no KYC element in this industry, because you don't know everyone you work with.

You have this kind of strange incentives that go on and without a universal set of standards and an agreed upon measurement of performance and billable metrics, you just have these huge discrepancies.

[0:06:05.7] JM: Okay, but we do have some standards bodies, there's IAB, I think that's the — What is that? International Advertising Bureau, or something.

[0:06:14.0] KB: Yeah, the Interactive Advertising Bureau. They're the governing body of our industry. They do a great job providing these standards and guidelines. The problem though is

that they're not enforceable. You provide these guidelines that each entity in the industry is supposed to follow, and that provides everyone the ability to operate at scale to make things more efficient. We use these standard protocols, VAST, VPAID, MRAID, RTD, and these allows us to build technologies and achieve these efficiencies.

[0:06:49.3] JM: IAM is one governing body. We define it as a governing body, but there're also players who are just so big that they can access a governing body by virtue of how much deal flow they have. For example, Google, Facebook, perhaps AppNexus. What are the roles of these organizations that have so much deal flow going through them that they can impose some sets of standards?

[0:07:18.5] KB: I think that's a loaded question. I don't know if you saw the stats coming out of the IAB last year, but Google and Facebook are responsible for 99% of the advertising industries' growth, and that's staggering. That's all at Q3. What that tells me is that everyone else is playing zero-sum game, and to be an independent adtech player in this space today, it's tough. You're not only getting squeezed by this duopoly, but you're facing all of these issues of fraud, and you're using the latest tools, but it's just — You're paying for the latest mousetrap and it's an ongoing battle.

[0:07:59.2] JM: My sense is that Google and Facebook, their systems are inherently a little more resilient to fraud, because they have this login barrier that is sort of stopgap against bot traffic, because the bot can't get as good of an identity that —

[0:08:16.2] KB: To your point, they're massive. They have an end-to-end solution for advertising and they consist and make up the entire supply chain themselves. When you talk about standards, they can be compliant with themselves, because they pretty much own the industry. They have the audience, they own the content, they have all the data, and they have the tech, end-to-end, to execute on these campaigns. The problem though is it comes down to trust, and just because they can be compliant with themselves, you're forced to trust that.

[0:08:51.7] JM: It is to some degree like what we ruled on after the financial crisis where, "Okay, we don't want these banks taking customer funds and doing risky bets with them that might impact —" It's like they're playing both sides of the table in some sense, which is fine. I'm not

saying that that's necessarily something to criticize, but it is something to take into account where they control the ecosystem. Let's be honest — Global ad spent was about $542 billion in 2016. Do you have any perspective for how much of that is captured by Google and Facebook?

[0:09:31.2] KB: People would argue that they capture at least 75%.

[0:09:37.3] JM: Do Google and Facebook — Do we have any perspective for how they look at fraud? How seriously they take fraud, because what's — It's kind of hard to tell, because in some sense, their incentives are not aligned with brand advertisers because the brand advertisers are spending money regardless of whether that ad is shown to a bot or if it's shown to a human. In some sense, the long-term integrity of the companies depend on advertising remaining something that does have integrity. Do you have any sense for how Google and Facebook view fraud?

[0:10:13.0] KB: The sense that I gather, they take a very quiet approach to online fraud. I know that Google, as this publicly traded company, during their earnings reports and their statements, their public statements, they don't even mention online advertising fraud. Whereas other independent and publicly traded adtech companies stay to the shareholders that fraud is a major concern. There is risk and liabilities when it comes to online advertising fraud and given that company's position.

Facebook is taking a stance on fake news. That's a big deal right now given the current events. They're constantly battling measurement, the billable metrics that they use, the formulas that they use to calculate advertising performance across their network, how they source audience data, how they monetize this data, however, there really is no alternative. If you have an advertising budget, you got to spend this budget, where are you going to go? In everyone's best interest, including the free internet, that there is distribution of power when it comes to content delivery and monetization.

