

# What Are NFTs?

<https://mindmatters.ai/podcast/ep199>

Robert J. Marks:

Welcome to Mind Matters News. I'm your cryptic host, Robert J. Marks. We have been talking to Adam Goad and Dr. Austin Egbert both at Baylor University about web3, web3 uses distributed computing and is the tool that's used in so-called non fungible tokens, stuff that I don't understand. And they're going to try to sell me on non fungible tokens here, or at least explain it to me to the point where I have an understanding of it. Adam, let's start with you. People are selling pictures on the internet using a non fungible token. Before we talk about that, though, what's the difference between a non fungible token and a fungible token? They both use blockchain, right?

Adam Goad:

Yes, they can. So an example, perhaps. A fungible token, so that means that each of these tokens can be interchanged. So a \$10 bill, a US \$10 bill, I can have one, I can trade you for your \$10 bill, we're both in the same place we started, because all \$10 bills are the same. But what if we had trading cards? If I had just some unknown rookie baseball player and you had a Babe Ruth trading card, it would not be an equal swap to trade those. So they are non fungible. They are not interchangeable. So yes, you can have blockchains with both of these.

Adam Goad:

So Bitcoin, that is an example of a fungible token. Each Bitcoin is equal to every other Bitcoin. There is no difference between them. It only matters how many of them you have. But with NFTs, the non fungible tokens, that is where they become more unique. So a common use of NFTs is as a collectible. So then it's each of them is different and some of them are rarer or legendary. And that could mean that they have more value when people are trying to sell them.

Robert J. Marks:

Okay. So explain to me non fungible tokens. I think I understand Bitcoin. I understand why it works. I understand that the blockchain infuses trust so that people can trust that if they get a Bitcoin, nobody is going to hack it, nobody is going to have some sort of control over it. So explain to me now non fungible tokens. It seems to me that it's just a way of selling art and music and gaming collections on the web. So what's the big deal about non fungible tokens, and why would I want to buy one?

Adam Goad:

Right, so it is all those things you mentioned. People have been using them, artists can use them to sell their arts. Musicians can use it to sell the music. There are some games that have been made where by playing the game, you can generate NFTs of perhaps various equipment of items you can use.

Robert J. Marks:

Wait, so is this like mining Bitcoin in a small way?

Adam Goad:

It is not quite the same thing. It's not doing the cryptographic math to support the blockchain. But in several games currently, how about we use this example, if you play Pokemon, you go into the game and you collect the various creatures, various Pokemon. So there are some games out there now on the blockchain that you can go and you correct those various monsters and you get them as an NFT. So then with this NFT, you could continue to use it in the game. You could perhaps even level it up and prove it in different ways. Or you could go to a NFT marketplace and you could sell it to someone and you would be selling it to them directly through the decentralized systems. So you can sell it for whatever price you agree upon with other people, you can auction it, but you wouldn't have to go through any centralized authority and no one would be able to stop you from doing it.

Robert J. Marks:

So let me ask you this. I can understand putting a high price on a physical painting by something like Jackson Pollock, or maybe Picasso. It's a physical piece of canvas that I can hang on my wall. Yet if I have a digital sort of painting and that digital painting can be replicated, for example, it's very easy to copy digital files, what is the worth of me investing in such a thing that can be taken from me so easily?

Adam Goad:

So yes, this is a very common question and criticism of NFTs. It is a common joke among NFT critics that they can just right click and save any NFT someone has. The images, the artwork behind NFTs are all publicly available. They have to be by nature for the system to work. You can go on and download NFTs right now that are worth millions of dollars. The real value though behind the NFT is not the image of the artwork, but the record of ownership. When you get down to the underlying technology, all you are really getting with the NFT is an entry into the ledger of the blockchain that your cryptocurrency address has this token. That token will actually just contain a link. That link will go to a small JSON text file that will have information about the NFT, it will have the name-

Robert J. Marks:

What's a JSON tech file? I don't know what that is.

