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Forum

Reckoning with the Metaverse

Understanding Web3 Marketplaces and Economics

This is the second in a series of papers on the metaverse. In our previous paper, ***Reckoning with the Metaverse: A Primer on the Metaverse and NFTs,*** we discussed the basic building blocks – and blockchains – of the metaverse and NFTs, why they matter, and why policymakers and executives ought to begin paying attention to the space.

Introduction

The Web3 metaverse represents an opportunity for a reset that could fix some of the well-known problems of the Web2 internet, including data mining and concentration. It embodies a new, decentralized framework that employs blockchain technology to integrate virtual worlds with new types of money and assets. This model promises more opportunities for creators and users alike and offers them a greater share of the benefits of these virtual worlds than today's internet. The future looks bright judging by the money pouring into the industry: Companies related to the metaverse raised over $10 billion in 2021 alone.[1]

On the other hand, there is no shortage of skeptics who believe the Web3 vision is illusory. The critics argue this vision is just hype and prone to scams, with a bleak future given the technical and regulatory challenges it faces. They often see a brighter future for a metaverse based on centrally owned platforms, like the ones that dominate today's online gaming sector. These proponents still believe in the value of virtual goods and virtual worlds, while remaining skeptical about fully interoperable goods such as NFTs or fully interoperable worlds based on blockchains.

This paper explores the Web3 vision of the metaverse. While we recognize that this is just one of the possible visions for the metaverse, we believe policymakers and executives need to understand the economics behind Web3 concepts like NFT trading and metaverse marketplaces in order to evaluate that vision. In this paper, we provide an overview of the dynamics of NFT trading and metaverse markets. In particular, we focus on:

- Context of the Web3 metaverse
- NFTs as digital goods: new marketplaces
- Metaverse as digital worlds: new economies
- Future implications

Context of the Web3 metaverse

Q: What is Web3?

Many people talk about Web3 as the future of the internet, but there are as many definitions as there are visions.[2] The hallmark of Web3 relative to Web2 is its focus on decentralization to give users control over their data and identity. Building on that premise, among the key elements of Web3 are the use of public blockchains, the implementation of self-custodied wallets for transactions and identity verification, and the role of tokens in the system.

Some metaverses utilize the blockchain, but not all do. Defining characteristics of Web2-based metaverse platforms include using centralized marketplaces and having transactions that rely on traditional payments methods like credit cards. This contrasts with platforms that are decentralized, with transactions occurring on a blockchain.

While NFTs form an important aspect of property within Web3 and the metaverse, fungible tokens also will play a vital role. Fungible tokens include everything from cryptocurrencies like bitcoin to tokens that give users a say in the governance of the

platform. Cryptocurrencies may form the backbone of exchange between metaverse users and merchants. Governance tokens put the power to make changes to a platform in the hands of the users who hold them rather than a centralized corporation, showcasing the decentralization potential of Web3.

Self-custodied wallets are another Web3 innovation. Whereas the big tech platforms that dominate Web2 custody a user's account identity, meaning they keep passwords and data on their servers, Web3 seeks to return that function to users. With a self-custodied wallet, the owner of the private key is the only one with custody. Such wallets can hold cryptocurrencies for transactions as well as information to verify a user's identity when moving across platforms. This is crucial for both Web3 and the prospects of an interoperable metaverse. But self-custodied wallets are not a panacea: the immutable nature of the blockchain means that transactions or messages a user wants to forget, such as from an abusive user, cannot be deleted.

A blockchain is a shared ledger that can be designed to be immutable, which can

present an advantage when recording the transactions of assets on the blockchain. With NFTs, for example, it is desirable for projects to be on an open, public blockchain as that means there's an accessible record that proves one's ownership, giving the NFT value. But the ownership can be proved only on the blockchain the asset is recorded on. That necessitates choosing one blockchain over another or potentially interacting with a sidechain for speed and lower costs.[3] But there are also protocols and technologies to connect different blockchains to one another, each with their own benefits and drawbacks.