[0:11:28.4] JM: We will get into that with the adChain, but a little more on Facebook. I remember reading in — Did you read Chaos Monkeys?

[0:11:36.7] KB: I started to. I'm halfway through. It's great.

[0:11:39.2] JM: Great book. Now, that book is about a guy whose company gets acquired by Facebook. It's a true story. His company gets acquired by Facebook, it's an adtech company. It's funny because you get the impression — In his interactions with Zuckerberg, Zuckerberg doesn't really care about advertising. He doesn't care at all. He just wants to delegate it to other people mostly, which is fine, but it does make you wonder if a problem is complex as fraud that potentially inhibits growth of the company, is really getting paid much heed at all. Together with that, the other sign, the disconcerting sign. I was talking to Shailin Dhar who introduced You and I, he's perhaps the strongest voice against ad fraud in the industry. That's why I like talking to Shailin so much.

What I think he said about Facebook is Facebook acquired a company called LiveRail for something like $450 million. CEO left shortly after under circumstances we don't know, if he was fired, or not. Basically, the idea was like they were doing video in such a questionable way.

The question I'm getting at — LiverRail was a video advertising company, I believe. Question I'm getting at is does Facebook care about this? Do they — I feel like I've talked to some people at Facebook and they just have no idea what ad fraud is. They don't know that this exists. They understand, "Oh, yeah. There's bots allover Twitter. Yeah, there's bots allover Facebook," but they don't seem to realize those bots consume advertising.

[0:13:14.6] KB: Right, and there's fake profiles. I have to believe that they care. I have to believe that they are actively taking action against advertising fraud and they're combatting fraud in many different ways, because it exists in so many different forms. I don't think Facebook is evil. I don't think Google is evil. I also think that when you become so big and so centralized, these mechanics kind of take shape and fraud exists and you can't exactly just stop fraud, and your incentives are not to stop fraud. Facebook and Google are the wealthiest companies in the world. When you're printing money and that money is generated from online advertising, you have to look at all of the incentives.

[0:14:03.9] JM: I was talking to Augustine Fou who does a lot of ad fraud research and he was telling me just how easy it is to set up a datacenter traffic to do fraudulent schemes, and you could just have the datacenters running a headless browser, making fake Facebook accounts,

making fake Twitter accounts, making convincing user behavior and it's just — It's so hard to prevent. You think about a problem like Gmail, where Google is actually incentivized to prevent as much spam as possible, and you still get spam in your inbox.

You take a problem where their incentives are not aligned, where they actually make money off of fraud passing through their systems, and it's — I don't know. It's disconcerting. I'm with you that it's like these are not evil companies, they're just big, they've got a lot on their hands and it's like, "Well, do we really want to tackle this huge problem over here? Do we want to go focus on VR, and messaging, and bots, or chatbots, or do we want to focus on ironing out the fraud in our ecosystem that nobody is complaining about?" Let's focus on the chatbots and the new newsfeed interface, or something.

[0:15:09.0] KB: If we don't do anything, if we don't focus on this problem, there's a logical conclusion. If you fast-forward five years, what is that future look like for the internet? Because this issue is actually, in my opinion, shaping the internet the way content is consumed, the way it's distributed and monetized, the tactics that content creators and publishers use to generate revenue, the way Facebook operates in their algorithms and newsfeeds. It's actually changing the way we express ourselves online, the way we get our information, and the way these companies build out their businesses. That could be a problem.

[0:15:49.9] JM: An advertising fraud propagates fake news. This is one subtle point, because when you create fake news that drives legitimate human traffic to a fake news site created by a Macedonian teenager that they setup some WordPress site, set up beefrecipes.com, or they set up trumpsnewrules.com and it just got a bunch of fake news about Trump, or fake news about beef recipes, and then they get people to navigate from Facebook to the fake news site. That can serve as a traffic laundering mechanism. You get legitimate traffic, and then it becomes much easier to blast your site with datacenter traffic as well and it becomes really hard for any kind of analytics system to be able to discern the traffic coming from a datacenter from the traffic coming from legitimate users that are clicking on fake news. This problem is incentivizing people to create fake news, because it makes the margins bigger.