Adam Goad:

A JSON text file.

Robert J. Marks:

Text. I'm sorry. Okay.

Austin Egbert:

Yeah. A JSON text file is merely a standard way of serializing a computer code object in a human readable format. So you have different fields of the object and then their value. And it's just stored in a standardized way that computers can read and process.

Robert J. Marks:

Okay. Thank you.

Adam Goad:

Yes, exactly. So this file will say the name of the NFT, perhaps the token number inside the NFT collection, it will have a description, and it will have a link to the image that it represents. So when you buy an NFT, all you are buying is that public, immutable record of your ownership of it. You do not have exclusive rights to it. There's actually a lot of legal debates going around right now about what rights can be conferred with an NFT. Does buying an NFT entitle you to copyright usage? Are you the owner of it? Does it grant you a license?

Robert J. Marks:

Yeah, that's a question that I would have. It seems like, well, I had a friend tell me that copyrights and patents are when you get one, it's just a license to sue somebody. Okay? That's really all they are. So I guess that's my question. What do non fungible tokens in the form of art, how do they protect you anymore than a copyright does?

Adam Goad:

I would say it protects you even less than a copyright.

Robert J. Marks:

Does it? Okay.

Adam Goad:

So like you said, with a copyright or a patent, you can take someone to court and stop them, attempt to stop them at least, from using your artwork or whatever it is you have created. With an NFT, you have no such protections. Anyone can just take your image and use it however they please, and it is public record and there's no way you can stop them.

Robert J. Marks:

This right to use is a big thing when you do a lot of publication. I just published a book that I wanted to use an old Dick Tracy cartoon in that referred to neural networks. And it was of course copyrighted. Dick Tracy, for those who are young, used to be a detective in the comic strips. Anyway, we attempted to obtain a copyright permission for doing that, was even willing to pay a little bit for it, but there was no contact that we could make because the strip was so old, it went back to the 1980s. So it seems to me if that Dick Tracy comic was in a non fungible token, there's a possibility that we could have gone to the non fungible token, paid for the copyright usage, and then used it in the book. It would've been much more convenient than trying to go through all of the bureaucracy that we tried to go through. So could this be one of the advantages of doing non fungible tokens of that sort?

Austin Egbert:

So one complication that I can see that would rise from that, and Adam may have more to say, is it's a little bit less flexible than copyright. Copyright is if you have the primary ownership of it, you have the ability to grant copyright to other people. However, non fungible tokens, by their nature not being interchangeable with other things, implies that... it's not that you could get a copyright request to use something via an NFT. You would actually get the ownership and then you would be the one who controls who's allowed to use it. So it's not a them granting you permission, it's they've just sent you the whole thing and now it's yours, not you have permission to use it.

Adam Goad:

Two points on this. Well, first I am not a lawyer and cannot give legal advice.

Robert J. Marks:

But you look like one, you look like one, Adam. Okay, go ahead.

Adam Goad:

So my understanding of some of the legalities behind this though, is basically the creator retains the copyright rights to the artwork that they have published through NFTs. So NFT law is something still being developed and is undefined in many ways. The current theory is though that they cannot pass along copyright privileges through the sale of an NFT, because there is no way to enter into a contract with a buyer or the people that buyer transfers to. Perhaps you could have someone agree to something on a website before they are the first one to buy it. But if they pass that along to someone else, that person has entered into no contract.

Robert J. Marks:

I see.

Adam Goad:

And then to Austin's point, though, if we do define laws that allow this to work, to allow copyrights to function in this way, there is such thing as a semi fungible token.

Robert J. Marks:

Semi fungible. Is that tokens that kind of look alike?

Adam Goad:

Yes. A common implementation of this is through ERC 1155, which is a type of Ethereum smart contract. And what that allows is to have a multiple of the same token. And perhaps these tokens can change in other ways on their own, but they all start the same. So they start fungible and perhaps they can become non fungible or whatever the creator has developed for them. But this would be a way that you could grant multiple people a license to a copyright, perhaps, as they would all have an equal license through a semi fungible token.