Blockchains both enable and limit how NFTs are transferred, which is critical to their economics. Take, for example, Standard ERC-721 for Ethereum-based NFTs. This standard implements an API for tokens within smart contracts. It provides functionalities including token transfer between accounts, querying the current token balance of an account, seeing the owner of a specific token, and seeing the total supply of the token available on the network.[4] The standard does not provide for royalties to creators, which has required NFT marketplaces to produce their own standards for doing so, impacting cross-marketplace interoperability.[5] A separate protocol, EIP-2981, does allow NFTs and other assets linked to smart contracts to disburse royalties.[6] EIP-2981 allows NFTs, and other assets linked to smart contracts, to disburse a royalty to the NFT creator or rights holder every time the NFT is sold or re-sold. This is intended for NFT marketplaces that particularly want to support NFT creators.[7]

Q: What are the challenges in building Web3?

Challenges for building Web3 fall into several buckets: technical, legal, and organizational. If developers are unable to overcome these challenges, we may see Web2 prevail or a more hybrid, "Web2.5" internet emerge.

From a technical point of view, if NFTs, avatars, and digital currencies are to move across metaverse worlds, there must be interoperability at multiple levels, from graphics to back-end programming to blockchains and everything in between. Variety can be what makes gaming interesting: Having different styles of graphics for different games and worlds gives them character, and standards that mandate a single style to ensure interoperability may trade off that benefit. Virtual goods are typically built within the rules of a specific virtual world. The complexity and variation of rules and graphical elements across virtual worlds makes it very challenging to ensure their interoperability. If virtual goods are strictly connected to individual platforms, it may lower the value of having transferrable representations of them through NFTs. Additionally, overcoming the legal challenges for events like hard forks are seen by some as an insurmountable problem.[8] Developing Web3 metaverses at the moment risks entering a space with immature intellectual property rights and enforcement. Creating international consensus on laws and regulations in addition to getting developers to sign on will compound this difficulty.

Organizationally, developers, executives, and policymakers will need to come together

Web3 has the potential to make significant improvements in peoples' lives. There will doubtlessly be snags and challenges in the early stages. Overcoming these requires teamwork between policymakers and industry, especially across borders.

to agree on standards that meet the legal and technical challenges. There must also be agreement within the industry over codes of conduct to avoid fraud. A recent survey found that 90% of NFT holders have experienced a scam.[9] Wash trading, where users repeatedly sell themselves their own NFT to inflate prices, has also been observed.[10]

Perhaps due to some of these concerns, there are signs that metaverse developers may face challenges attracting users. In a recent Oliver Wyman Forum survey, 76% of respondents in 10 major countries (including 79% in the UK and 80% in the US) are unwilling to pay money to participate in the metaverse.[11] Adoption may be further impacted if there is not widespread, fast internet access and affordable hardware to access the metaverse in a way that allows users to feel that their data is secure.

None of this is to say that Web3 is an impossibility. On the contrary, Web3 has the potential to make significant improvements in peoples' lives. There will doubtlessly be snags and challenges in the early stages, as with any transformational technology. Overcoming these challenges requires teamwork between policymakers and industry, especially across borders.

Q: What are the different business models for metaverse actors?

Different actors within the Web3 ecosystem will make money in different ways. While distributed control and other aspects of Web3 will give users some power and ability

to profit, there are still opportunities for other players in the field. Sharing the value derived from users with users may be a new concept for some, but synergies from such an approach may increase the size of the pie for all stakeholders.

Users

User control over their data allows for choice in what is monetized and provides an avenue for users to receive some of the value of their data. Furthermore, Play-to-Earn (P2E) gaming allows for users to earn cryptocurrency by playing certain games. P2E faces controversy over its ethics and sustainability, but it does have a large following, particularly in Southeast Asia.[12] Users may own their digital assets, in addition to their data, which can be sold on different platforms.

Creators

Creators will be able to mint NFTs on a blockchain that users can then purchase. This may range from the well-known examples of digital art projects to other NFTs like homes and objects in the metaverse. The ability to move NFT property between different metaverse worlds adds to the appeal of purchasing them as they will have broader utility. Creators will make money from selling the work they create initially, but they may also profit from continued royalties built into smart contracts each time their work is resold.