[0:16:50.0] KB: From that one blog, or one site, they can make 60k a month easy.

[0:16:53.7] JM: Yup.

[0:16:55.0] KB: If you were to go to the brands that actually were monetizing and buying that inventory, they are buying these impressions and serving out their campaigns. If you ask them, "This is the content that your ad was viewed." Would they be okay with that? A lot of advertisements were like, "Absolutely not. We don't want to associate our brand with this content, or these views, and opinions, and this headline, and this WordPress site that's just capitalizing on fake news and the opinions are purely exaggerated just to monetize that content, drive traffic and to get paid out."

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[INTERVIEW CONTINUED]

[0:18:59.6] JM: Now I think people who have been listening to this podcast for a while understand this problem at this point and we've recapped it pretty convincingly. Basically, it is a super sophisticated ecosystem of different players, this datacenter traffic. There're all kinds of fraud, and there's brands who are slowly becoming educated to this problem. You have Procter & Gamble, or Nike, or Gap, gap.com, these different brands that are slowly but surely realizing that most of their brand advertising — I don't want to say boast, you can't prove that with

numbers, but probably most of their brand advertising dollars are getting wasted on fraud, or ineffective advertising strategies. Overtime, they're realizing things.

Let's start to talk about the solutions, potential solutions. One of which is adChain, which you are working on. In order to get an adChain, let's talk a little bit about blockchains, because we've done a bunch of shows about Bitcoin, blockschains, Ethereum, these kind of stuff. Just give a recap. From an abstract point of view — You are not a programmer, correct?

[0:20:07.7] KB: Correct. No, I'm not.

[0:20:08.5] JM: This will be a perfect opportunity for you to explain what a blockchain is from the utility point of view, not from the in-the-weeds. How does this work on a technical level? What is the utility of a blockchain? What is a blockchain?

[0:20:23.0] KB: Sure. A simple way to think of the blockchain is just an improved database. It's a share source of truth and, most importantly, it's decentrally owned. You can use this new type of database and build out these decentralized applications, and you can align incentives and provide on the trade layer, or this application layer, an opportunity to have a healthy ecosystem with aligned incentives, and it's not that you have to trust the technology or the protocols.

Another unique characteristic of blockchain is it's very secure. Through cryptography, you're able to ensure the integrity of this data in the way it stored is in tacked. The beauty of it is it's a trust-less environment. When you use a blockchain, it's not limited in terms of, "Okay. If I have this web application, I have to abide by some centralized platform's policies, or if I'm using their APIs." You're limited in a lot of ways. This kind of unlocks a lot of opportunities for web developers to build out unrestricted applications.

[0:21:43.7] JM: Absolutely. Let's get into some of those. You listed the ideas why a blockchain is this new served database. Start your talk about the abstracts appealing features of a blockchain. We hear about blockchains potentially being used in finance, or digital rights management for example, for artists who are creating music. What are the appealing features of a blockchain when you talk about a slightly higher level, the business use cases?

[0:22:14.3] KB: Right. Right. I think the appeal is really, again, the ability to expose the business logic. From a business standpoint, a lot of values derived from your secret sauce, your intellectual property, and it could be some proprietary thing that you own and sell. Blockchain isn't about closed propriety secret sauce. It's more about transparency and openness. The opportunities, there are these — These new opportunities now exist, where instead of relying on, let's say, going back to Facebook, their proprietary algorithm, you could use your own algorithm. You can decide how you want to view your newsfeed. How Twitter works. How Instagram, or Snapchat works. You can distribute and decentralize all of these applications, it's all peer-to-peer. The incentives, really, on the business side is much different. It's fundamentally different than what currently exists.

[0:23:21.7] JM: What is adChain? This is the thing that we're here to talk about. It's a blockchain solution relating to advertising. Explain what adChain is.

