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New Frontiers™

ENTER THE METAVERSE: CHALLENGES AND OPPORTUNITIES IN NFTs

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Forward

Neal Stephenson saw it coming nearly three decades ago. In his seminal cyberpunk novel Snow Crash, the author describes a world where the lines between reality and computer-generated universes had blurred. In addition to having one of the best opening scenes ever (involving a frantic, high-speed pizza delivery), part of the novel takes place in a "metaverse" (a virtual reality "universe") where humans interact, transact, vie for virtual resources, and live much of their lives.

Stephenson was remarkably prescient, given that both the internet and virtual reality were in their infancies in 1992—the latter having entered popular consciousness with a clunky VR game where players launched projectiles at polygon Pterodactyls, and a "wow-that-didn't-age-well" movie called Lawnmower Man. By the time Ready Player One recapitulated these themes 20 years later, the ubiquity of the internet and the rise of virtual worlds like Second Life and World of Warcraft made the metaverse scenario seem much more plausible.

Fast-forward to the present day, and a real-life metaverse is dawning. A pandemic has pushed more social interactions into the online realm. VR tech has come a long way and is getting better every year. And thanks to crypto, virtual economies supported by digital scarcity are now feasible: tokenized property rights, facilitated by non-fungible tokens (NFTs), will play a crucial role in the adoption of our modern metaverse.

On a more mundane and prosaic level, NFTs are already introducing game-changing economic dynamics to the worlds of art and music; creative people have a new way to profit from their work, while cutting out that unavoidable middleman that's come to characterize web 2.0. Soon, the power of self-sovereign digital ownership will be extended to real estate, credentials, and many more facets of ordinary life.

Alongside the mindblowing promise of NFTs, there are also a few aspects of using them that really suck:

- They're expensive to create and exchange
- It's time-consuming to find what you're looking for
- They don't have hooks into the legal "real world" of copyrights and intellectual property
- You can't share ownership of NFTs with others

This report is not a comprehensive overview of what NFTs are or how they work; you can find that elsewhere (but watch out for some truly awful takes in the mainstream media). Instead, we'll explore the pain points and their potential solutions. And as we'll see, those solutions aren't far off; some of them are already here!

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Table of Contents

01 Scaling NFTs to the Masses 04

- Layer 1: Roll Your Own Blockchain 05
- Sidechains: Mainnet Integration, Separate Security 06
- Rollups: The Best of Both Worlds? 06
- Interoperability 07

02 Marketplace Fragmentation 08

03 Fractional Ownership and Collateralization 10

04 Copyright and Intellectual Property 12

05 Toward a Tokenized World 12

01 Scaling NFTs to the Masses

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Scaling NFTs to the Masses

Between an emerging virtual real estate boom and the ongoing tokenization of digital art and music, there's no shortage of demand for NFTs.

But like most new, early-stage technologies, NFTs are not cost effective to use. Minting a single non-fungible token typically costs more than $100 in this current expensive-gas fee climate. Even simple exchanges and transfers can cost $30-$50. From the standpoint of a gaming platform that wants to create badass mythril swords or a young and upcoming artist in rural India, these costs can be a show-stopping barrier to adoption.

Some marketplaces have addressed this issue through "free" minting, whereby they subsidize the initial creation cost and then recoup that expense if a creator's NFT is sold. That's a decent temporary workaround, but it's probably not sustainable over the long run due to the associated costs. Fortunately, more lasting solutions are coming (or already here) via various approaches to scaling.

Layer 1: Roll Your Own Blockchain

The easiest way to address the scalability issue is at "layer 1" (L1), by creating a blockchain with higher transactional throughput.

This has been embraced, with wild success, by Dapper Labs. Dapper got firsthand experience in dealing with scaling challenges when it created Cryptokitties during the last market cycle. The popular digital cats congested the Ethereum network and made it expensive to use for everyone.

Dapper's solution was to build its own blockchain called Flow. Flow serves as the foundation for NBA Top Shot, which is hands-down currently the most popular crypto-collectible. Its daily USD volume dwarfs most other collections.

However, there's one giant caveat to Dapper's success: they've achieved scalability through centralization. Flow currently has around 350 nodes, and the platform's board maintains direct control over the token's supply. For some users and use cases, that might be just fine; Top Shot collectors sure don't seem to mind. But for those who seek better guarantees of credible neutrality and censorship-resistance, or just closer integration with the Ethereum ecosystem (where most other NFTs and marketplaces currently live) there are better routes to NFT scalability.