Developers

Developers can make money through sales of tokens for their platform, from the initial coin offering of an in-world cryptocurrency to NFTs like avatar clothing and land. Transaction fees can also help developers profit. Web3 presents an opportunity for entrepreneurs looking to build a new product. New platforms can plug into the network of an established platform without the established platform's permission, users can view the code of a platform and determine if they trust it without knowing the developer behind a project (or rely on a third party to rate the code), and open and interoperable platform backends allow for networks to improve the user experience to gain a competitive advantage.[13]

Investors

Ordinary people and institutions need not be users of Web3 platforms to earn money from the venture. Like any asset, metaverse property and currency can be invested in with hopes that it may appreciate. Investors expecting a metaverse platform to grow in popularity may be wise to invest in the associated governance token, which would be expected to rise in value with greater user participation as having a say in the platform governance will become more valuable. Investors should be careful, though, as the NFT market has taken a hit in 2022 with the average sales price of an NFT being $412 in June 2022 after reaching $6,800 in January.[14] Investors can also invest in the companies that will serve a role in building the Web3 metaverse through the stock market.

Intermediaries

Businesses that are not looking to directly create, develop, or invest in the metaverse

may still find a role as intermediaries. Companies can function to help creators market themselves across metaverses and build products that provide creators with monetary incentives to build in the metaverse.

Q: How are different types of NFTs and tokens used in the metaverse?

Tokens, including NFTs, have varying uses in the Web3 metaverse. Among NFTs, there are several emerging use cases:

Digital art
In the same way that art in the physical world can be prized for its aesthetic appeal or as an investment, so too can digital art in the form of NFTs. Related to digital art, NFT collectibles can be in the form of the digital representation of a physical object. These are valued based in part on their rarity and aesthetic appeal and may give the holder access to some exclusive event, like a musician meet-and-greet experience.[15]

In-world land
NFTs can be used for unique parcels of land, if the social worlds are designed in a way that different plots of land can have different values.

Other property
NFTs can form the basis for metaverse property beyond land including avatar skins and other objects. This can go beyond gaming. In a theoretical metaverse office, property like an office desk can be

uniquely identified as an NFT belonging to a particular owner.

Fungible tokens also will have important uses in the metaverse:

Digital currency
In the case of metaverses on the blockchain, these can be traded at cryptocurrency exchanges and spent in the metaverse world. Examples of these types of tokens are Decentraland's MANA and Axie Infinity's SLP.

Governance tokens
Participation in a Decentralized Autonomous Organization, known as a DAO, can be made available through a governance token or granted to holders of another token.[16] These tokens allow for voting on important aspects of the metaverse rules like User Interface (UI) changes and fee amounts.

Q: What is the role of wallets in Web3?

Wallets can form a key part of the infrastructure for both transactions and identity verification in Web3. Wallets containing an individual's cryptocurrency holdings and NFTs can obviously be used for transactions. Someone's cryptowallet presents an interesting opportunity to cater to an individual's preferences. Developers can start building products and experiences that adapt to the inventory of a user's wallet. This can come in many forms, perhaps by offering a user the option

to offset their carbon footprint. Wallets linked to a real-world identity can help with purchasing a real-world home with a more streamlined process, simplification for logging into websites without needing a plethora of passwords, and transferability of connections and contacts across platforms.[17] Many see these adaptable wallets as an input to commerce and a key innovation that will come in Web3.[18] Incumbent banks in the United States need not necessarily feel crowded out in such an environment, as the Office of the Comptroller of the Currency has permitted all nationally chartered banks to provide custody services for cryptocurrencies by holding the unique cryptographic keys for a crypto wallet.[19]

Exhibit 1: Examples of Metaverse Tokens

Fungible Tokens	**Non-Fungible Tokens (NFT)**
Interchangeable with any other token of the same type like dollars or euros	Unique such that none are interchangeable with another

| Digital currency | Governance Tokens | Digital art | Land | Skins |

Source: Oliver Wyman Forum

NFTs as digital goods: new marketplaces

Forming the backbone of virtual property in Web3, non-fungible tokens have become a common phrase for many in the past couple years. Many are just understanding what NFTs are while others have questions about their role in Web3 and the economics behind them. For those in the former camp, we recommend reading our first paper, but those looking to dig a bit deeper into the world of NFTs will benefit from reading the following sections.

Q: How and where does someone purchase an NFT? How are NFTs traded?

Purchasing an NFT requires accessing NFT marketplaces, and whatever payment channels and currencies they accept. In the case of NFTs on public blockchains, that usually means using a wallet with the underlying cryptocurrency powering that blockchain. Buyers typically look for the NFT marketplace with the best collection,

while sellers seek marketplaces with an established user base interested in similar projects and where they can get the best terms for their sale.