[0:23:30.9] KB: Sure. Essentially, adChain is a set of protocols and standard interfaces that's built on Ethereum, the Ethereum blockchain, to provide common business needs for online advertising. I like to say that it's advertising's coordination platform, because we don't want to bring adChain to the industry and position ourselves as potential competitors to any of the entities that currently make up the industry. This is something that empowers everyone to add value and to operate in this healthy ecosystem and have a hygienic supply chain, instead of just this opaque black box of just everyone is — No one trust anyone.

A lot of the questions that advertises' brands agencies are asking can't be answered, and the incentives are all out of whack. This is kind of a way to provide a standard that allows for fair trade for the entities that not have to trust each other, and that's the beauty of the blockchain, is it's so centralized, but it's decentrallly owned. It's kind of this weird way of thinking about how to approach a lot of the problems that plague that industry. It's a fundamentally different approach.

We're not just looking at the trade layer of the industry where we have these protocols, we work with DSPs, SSPs, exchanges, and then you have safety vendors for viewabilty and bot detection. Yeah — And Shailin Dhar is great. He knows this stuff better than anyone, but the problem is much deeper than where everyone is looking and where everyone is talking about.

When you talk about datacenter, and driving traffic, and the headless browsers, recently, Methbot was discovered, and this botnet was doing just that. It was making real people. It was hosting webpages and they are representing these advertising opportunities coming from legitimate sites, like ESPN, or CNN, or USA TODAY, and driving traffic to these pages. They are generating $3 to $5 million a day from this botnet. WideOps discovered it, but they're scratching the surface. They're kind of just taking a look and they're going, "Okay. There's a lot of fraud here. There's a lot of stuff going on that no one is really looking deep enough to really understand or see."

[0:25:57.9] JM: Let's use Methbot as an example, this, I think, Russian botnet that was just able to drag in millions and millions and millions of dollars. There's a great New York Times article about Methbot, about this botnet. I'm going to put that in the show notes. Let's take Methbot as an example. How would adChain be a preventative measure against the problems that Methboth it taking advantage of?

[0:26:28.6] KB: Sure. We're using what's called smart contracts, and these smart contracts are written in a blockchain language called Solidity.

[0:26:37.8] JM: That's the Ethereum language.

[0:26:39.0] KB: Correct. That's right. What this will allow us to do is when we run campaigns, when advertisers have their media spends planned out and they work with their agency, or their trade desk, or they bring this internally and use some form of an advertising bidder, they're using this technology for display or video campaigns.

We get to see the entire supply chain, and they would start to see patterns, and they work with safe vendors, like WideOps, who ultimately discovered net bot. WideOps would not have to make so many assumptions with their bot detection scripts and algorithms. They would be able to run their proprietary bot detection algorithms on a complete dataset of the complete supply chain, because we're tracking, at the trade level with adChain, beacons, and we're encrypting that data and then we're using our adChain smart contract and state channel blockchain technology and implementation on top of Ethereum to track and store this advertising data, and it's permissionable.

When we open this data to WideOps, they're running their script on a complete dataset that's ubiquitous across the entire supply chain and not just one dataset, because even WideOps admitted that this is just a sample of data from just our clients and we're releasing this publicly, because we need the entire industry to help us combat this.

The thing about what we're doing with adChain is that when we talk about governance, when we talk about regulatory bodies in our industry, they're not able to regulate their policies because they don't have the ability to regulate at a technology or protocol level. They provide guidelines. This is the difference, is we have this technology now utilizing blockchain that allows for enforcement at a protocol level. That way, when something like Methbot is discovered by WideOps, they don't just announce it to industries saying, "You have to manually blacklist all of these known IPs across every single adtech entity in the industry. Whereas with something like adChain, you could flip a switch and all of a sudden botnet stops, but that's still running. Advertisers are still spending and botnet is still running.