Robert J. Marks:

Would this be, for example, something like prince of paintings, you can have a painting and usually there's something like an announcement that there have been, I don't know, 20 prints made of this painting. And then you sell the 20 prints and each one of those prints becomes its own token, if you will, is there an analogy there?

Adam Goad:

Yes, you could think of it in that way. I do not know if I've seen anyone use it in that manner, but that would be a use of it. You could have one of the official non fungible version of an artwork, and you could also perhaps provide lesser versions as these semi fungible 1155 tokens.

Robert J. Marks:

So somebody has a non fungible token of art. You can make as many copies of that image as you want to, whether you own the non fungible token or not. Why in the heck should I ever want to invest in something like that?

Adam Goad:

Right. So there are all sorts of different motivations. Perhaps you are a collector, and instead of owning a print of a piece of art, you want to own the original piece of art, or at least be able to say you are the owner. That is kind of the original use of NFTs that came about. Several of the beginning high value NFTs that were sold were the originals, quote unquote, of the digital files of various popular memes. Several of those sold for millions of dollars when they were released.

Robert J. Marks:

Millions of dollars. Wow.

Adam Goad:

These are images that are all over the internet, but now someone can say that they own the original, that they own that meme.

Robert J. Marks:

I've seen a lot of memes. I don't think I've ever seen a million dollar meme though. That's really astonishing. So let me see if I get this right. So you might have a beautiful piece of digital art and you can sell pieces of it, maybe 10%, 10 units of 10%. And then I want to come along and I want to own 20%. I have to go to the people that have two 10 percents and see if I can get them to sell that to me. Is that a decent description or am I off?

Adam Goad:

So one property of NFTs is that they are non-divisible.

Robert J. Marks:

Oh, they are? Okay.

Adam Goad:

So you cannot have half of an NFT. You can only have a whole NFT. But I think that perhaps something similar to what you're talking about there is the use of the NFTs as collectibles. So the NBA, the basketball association, they have actually gotten involved in this, and they sell NFTs of video clips of famous basketball moments.

Robert J. Marks:

Wow.

Adam Goad:

You can go onto the websites and it's just like buying trading cards. You buy like a foil pack of them and you can open it, and it will have various video clips of various basketball moments. Some of them, maybe it's LeBron James getting a slam dunk, or maybe it's just an average player dribbling down the

course, they have various rarities to them and various significances. And then on that website, you could trade them, sell them to other people who would also be interested in buying them.

Robert J. Marks:

But copyrights aside, anybody can basically use those clips. Is that right? What's the advantage of me owning them?

Adam Goad:

That one is a bit of a special case in terms of copyrights. They do not quite follow the same decentralization as everyone else. They have set up the own system there that kind of mimics the web3 idea, but they are still selling them as NFTs, but you cannot really use them outside of their website, so that they are able to maintain that control over them and you do not actually have ownership of the video clip, but you may look at it and you may tell people that it's yours on that website. But yeah, you do not get the rights to those highly valuable MBA videos.

Robert J. Marks:

Okay. Understood. One of the interesting applications, the non fungible tokens that you told me about, was investment in business. If you have a business and you want to raise capital, maybe you can do it using a non fungible token. Could you talk about that?

Adam Goad:

Sure. So yes, there are several companies all over the world who are trying this, and have been very successful, getting hundreds of thousands, millions of dollars that people who are able to successfully do this. Now I will say that just like with the copyright laws with NFTs, the financial laws with NFTs are also still being defined. So I know that the Biden administration is currently looking into a lot of NFT regulations and how that they will handle these moving forward, and looking forward to a report on that sometime in November of this year. But yes, so the SEC is still trying to figure out how they're going to weigh in on this issue. I cannot give financial advice the same way I cannot give legal advice, but yes, there are companies who have been very successful in raising money by selling NFTs.