Note that there is a difference between a primary and secondary market for NFTs. In a primary market, one is purchasing directly from a creator. In a secondary market, one purchases an NFT from another collector. Some marketplaces allow for both types of sales, but primary transactions also can be conducted directly with creators, usually through their website.[20]

Purchasing an NFT requires owning a digital currency, most commonly Ether, as many NFTs are on the Ethereum blockchain. Owning a digital currency requires having a cryptowallet. Opening an account on a cryptowallet usually takes only a few minutes, although it does require producing identification documents to comply with Know Your Customer (KYC) procedures.

The next step is to choose an NFT marketplace. The most popular NFT exchange by all-time volume is OpenSea, with $31 billion worth of trades since inception in 2017 and $18 million in volume per day as of July 2022.[22] The next most popular marketplaces include Axie Marketplace ($4 billion in all-time volume) and CryptoPunks ($3 billion in all-time volume).[23] Once a cryptowallet is connected to the marketplace, a purchase can be made. Purchases can made through a bid at an auction or at a fixed price, depending on the NFT.

On the other side of the transaction, selling an NFT entails choosing to do so on the NFT marketplace of choice, where additional options may be required, such as choosing a Fixed Price sale or Timed Auction. Some marketplaces charge a fee for the first sale listing.[24] A Fixed Price sale is when the seller lists a price and either receives it or the NFT does not sell. Timed Auctions can have different options: selling to the highest bidder where the highest bid wins at the end and selling with a declining price where the price falls until someone purchases it. If the

Exhibit 2: Example of NFT Transaction Flow
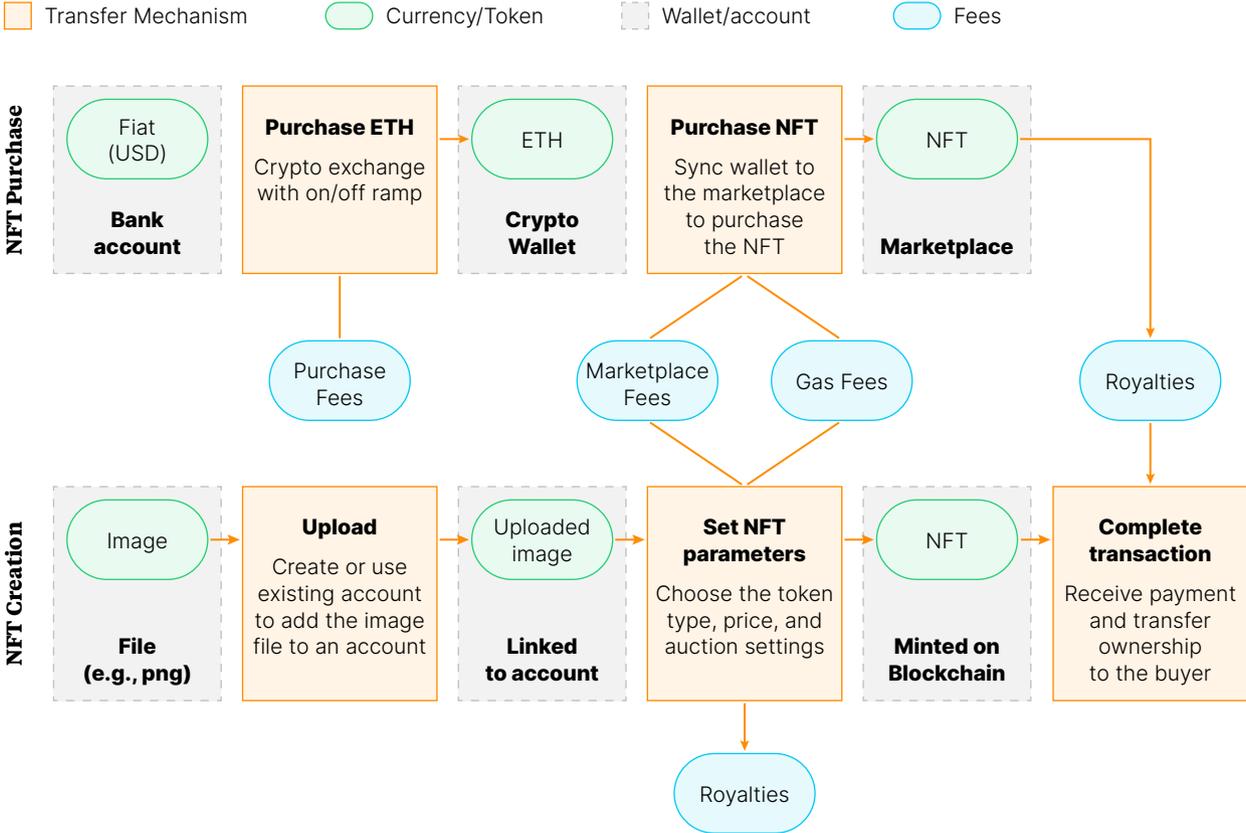
Source: Oliver Wyman Forum