[0:29:01.2] JM: Yeah. Okay. You're pointing out a lot of interesting things, because this is essentially the dream of what Ethereum smart contracts provide. It's basically, "Here is the way that this business works, not only codified in like a contract that is written, but in computer code that enforces that contract in an electronic way." What you're saying is that this provides less room for ambiguity, because you have to be, "Oh, I'm IAB compliant. I'm complying with this API, or these set of standards." That's a lot different than saying, "Yes. I am willing to integrate with the adChain smart contract system that enforces the safety of traffic passing through my system. Is that correct?

[0:29:59.8] KB: That's correct. In the sense of smart contracts, code is law. When you break it down to the lowest level, binary, ones and zeroes, it's math, and you can trust math. What we want to do is we want to bring this undeniable trust to the industry, because that's what it lacks. It lacks the ability to trust. This is the only — In our opinion, this is not just the optimal solution, but we feel like this could be one of the only solutions to solve all of these problems. It's not that they have to trust us, it's just, "Here is this utility. Here is this platform for you to coordinate with all of your partners that you already work with." That's the approach that we're taking.

[0:30:45.4] JM: Yeah, and it makes a lot of sense to me. As you were telling me about this over the phone, I started to understand like — And it's not necessarily a boil the ocean approach, because you could see companies adopting this overtime sort of in the same way that they have adopted things like these verifications systems; are you a human? Or — What are the other ones? Moat, I think. Is Moat one of them?

[0:31:14.0] KB: For view-ability. Moat's another big one. There's DoubleVerify, Integral Ad Science.

[0:31:17.8] JM: DoubleVerify, right. These things where you throw in a JavaScript tag on your page to verify that the visitor to your site is a human, or is closer to a human, more likely to be a human, these are differentiators for publishers who want to sell traffic to advertisers. You could see the adChain process also being a certification press where you say, "Okay. This site interfaces with AdChain," and then there's a network effect there, where the more companies that integrate with the adChain system, the smarter the adChain system is. You get this positive feedback loop. Am I understanding the rollout process correctly?

[0:32:03.8] KB: You're right. Yeah, absolutely. The more adoption, the stronger the chain and the more powerful adChain becomes for the industry. When you look at the publisher side, if they interface with adChain, they can prevent — They could protect themselves from malware, which is a big problem for publishers.

On the advertising side, they get to audit the entire trail of the campaign and have transparency into the supply chain of this advertising campaign. When you hash, or if you run an advertising creative, like the actual creative file through adChain, what you could do is you execute the smart contract. You essentially save this — Or hash this creative file in the form of this smart contract.

If somewhere along the supply chain, this creative file changes, it will not surf, it will not be tracked, because it has been altered. That is going to be exciting for a lot of advertisers, because a lot of the opportunities, or advertising placements are modified. Where, for example, going to video, if you, as an advertiser, think you're buying large player traffic, or impressions, you're actually running your video ad in a small player.

The dimensions of the player size have been altered somewhere in the supply chain, and you're paying for large player premium advertising inventory, when you're actually paying for really small video and banner replacement video. This is just — If the dimensions don't match, the ad doesn't surf, and it's that simple.

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[0:34:02.8] JM: When you are continuously deploying software, you need to know how your code changes affect user traffic around the world. Apica System helps companies with their end-user experience, focusing on availability and performance.

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[INTERVIEW CONTINUED]

[0:35:31.8] JM: When you talk to people about Ethereum, or Ethereum related things, there's like people who have very substantive things, and they have substantive idea — There's a spectrum. There's like the substantive ideas, there's the substantive ideas that have been implemented, or they're starting to implement, they actually have a code behind their words, and then there's like the non-substantive ideas, and there's the non-substantive ideas and

nonetheless have code written for them. Where does adChain fit here? Do you have progress if you? Has the code been written? Do you have any integrations going?

[0:36:07.3] KB: Yeah. We have a prototype now, and we have a pilot running as we speak. We're tracking impressions and we're storing performance data in Ethereum, and then we have an interface for our participants in this pilot to check performance. We have the ability to automatically resolve any disputes in the performance metrics, because a lot of the advertisers right now are auditing their campaign spend for 2016. There's just a lot going on in the industry. This is a neutral utility that answers a lot of the questions, and it allows for everyone to look at the same set of data and to agree to the billable metric. If there's a discrepancy, there are these market signals that surface. If there's major discrepancies somewhere in the supply chain, it's exposed.