Robert J. Marks:

Oh my goodness. It turns out that if the government gets involved, lots of advantages of distributed systems and blockchains become, I don't know, diluted in a way. It used to be that Bitcoin could be done pretty anonymously, but as you pointed out to me on the current tax forms that you fill out, one of the first questions is have you messed around with cryptocurrencies at all? The government wants to know how much money you've made on cryptocurrencies so that the IRS can grab the taxes. So, yeah, I don't look forward to the government regulation, but there does have to be some sort of oversight of this so that people know what their rights are with non fungible tokens. Right now I think it's totally in the air.

Adam Goad:

Yes. It's very much kind of the wild west out there right now within NFTs. It feels like it especially. But yes, you're right. If the government wants to do something about it, they can try to tax you. They can tell you that you can't do things. But due to the decentralized nature, they have no enforcement mechanism. One example of this that we've seen recently is that Russian oligarchs are using this to get around sanctions. They are able to still send transactions through cryptocurrencies and there's nothing

anyone can do to stop them. So they were able to send millions of dollars worth of money and funds through crypto and get around sanctions using that.

Robert J. Marks:

Yes, there was a great book, it was called American Kingpin, and it talked about a guy that used to sell drugs over the Tor internet and used to do the trading using Bitcoin. And for some reason in the book, they couldn't track him down through the transactions. Apparently there's a record of transactions, but they were unable to use that to point to the person that was doing it. The person adopted the pseudonym, what was it? The Dread Pirate Roberts after The Princess Bride. And the FBI, the federal people came in, I forget if it was the FBI or the DEA. But they came in and they did a sting on this guy, recognizing that if he closed his laptop or hit a certain key, everything in his file would be encrypted. He used to do his work at internet cafes, and they knew where he went for the internet cafes.

Robert J. Marks:

So they set up a sting, and this is in the book, the American Kingpin is a fascinating book. I recommend it. But the feds came in and a number of agents positioned themselves at different places in the cafe while this guy was clicking away on his computer, his laptop computer, and something happened behind him. Two of the agents, a male and a female, pretended to get into an incredible fight. And the guy who was at his keyboard turned around to see what was happening. A guy sitting in front of him across the table grabbed his laptop before he could close it and the guy behind him grabbed him across the chest and the arms so he couldn't move.

Robert J. Marks:

So for some reason, that's the way they put the sting on him as opposed to tracing it through the Bitcoin transactions. Yet I know later on, there was a great sting of kiddy porn, a kiddy porn site that was run similarly through the Tor network and run out of it turns out South Korea. And they were able to put the sting on this guy and arrested over 600 people that were using this kiddy porn simply by tracing the transactions on Bitcoin. How private are your transactions on Bitcoin?

Adam Goad:

So on Bitcoin, there is no inherent way to chase who owns a wallet. So when you set up your Bitcoin wallet, you get what is essentially a random sequence of hexadecimal values, and you have a private key and a public key. That public key, part of it goes into becoming what is known as your address. Anyone can send something to your address. Your address is public and will be recorded in the chain. Your private key is what sets up your ownership of it. This private and public key is then used cryptographically to confirm that you own this account. And to send any transaction from your account, it must be encoded using that private key. So that way you are always able to confirm who owns an account, but that does not require someone to identify themselves, to say that they own it.

Robert J. Marks:

And you identify them through their public key, right?

Adam Goad:

Yes. Which is just a hexadecimal value. It has no connection back to a person's real identity.

Robert J. Marks:

And I've heard of people losing their private keys and end up losing millions of dollars on Bitcoin because they forgot what their private key was or their personal key was, or they died or something like that, and it's totally lost forever.

Austin Egbert:

Without the private key, you no longer have a way of accessing the funds within your wallet. So it'd be like if you kept all of your money in a safe deposit box at the bank, you lost the key and let's assume that you had no other mechanism of drilling into it or getting stuff out of it, that's just locked in the box and no one's ever getting ahold of it, essentially.