Gas Fees in Decentraland

Decentraland's developers have viewed gas fees as an issue on their platform.[25] As a result, Decentraland has partnered with a provider to create a so-called Layer Two solution to reduce transaction fees. This involves adding a second blockchain to sit as an intermediary. This second layer is more lightweight and can therefore provide faster responses and a much lower gas cost. For example, Layer Two scaling may increase transaction-per-second volume by over 250 times.[26] Instead of making transactions directly on the main chain, transactions are done on the side chain, and then eventually synced back with the main chain.[27] None of this is to say that Layer Two solutions are perfect. Downsides include less composability (the ability to combine different DeFi protocols), reduced primary-chain liquidity, additional on-boarding time, and potential security vulnerabilities.[28]

auction finishes below a set amount, the seller is under no obligation to complete the transaction.[29] In the declining price option, the price falls over time given the seller's parameters until reaching a reserve price.

NFT marketplaces are expanding payment mechanisms to broaden the market, with new players emerging that allow buyers to pay with credit and debit cards, and bank transfers.[30]

Q: What are the transaction costs involved with NFT purchases and trades?

There are a number of fees involved in the purchasing and trading of tokens. Below we outline the most prominent ones:

Blockchain transaction fees
These are fees associated with recording a transaction on the blockchain, and they are influenced by the cost of the computing power and energy required to validate transactions. Amounts can vary significantly, based on the underlying blockchain. In Ethereum, these are referred to as "gas fees." They fluctuate with supply and demand. Since May 2021, they have ranged from about $5 to over $50 on average per transaction.[31] These fees may be paid by the NFT buyer, seller or marketplace, depending on the marketplace, and they go to blockchain miners to compensate them for verifying the transaction.[32] Not all blockchains have transaction fees, and some blockchains have fees as low as $0.00025 per transaction, depending on block time and size.[33]

Crypto exchange fees

There is a fee paid to the wallet provider for purchasing ETH to use for the purchase of an NFT, which has other fees.[34] For example, one of the largest exchanges charges fees ranging from 0.5% to 4.5% of the purchase price.[35]

Marketplace transaction fees

These are charged by NFT marketplaces to process transactions. Some large exchanges charge a flat 2.5% to buyers and sellers in a transaction.[36] Others levy a fee of 4.25% on the seller.[37] Some exchanges have indefinitely waived marketplace fees altogether.[38]

Minting fees

Marketplaces may charge separate fees for minting an NFT, that is, registering it on the blockchain. These fees range widely from under $1 to over $1,000.[39] Fees also can be set as a percentage of the final sale price rather than a fixed amount.[40]

Royalties

This fee will vary by NFT project, as well as NFT marketplace. For example, OpenSea allows creators to charge buyers up to 10% as a royalty fee.[41]

Q: How do NFT marketplaces differentiate themselves?

NFT marketplaces distinguish themselves by the volume and diversity of projects they represent, as well as how they pay creators. Different marketplaces may support different blockchains including Ethereum, Polygon, Klatyn, and Solana.[42]

The most salient distinguishing factor between marketplaces for digital art are the projects hosted on a given exchange. Often purchasing an NFT from a marketplace, outside of somewhere like Decentraland where there is one in-world store, comes down to taste in a particular project.

A project may choose to be listed on a certain exchange because of its underlying blockchain and other factors such as smart contract functionality, the consensus mechanism (proof of stake versus proof of work), verification speed, and transaction cost.[43]

NFT marketplaces also distinguish themselves on how they pay creators, including offering different options for royalty fees. Creators may be tempted to list an NFT on a marketplace with more advantageous royalty arrangements, but that may come at the cost of lower volume and popularity of that exchange among buyers. Smaller platforms also may compete to attract creators by offering low transaction prices and fees, whereas dominant platforms with significant user bases may be able to charge creators significantly more for the opportunity to tap into that demand.

Q: What makes some NFT projects more valuable than others?