Overtime, this market-driven approach will essentially resolve itself, and we don't want to — We're not saying we can stop fraud. AdChain doesn't stop fraud, but what it does is it allows the industry to align incentives and to show, "Hey, I'm adding value," and overtime, deincentivize fraud, and it push it out of this new protocol.

[0:37:25.8] JM: Absolutely. What has been the feedback from the people who have integrated with adChain?

[0:37:32.0] KB: Right. The feedback is, I would say, overwhelmingly positive. However, depending on who you are, there is a little bit of caution here. We don't expect everyone to; first, fully understand what it is we're doing here, because it is complicated. Adtech itself is extremely complicated. Now we're taking blockchain technologies, which is extremely complicated, or bringing the two together.

Having to explain to the industry what exactly blockchain could mean for them and why this is important when we talk about fraud, you kind of have to unwrap that. For the most part, if you have this new approach and you talk to an advertising agency saying, "This is how you can secure media spend, and this is how you can earn new advertising business by providing value and proving it mathematically. Not just saying, "You have to trust us. We're going to watch after your campaign budgets and look after your best interest," because that sales pitch is getting old,

and advertisers are demanding more. If you can't prove ROI, advertisers are going to go elsewhere, and this is a solution for the agency and the advertiser as well as the rest of the supply chain.

[0:38:48.4] JM: Absolutely. Can you talk more about that? Because I feel like there are probably people listening who — There's probably at least one or two people listening who are building some sort of business on a blockchain and they're trying to figure out is it too early, or what is the narrative that I should try to sell to my customers to make sure that I'm conveying this product correctly so I can know whether it's too early. Maybe — Can you talk —

[0:39:14.9] KB: Yeah. Sure. I don't think it's too early. If you look at the adoption of blockchain, and you look at this growth rate, and you look at the early days of the internet, leading up to the internet as we know it now, there's this adoption rate. Blockchain is taking off because of the need for it.

[0:39:36.0] JM: That's the thing, is that people are like — I remember talking to these — I think I talked to multiple Bitcoin investors when I was doing the first series of shows about Bitcoin. This was like a year and a half ago, and I think Bitcoin was like at this place in the hype cycle where the people who didn't really understand it, but had invested in it nonetheless, were starting to get fatigued and they were like, "I'm done with Bitcoin. Bitcion is not trendy."

It was like — You must not understand it then, because this is a fundamental technological breakthrough. This is not like a, "Maybe it will work. Maybe it won't." It's like, "No. It's just a matter of time until it works."

[0:40:09.7] KB: Right. I think there's — once you understand, you can't un-know it and it's just a matter of time. It's inevitable. Those who understand it know it. There's also the fear of missing out. There's this strong force that's compelling major corporations to jump on the blockchain before they even know what it is.

Fintech and finance is a great example, because as soon as Bitcoin was this new exciting digital currency, and then banks where looking at this new underlying blockchain technology as a way

to save billions of dollars, they're like, "Let's do this." It's not a matter of if, it's just how can we start to integrate this new technology into our day-to-day operations?

[0:40:53.2] JM: Explain how a bank saves billions of dollars in blockchain.

[0:40:57.7] KB: If they want to audit, that's costly. If they want to reconcile data across their global bank, that's costly. There're these efficiencies that are realized when you use a central database that's encrypted and secure like blockchain. If you can unlock that for your organization, there are tremendous savings. That's like almost instant. You realize these savings.

Then you can build value on top of this new database. I think that's the real appeal to web developers that are exploring blockchain technologies, is that you don't necessarily have to understand how to write solidity. You don't really fully have to understand smart contracts, because there's really only a few people that truly understand and are good at writing smart contracts. It's something that is complicated.