Robert J. Marks:

I see.

Adam Goad:

Yes. And there are several people who back in the early days of Bitcoin, perhaps they mined Bitcoin, bought it in different ways, but then they thought it would never go anywhere. And they lost the keys, they lost the computers it was on, and they lost millions of dollars from doing that.

Robert J. Marks:

So how would you conjecture that this guy that ran this kiddy porn site off of Tor got stung? Were they looking at patterns of transactions? They clearly identified him from that, right?

Adam Goad:

Right. So all transactions are public. That is all stored in the public blockchain ledger. It is an immutable record, anyone can look at it. There is websites you can go to, Etherscan is a very popular one for looking at the Ethereum blockchain. You can go on there and follow transactions all day long. So though, the only way to tie that back to someone is to have them interact in the real world somehow. So you can have a thousand Bitcoin, but you can't buy a loaf of bread with it unless you can take it out of the blockchain and someone will give you dollars for it. And that is how they catch and identify people.

Austin Egbert:

Yes. So the government had passed regulation saying that if you are a business that is operating an exchange where I can give them dollars and they give me Bitcoin or vice versa, I give them Bitcoin and they give me dollars, those exchanges are required by law to confirm people's identities. And so when I make an account there, I have to say, "I'm so and so, here's my driver's license," or whatever else. And they have to report all of that for tax purposes, et cetera. But it also allows the government to make those connections in terms of who is operating a given Bitcoin address.

Robert J. Marks:

I knew the IRS had to figure out some way to tax Bitcoin earnings and things of that sort. So that's-

Austin Egbert:

Yeah. It's interesting to note that it's the exchange where everything kind of breaks down. So just like with cash, if you only ever receive cash and spend cash, that's not going to be traced back to you. There are going to be records of the store goes, "Hey, we sold this stuff to somebody for this amount of



money." There's a record that a transaction happened, but they don't write down necessarily who paid them in cash. Just like with Bitcoin, as long as you're only ever receiving Bitcoin and then spending Bitcoin, there's no necessarily record of who's making that transaction. It's only once you try and jump currencies, like to go back to the dollar example, if you had a job and your employer paid you with a transaction straight to your bank account, you weren't paid in physical cash. So now there's a record of, hey, this transaction was tied to you and now the government knows you received that much money because it gets reported.

Robert J. Marks:

Got it. Adam, let me ask you another question. I'm a cartoonist, I cartoon for fun, because I go to all these faculty meetings and I'm bored out of my skull and I sit there with a blank sheet of paper and a pen and I draw characters of my colleagues. So I have a bunch of these sketches. I want to put them in a non fungible token, where do I go? And does it cost me money to start a non fungible token?

Adam Goad:

Yes. So there are a couple options you have. There are some services that will kind of do the legwork for you. Places like OpenSea. OpenSea is kind of the, well, it is the most popular NFT marketplace right now. And they also provide a service where they will basically make an NFT for you.

Robert J. Marks:

Okay. This is OpenSea, is this a website? Is it O-P-E-N-C.com or something like that?

Adam Goad:

opensea.io.

Austin Egbert:

For the listeners, that is sea like the ocean. So O-P-E-N-S-E-A.io.

Adam Goad:

So yes, you can go there and you can buy, sell, trade, auction NFTs, but they also provide a service where they will launch an NFT for you using a slightly different mechanism than usual that is not really an on chain NFT as much as it is kind of through their service. So you can go through a company who will do something like that for you. Or you could go to the blockchain itself. You could write a smart contract or you could go find a copy of one and just use it. And then you would upload your images to the internet. The most common way of doing that is actually through a protocol called IPFS, The Interplanetary File System.

Robert J. Marks:

Inter Planetary. Do they know something that we don't? Is there another planet out there that we're communicating with, or is that just humorous on their part? I guess it's humorous.