It is no secret that interest in purchasing NFTs collapsed in Spring 2022, leading to price declines. NFT sales were down 92%

in June 2022 compared with September 2021 and active NFT wallets were down 88% from November 2021.[44] Users may be wary of the well-documented "pump-and-dump" schemes orchestrated by groups that use social media and chat rooms to spike interest in their NFT projects to raise prices and make a quick profit, leaving the buyers holding the bag.[45] NFTs have legitimate uses and digital art may have a bright future, but these issues will need to be resolved to bring that about.

Notwithstanding the issues of fraud that are too often seen with NFTs, two main schools of thought have emerged in their pricing, particularly when it comes to digital art: rarity pricing and aesthetic pricing.

Rarity pricing refers to valuations based on how rare the traits of the NFT are regardless of individual appeal. For example, this theory suggests that an NFT with a one-of-a-kind

feature would be more valuable than one that was less rare but had more aesthetic appeal. This is more in line with collectibles like baseball cards.

On the other hand, there is the aesthetic pricing theory, which dictates that value comes from how popular the traits of an NFT are and its resulting cultural appeal. The aesthetic appeal of an NFT project can be influenced by a few factors beyond taste, such as access, universe, and technical features.

With some NFTs, ownership involves not only the artwork itself but also provides access to a community, such as membership in a club with in-person events. NFTs also can gain popularity by being associated with a celebrity, for example a musician. For this reason, observers have noted that NFT projects related to video games, which often

Exhibit 3: Pricing Models for NFTs

Aesthetic pricing

Value comes from how popular the traits of an NFT are and the resulting cultural appeal

vs.

Rarity pricing

Valuations based on how rare the traits of an NFT are

Source: Oliver Wyman Forum

demand payment for the ability to play the game, are viewed negatively by consumers whereas NFT projects associated with musicians are more popular because they are more akin to concert memorabilia.[46]

There is also an aspect of being part of an NFT community's universe that is intangible but may provide value. An NFT project can have brand strength that makes it easily recognizable and popular. Tapping into this value-increasing sentiment is reliant on the intellectual property rights the creator grants to the NFT owners. Airdrops are another element that can affect the community of an NFT project. In an airdrop, an NFT developer will give away a certain quantity of a type of NFT. The giveaway often goes to people who share a social media post or to those who already own an NFT from the community.[47] Airdrops can raise awareness for a project and increase value, but they also can dilute the value and uniqueness of the community.[48]

Technical features can make some NFTs more valuable than others. There are services that use algorithms to grade NFTs based on code security, similarities to other NFTs, and energy constraints in order to give buyers more data to make a purchase decision. Higher grades signify greater value, adding another layer to the pricing function.

These elements describe the value that comes from digital art, but they also can apply to other types of NFTs such as plots of land in virtual games. Plots that are closer to in-world attractions can benefit from rarity pricing, for example. Aesthetic pricing also can play a part in the valuation: If the

community culture were not strong, the value of plots would go down substantially. Putting a precise value on any of these pricing factors is difficult and requires more research for large institutions attempting to launch financial products that collateralize NFTs of any form.
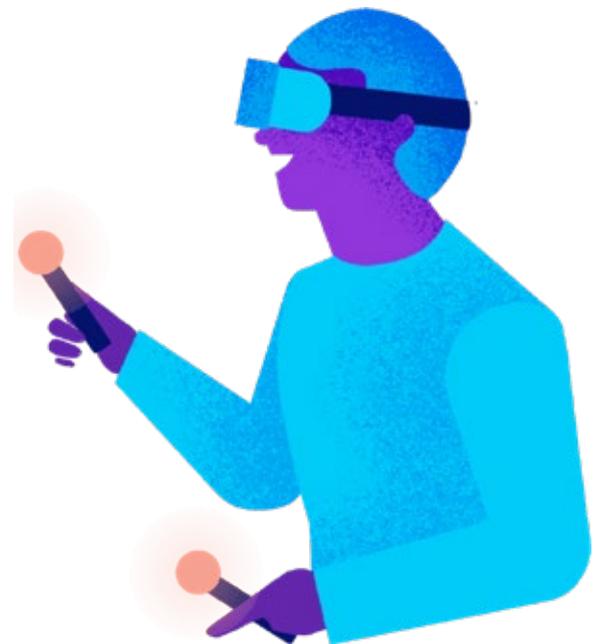
Metaverse as digital worlds: new economies

Q: What are the different types of metaverse worlds and how do their economies differ?