Sidechains: Mainnet Integration, Separate Security

An alternate approach is to build a scalable NFT environment on an Ethereum sidechain. This has the distinct advantage of being more seamlessly integrated with the mainchain than separate L1s; public accounts can be mirrored in the sidechain's L2 environment, and existing EVM code can be ported over with relative ease as well.

Polygon (formerly Matic) is employing this technique with its proof-of-stake network. Currently supported by 86 validators, the sidechain is already enjoying early adoption with projects like Neon District (gaming) and Nanakusa (an NFT marketplace).

The scaling potential provided here is impressive—however, it comes at a cost. Although Matic is closely integrated with Ethereum, it doesn't inherit the latter's security guarantees; the security and consensus of the sidechain depends solely on its validator set. While Polygon has made efforts to make its consensus mechanism more trustless, it's far more centralized than the consensus provided by the Ethereum mainnet.

Specifically, hodlers of the network's token can delegate to one of those 86 validators. However, it's unclear how many of those validators are separate and distinct entities. The Matic Foundation itself runs multiple nodes, and the top five addresses hold more than 65% of all tokens. This heavily skewed distribution raises the specter that more than one entity (Polygon), or a collusion of a few entities, could unilaterally dictate what happens on the sidechain.

Over the long run, that's not a deal-breaker. Polygon has strong incentives to improve its distribution; it has a nice first-mover advantage with its scalable NFT architecture; and there should be ample use cases where this centralization trade off is acceptable.

Rollups: The Best of Both Worlds?

When it comes to maximally decentralized scaling, Ethereum layer 2 is where it's at.

Rollup platforms increase transaction throughput by taking computation and (most) data off-chain. Crucially, they also periodically post fraud proofs (in the case of Optimistic rollups) or cryptographic proofs (in the case of ZK-rollups) to the mainchain. This means that unlike sidechains, rollups enjoy the robust security and consensus provided by Ethereum.

With respect to NFTs, rollups offer a promising way forward; at the most basic level, minting and sending these tokens is very similar to how ERC-20s are handled. However, a key difference emerges between the two rollups when one considers withdrawal times.

Optimistic rollups require a week-long withdrawal period in order to provide sufficient time for fraud proofs to be challenged. That's not an intractable issue for ERC-20 use cases like DEXs or AMMs, since market makers can provide early liquidity on these fungible tokens.

It's a much different matter for ERC-721s, which by their very definition are non-fungible; you can't provide early-withdrawal liquidity for a one-of-a-kind asset.

This fact means that ZK-rollups have a distinct advantage when it comes to scalable NFT marketplaces. While hypothetically putting NFTs on Optimistic rollups is possible (and there are even some planned implementations to do so), the friction of week-long withdrawal times will likely be too onerous for the majority of users.

The move toward scalable NFT architecture should hit a major milestone in the very near future with Immutable X. The blockchain gaming platform has built a roll-up based solution using STARKWARE technology. This will allow that platform (and its users) to mint an arbitrary number of NFTs and transact them without incurring any mainnet gas cost. (For a great read into the design considerations that were taken into account, check out this post from Immutable's CTO.)

Keep an eye on how Immutable's rollup performs in production; if all goes well, it'll provide a strong validation of the solution. Given the strong demand for scalable NFTs, it's highly likely that other platforms and marketplaces (perhaps focused on other markets, like art and music) will adopt a ZK-rollup within the next two quarters.

Interoperability

One big uncertainty with scalable NFT marketplaces is how these environments will interact with one another.

If an artist mints an NFT collection for a very low fee on a L2 platform, how can they ensure it can be seamlessly moved onto the mainnet, and then potentially onto another L2? Can the same NFT be listed on multiple scalable marketplaces?

While money-lego interoperability and composability arguably isn't as important as it is in the DeFi world, these will be important questions for scalable NFT platforms to address as the technology rolls out. On paper, at least, those with full EVM compatibility should have an easier time bridging to the Ethereum mainnet and to other EVM-compatible chains. For those that don't have EVM compatibility (such as some ZK-rollups), there will need to be carefully implemented bridges. Over time, some scalable marketplaces may grow big enough that many creators and users need never leave the layer 2 environment, with perhaps a minority of NFT owners choosing to withdraw to the mainnet for its superior security.

02 Marketplace Fragmentation

Marketplace Fragmentation

“Liquidity” in the NFT space is currently split between a wide range of marketplaces. Some are all-inclusive, while others focus on art or music. Each offers a unique take on UX, including some crucial differences in terms of “free” NFT minting for creators.