Adam Goad:

It's humorous on their part, but I think they also... I'm not as familiar with the back end of it, but I think they do intend for it to work inter planetary one day, perhaps, if we have people on the moon and on Mars.

Austin Egbert:

I think the idea is that it's decentralized storage. So as opposed to a hard drive exists in the hard drive and could hardly be described to be interplanetary, you can think of it as the file system is you can access any of the files and the files are going to be physically distributed anywhere that has access to the network, essentially.

Robert J. Marks:

Fascinating. Okay.

Adam Goad:

Right. So instead of storing a photo say in Google photos, which puts it only on Google's server who could go down or delete it, do whatever they wish with it, it is decentralized and puts it onto the servers of anyone who is supporting the IPFS network. And they get a small bit of the IPFS crypto in payment for doing a service and you pay a small fee to upload to it.

Robert J. Marks:

How small a fee is that?

Adam Goad:

I'm not familiar with that fee particularly, but I believe that is the smaller of the fees we're going to come to.

Robert J. Marks:

Okay. Oh, there's more. Okay.

Adam Goad:

So then you upload all your artwork to this so that it is now decentralized and it is out there and anyone can access it. So then you have to create these JSON text files we talked about earlier, that will actually describe the NFT. So it says, "This is the Dr. Marks NFT brand, this is drawing number five," and it points to the image of it. So then you actually also store that on IPFS and you get a link to that. So then you go to your smart contract and you tell it, "All right, we're going to have 20 tokens, and each of those tokens is going to point to whatever address you have." And then you would have to pay the gas fees. You have to pay the transaction fees to put this contract onto the network.

Adam Goad:

Now, this contract is bigger than a normal transaction. Just the amount of bites that it contains. So you have to pay much more in transaction fees because you're going to take up a larger percentage of a block. So instead of the miner being able to get fees from 20 different people paying for a transaction to go through, they're going to only be taking your contract onto the network instead. So you have to pay more fees. Now, the fees you have to pay go up and down based off market demand, but that could be anywhere from 50 to a thousand dollars or more that you pay just in the fees to get that contract published. But then it is done and it is out there and it will be out there as long as the blockchain exists, and it is ready for anyone in the world to come interact with it and buy your drawings.

Robert J. Marks:

So how much would it cost me, Adam? Give me a ballpark. 10 bucks, a hundred bucks, a thousand bucks?

Adam Goad:

Probably right now, with the current market, \$500 or less.

Robert J. Marks:

Oh, is that right? Okay.

Adam Goad:

May be a fair bit less right now, but.

Robert J. Marks:

Okay. Well, that's great. Now, I know you've gone to, what is it? opensea.io. I know that you've invested in a few non fungibles, Adam, and one of them was a pizza place. Right?

Adam Goad:

Well, I'm forgetting. It wasn't pizza.

Robert J. Marks:

It wasn't pizza. Okay. But it was a restaurant of some sort, right?

Adam Goad:

Yes. I have invested in an ice cream store, actually.

Robert J. Marks:

Ice cream. Okay. I get ice cream and pizza confused all the time. So it was an ice cream store. So how is your non fungible token doing?

Adam Goad:

So that one in particular, with the fall of the market, they had problems as well, so that is something that we can get into more is actually that a lot of these things don't work out.

Robert J. Marks:

Okay. We'll talk about that next time. Thank you. Thank you, Adam. Thank you, Austin. We've been talking to Adam Goad and Dr. Austin Egbert at Baylor University about non fungible tokens, and we're going to continue talking about the current status of non fungible tokens next time on Mind Matters News. So until then, be of good cheer.

Announcer:

This has been Mind Matters News, with your host Robert J. Marks. Explore more at [mindmatters.ai](https://mindmatters.ai). That's [mindmatters.ai](https://mindmatters.ai). Mind Matters News is directed and edited by Austin Egbert. The opinions expressed on this program are solely those of the speakers. Mind Matters News is produced and copyrighted by the Walter Bradley Center for Natural and Artificial Intelligence at Discovery Institute.