If you understand the framework — And the tooling around blockchain is quickly evolving as well, and there's more and more documentation, there's more and more these projects and developer tools that exist. As long as these tools exist and we can start to educate web developers, they can start building out their own web applications utilizing their existing skill sets. This is the opportunity for web developers is to build out a decentralized application on top of Ethereum, or Bitcoin, and start to realize these values. It's not just the savings and efficiencies, but also unique business opportunities and the ability to build out application that's decentralized, and it's fundamentally different.

I think once web developers really start to understand what this is and why it's different, I think that's when we're going to start to see an explosion of just more applications where I could imagine that people start to use web applications that interface with the blockchain, and they don't even know it.

[0:42:59.7] JM: I want to zoom out here, because we're running up against time. I'm obviously very interested in the advertising business partly, because I am working on an advertising

company, and what I wonder about is like what are the fundamental changes that are going to occur in advertising in the next 10 years. AdChain definitely makes a lot of sense to me. At the same time, I do wonder, is the search for metrics-driven advertising, CPM-driven advertising — Is this ultimately going to be a dead end, because it feels like the bot problem feels unsolvable to me. It feels like something that it's too hard, maybe that's like the pessimistic side of me.

I'm normally such an optimist with anything related to technology, but the bot problem is so pernicious that incentives are so poorly aligned, that it seems like there is alternative thread that we go down where advertisers just say, "You know, this is just a crappy way to be spending our budget where we look at how many views we've got and how many clicks we've got. Let's try something where it's more like the good old billboard days where it's like, "How creative is this advertisement? How many people are talking about this advertisement? How viral is this advertisement in the sense that does this ad actually connect with people on a human level? Ads should be entertaining, ultimately."

[0:44:27.2] KB: In many ways, we're are going kind of full circle when we're talking about advertising. When we talk about the current standard billable metric of cost per thousand advertising impressions, there's nothing better at generating impressions than bots. There's nothing more efficient than a machine to generate scale.

When we standardize the CPM, cost per thousand metric as the billable metric for digital advertising, and all of the supply chain entities that make up the online advertising industry, get paid and payout on a CPM. Even the safety vendors that detect fraud and bots are paid on a CPM. These incentives are not in the best interest of preventing fraud. If anything, it's like your only incentive is to do away with fraud as much as your competitor.

Fraud needs to exist for a lot of the industry. When you look at something like WalkChain, you could start thinking of a different payment model, where it's not CMP, it's more of like attention. You have these attention markets that would exist potentially. From a fundamental level, it will reshape the industry. I think it would be for the better.

[0:45:43.4] JM: Yeah. All right, Adam — Or Ken. Why did I call you Adam? I was going to say adChain. I was going to say adChain, and then I said Adam.

Anyway, I'm not getting enough sleep. This presidency is really eating my sleep habits. Okay. Ken —

[0:46:01.3] KB: I forgot which comedian said it, but he said the presidency is supposed to age the president. It's not supposed to age the people, because I'm exhausted too. I'm exhausted.

[0:46:13.5] JM: Yeah. It's like you wake up every morning and it's like — I thought that the cravings that Facebook drove me — See what notification from some old high school friend, or some cute girl that might have liked a picture, I thought that was like as dopamine rushing as it could get. Flipping over to Apple news and seeing what kind of crazy stuff Trump has cooked up is like a new level of wake up, get to my phone anxiety.

All right. Okay, cool. Thanks for coming to the show Ken. I want to talk about VidRoll some, but we didn't make — I don't know if people are interested, they could check out VidRoll. Definitely check out adChain. Thanks for coming on Software Engineering Daily.

[0:46:54.7] KB: Yeah, thanks for having me.

[END OF INTERVIEW]

[0:47:00.6] JM: Thanks to Symphono for sponsoring Software Engineering Daily. Symphono is a custom engineering shop where senior engineers tackle big tech challenges while learning from each other. Check it out at symphono.com/sedaily. Thanks again Symphono.

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