Web3 metaverse worlds tend to fall into two general categories: gaming worlds and social worlds. Of course, most worlds will fall somewhere in the middle. As you move closer to either end of the spectrum, different aspects of the world influence the value of land and other elements of the in-world economy. The performance of cryptocurrencies and NFTs outside of metaverse worlds also can have second order impacts on in-world economies given the synchronized fashion in which many cryptoassets behave. Metaverse worlds used for education, religious services, and work may not be built with economic incentives for users and developers as a focus.

Gaming worlds

Gaming worlds focus on players completing missions, earning a score, or performing certain tasks. First and foremost, these games need to be fun to attract and retain users. Gaming worlds rely on other incentives, perhaps even monetary rewards users can earn from playing, to be successful. Developers must assess the costs of such incentives when creating them to avoid saturating the world with free NFTs and giveaways.

In a P2E game, users earn tokens for playing the game. The tokens can then be used within the game or converted to real-world fiat currency. The game's economy and monetary system stands at a risk of recession without enough players joining the game and expanding the user base. If all users tried to sell their crypto holdings, it would crash the value of the token much as would happen with a weak fiat currency being exchanged for a stronger one.[49] For these reasons, P2E can be a risky proposition for users. P2E isn't the only incentive mechanism. "Move-to-earn" games provide crypto to users who link their fitness tracker data to the platform, rewarding

healthy behavior. Inputs to the game also can impact the economy of the platform. Free land giveaways may dilute the value of land, for example, while conferring certain benefits to owners of select parcels can drive an increase in their scarcity value. Like P2E, move-to-earn games also call for some skepticism as any model that requires constant growth to maintain the stability of the in-game economy may not be sustainable.

Social worlds

Social worlds look to mimic the offline world in a virtual setting, and that involves replicating many elements of the real economy. For example, many social worlds in the metaverse start off with a fixed number of plots of land while others will let the market determine supply as creators decide to generate new digital goods in that world or not.

In-world currency can be purchased on crypto exchanges. Other items within the platform may be traded on the in-world marketplace as well. User demand for land, through consistent play from existing users and a steady influx of new users, give the tokens their value. Without users or interest, there would not be any value to the in-world property or currency.

In such an environment, many real-world elements of real estate valuation apply to metaverse land, particularly the cliché refrain of "location, location, location." Being near other users and community amenities makes land more valuable. Central to the maintenance of such value are the world rules and physics. In a world where avatars can move only by walking at a relatively slow pace, being close to community amenities is valuable as it saves time and hassle, just as in the real world. Introduce teleportation and suddenly the distance from the world's amenities matters much less, evening land prices.

Q: How do open worlds manage their virtual economies?

Open worlds will need currency control mechanisms, especially if their in-world currency is made available in other exchanges, just as the case is for an open economy in the physical world. Depending on the type of world and the goods available within it, there could be additional types of token management needed. For example, many social worlds also have mechanisms to manage land, while gaming worlds take more care to enable incentive mechanisms.

These virtual worlds are still young and the number of examples still limited. We expect the mechanisms and ways to control virtual economies to proliferate, especially if it becomes cheaper and easier to create new virtual worlds.

Currency control

In the physical world, central banks manage the quantity and/or price of money to provide a stable medium of exchange for commerce. Web2 platforms generally have tighter control of their digital currencies, allowing only direct in-world purchases with physical world money to purchase in-game funds while restricting transfers of funds outside

the platform. While secondary markets may emerge, there are frictions to their development. On the other hand, building on a blockchain means it is fundamentally easier to exchange tokens. Web3 metaverse worlds need to contend with their currencies being traded across multiple exchanges. This is similar to how small open economies may have a harder time ensuring price stability. To enable better control mechanisms, many worlds will allow in-world currencies to be openly exchanged while restricting how other digital goods are traded (for example, limiting the purchase of land plots to the in-world closed marketplace). Another tool could be "burning" tokens to reduce supply and stabilize the price of a crashing in-world currency.

If central bankers in the physical world do not find their jobs to be easy, there is no reason to think it will be any easier for a metaverse developer to manage their currency.