A multitude of trading venues is certainly nothing new in the crypto world, where dozens of exchanges (centralized and decentralized) compete to offer the best prices, lowest rates, and widest range of available assets. However, this natural market dynamic plays out differently with non-fungible tokens. Unless a creator chooses to list their NFTs on multiple sites, their token will be locked into just one ecosystem.

This creates a poor experience for creators and potential purchasers alike. Those browsing NFTs may need to browse through several marketplaces to find something that piques their interest. It’s a time-consuming process that can quickly get overwhelming, considering the huge range of NFTs up for auction or sale. From the creator’s standpoint, this translates to fewer eyeballs on their work.

It’s highly likely that we’ll see a conglomeration of marketplaces in the next few years as the space matures—but even then, there will exist a multitude of NFT venues.

03 Fractional Ownership and Collateralization

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Fractional Ownership and Collateralization

One of the most intriguing NFT use cases is the ability to join others in an investment. Sure, that new Beeple piece might be way too rich for your blood—but what if you were to share the purchase with 1,000 other buyers?

This isn't possible with the current EIP-721 standard. However, that all changes with a recently adopted standard called ERC-1633. As our PR rockstar Lindsay described in a recent blog post:

A new concept, "RFTs," or, "re-fungible tokens," was introduced in 2018 with the ERC-1633 standard (or, EIP-1633). The standard, which was merged into the official Ethereum EIPs within the past couple of weeks, can enable joint ownership and division of NFT assets. Using simple queries, it gives marketplaces like Opensea the ability to confirm whether an ERC-721 NFT asset was owned by an individual or group while preserving the integrity of the ERC-721 and ERC-20 standards.

Though still new and with much to be resolved around whether/how it will be implemented by marketplaces and the ERC-20 community, as well as copyright questions, the possibilities of this are significant. In the realm of real-world objects, such as intellectual property, real estate, or very costly assets of any type, people would have the option to co-invest, divide assets, and share royalty rewards as the property is resold over time. The definition of NFTs often includes "cannot be divided into smaller units"; this newest standard addition may be cause for a change in how NFTs are defined.

There are powerful implications for musicians as well! Imagine the ability to purchase a share of a song's future revenue stream, as suggested in this recent podcast. This would provide fans with a literal vested interest in a band or producer's success, giving them a sense of ownership and incentivizing them to spread the music. The shift of power from centralized label to distributed fanbase could be the most profound music industry change we've seen since the advent of streaming.

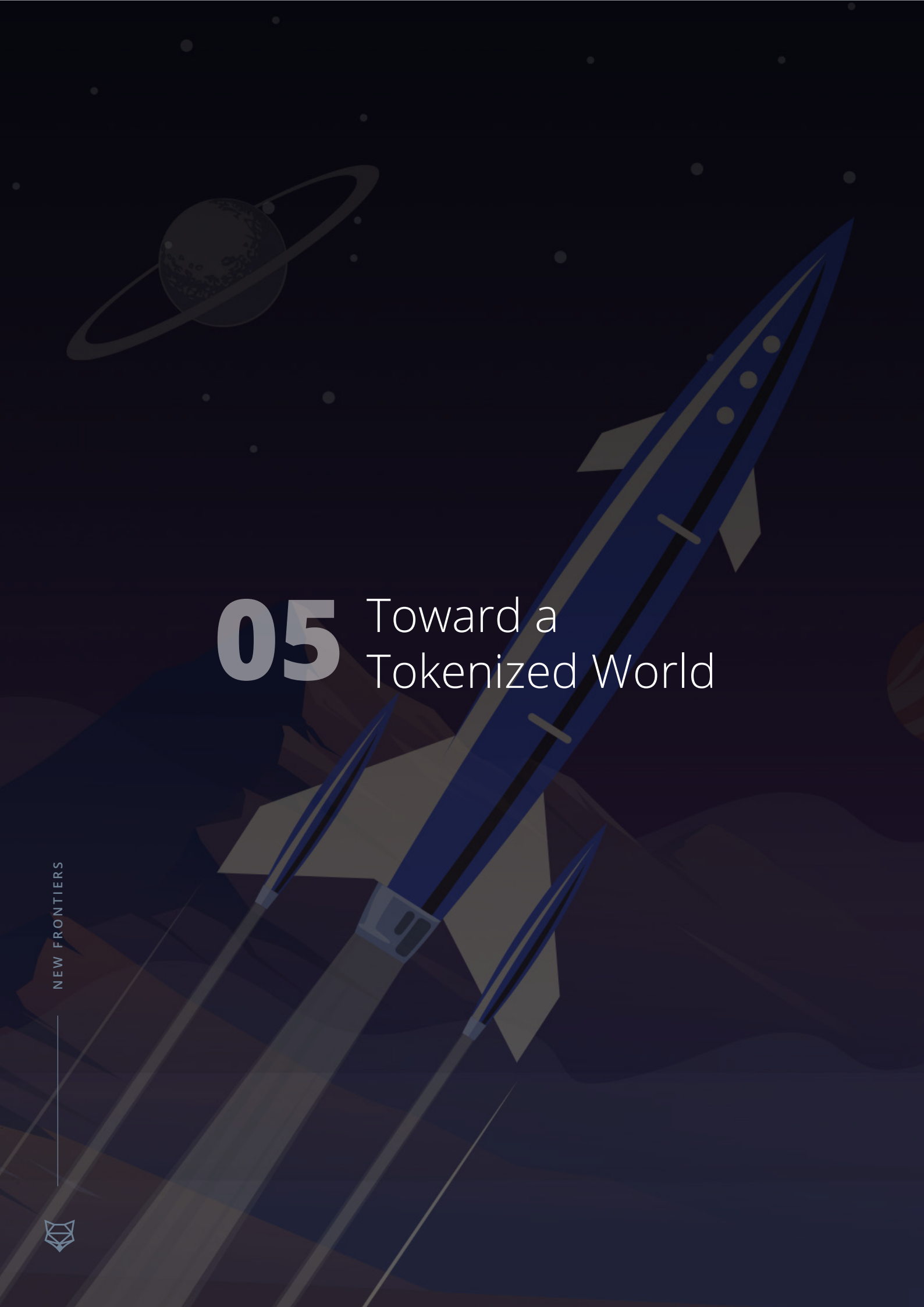
04 Copyright and Intellectual Property

Copyright and Intellectual Property

The nexus between ownership and copyright is an interesting one. Currently, the vast majority of NFTs for sale impart the purchaser with non-commercial rights. Thus, they "own" the associated work, and have the ability to sell it at some future date, but without using it in a commercial context.

But could copyright itself be tokenized? An initial effort to make this possible is scheduled to launch shortly at CXIP. The service submits users' artwork to the U.S. Copyright office, then mints the application as an NFT. This may afford some degree of legal protection for artists, although it's important to note that these NFTs are not official copyrights in and of themselves. Theft is a challenging issue as well. Artists are already having to contend with malicious actors downloading their work, then selling it under false pretenses.

Marketplaces will need to enact functionality to counteract this—something as simple as a Google image search embedded into the upload or purchase process could mitigate the most simple instances of theft. A service called Versiart also aims to address this issue by allowing artists to create certificates of authenticity and "trusted checkmark" profiles. Discerning purchasers already have the ability to thoroughly vet an artist's profile. Someone who came out of nowhere a month ago with a trove of art, for example, might in fact be selling an actual artist's work. Caveat Emptor.



05 Toward a Tokenized World

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Toward a Tokenized World

"Interesting things happen along borders—transitions—
not in the middle where everything is the same."
– Snow Crash

For all his forward-thinking brilliance, Stephenson himself acknowledges that he was just winging it when he envisioned the metaverse. Builders of the crypto ecosystem are taking a similar approach; this is a vast blank slate with very few pre-existing rules.

We're still early in the cycle of adoption for NFTs. The fundamental technology is there, but challenges such as UX and scaling remain. Once those barriers come down, expect these tokenized assets to become ever more pervasive.

Ignore the hype with respect to how many millions such-and-such NFT costs, and how much money certain artists are making; these market cycles will boom and inevitably bust over time, much like any other asset class. A bear market for NFT prices, when it happens, will not mean that the concept is somehow invalidated. We're only getting started.

Now is the time to dig in and learn more about this technology. If you're an artist or musician, NFTs are a fantastic way to connect to your audience and make money without a middleman taking a cut. If you want to support creative people, purchasing their NFTs is a great way to do that, regardless of where they live.

Pulling out to the 30,000-foot view, art and music NFTs are simply the beginning of all manner of assets winding up on the blockchain. Fractional NFTs will be especially compelling when it comes to providing new avenues for ownership to real estate and other large-ticket items.

In five or 10 years, perhaps even a bit less, NFTs will be a ubiquitous part of both our real-world and virtual, metaverse-based lives. We have a front-row seat to watch this space grow and evolve, and can even take part directly by minting, buying, selling, and building. Like all newer technologies, there will be frustrations along the way, but as with so many other aspects of crypto, there's a sense that an irresistible force is gradually shaping our society, economy, and culture. Try to act surprised when it happens!