Developers act as their own world's central bank, creating money and managing its supply. These cryptocurrencies would be convertible to other currencies in Web3 at a variable exchange rate. In-world currencies requiring currency control and management can be found in gaming and social metaverse platforms. There are many risks to such an arrangement as well-intentioned monetary interventions like airdrops or other free giveaways may lead to destructive hyperinflation. A move from proof-of-work to proof-of-stake that impacts the token supply and rate of token release also will impact the monetary economics of a metaverse world. If central bankers in the physical world do not find their jobs to be easy, there is no reason to think it will be any easier for a metaverse developer to manage their currency, especially if there are coded rules rather than active management of the token supply.[50]

Land control

Land scarcity is natural in the physical world. Think about Manhattan – there are very few empty lots available for development, leading to high land prices. But what if new land was added, as some have proposed.[51] What if Manhattan were infinite in size? Surely the value of a plot of land would go down if it were no longer scarce. In social metaverses, those Manhattan expansion hypotheticals can be realized with some changes to code and not engineering miracles.

Several models for land control have emerged. Decentraland contains a single metaverse layer evenly divided into plots of NFTs called LAND. All LAND parcels are the same size but they can be combined. There is a fixed LAND supply that can be amended only by a vote of the Decentraland DAO which, assuming a user has voting power, means they have some say in the matter. Somnium Space contains a single metaverse layer, but unlike Decentraland, the plots are unevenly divided with different sizes and limitations on use. Somnium Space also has not capped the number of plots issued and will occasionally issue new plots. Finally, Nifty Island gives away unlimited numbers of land parcels to incentivize users to customize them with NFTs and expedite content creation.

Land control is important for preserving scarcity and the value of a user's investment. Increasing the number of available plots can dilute the value of land. Even if developers keep their word and keep land plots fixed, if a similar world came along to act as a substitute it could dilute land prices. Scarcity may be problematic for a world that wants to grow, but increasing the number of plots would frustrate existing users. Solutions to this conundrum present risks of their own. Some proposals include giving away free, uncapped plots of less desirable land or limiting the holdings of individual users who would otherwise be hoarding plots.

Incentive mechanisms

Attracting users to a metaverse platform requires incentives. This is no different than any other customer acquisition incentive plan. A store might offer a sale to incentivize customers to come in. They may have loyalty programs where consumers can earn reward points that can be used to exchange for certain products and perks. In the metaverse, P2E gaming can be viewed as a rewards-earning customer acquisition incentive mechanism. Unlike earning reward points for a discount on groceries, P2E games pay users in cryptocurrencies.

P2E is not without controversy. A downside of P2E gaming may be that users see it as too profit-driven to create a loyal, sustainable user base.[52] Introducing money into a hobby sounds attractive to many, but for those who enjoy gaming as a break from work, adding money to the equation can disrupt the sanctity of the medium and infringe on overall work-life balance. If this view gains prominence, it can lead to issues with P2E games' growth in some markets. Alternatively, the P2E model could attract hackers from rogue regimes that can manipulate P2E game tournaments to win cryptocurrencies.[53] Further, if the cryptocurrency a P2E game uses for payouts crashes, many users may have spent hours playing games for nothing when they expected a significant monetary reward.

P2E is just one example of a metaverse incentive mechanism. The Nifty Island free land giveaway is an example of a social metaverse providing a customer incentive mechanism. This is like an airdrop where users receive a free NFT to promote a community. It could raise the value of all property in the platform if it becomes more popular with users, but it risks devaluing in-world assets if demand does not keep pace with the expanded supply. Other metaverse worlds like Shiba Inu's are experimenting with giving a portion of funds from land sales to early buyers to incentivize them to bid.[54]

Q: How are metaverses governed?

The governance of metaverses has been subject to much experimentation. Some metaverses are run by private companies with centralized governance, as is the case with Meta's Horizon Worlds and the Somnium Space platform. In other cases, metaverses are governed by a DAO, an organization that uses blockchain technology to allow voting by users who own a particular token. Governance of the metaverse is particularly important for land policies. Scarcity drives much of land's value in the virtual world, so decisions by the governing body to increase the amount of land can affect existing property owners. Changes to the rules and physics of a world can also drive impact. Metaverse governance can fall into a number of archetypes:

Centralized and corporately controlled
More commonly seen in a Web2 metaverse, this type of governance involves the developer, usually a corporation, controlling all aspects of the decision making. Users have no direct power to control the world, though as is the case with any system, they can "vote with their feet" and switch to other platforms or use social pressure to elicit action from the developer. A more democratically minded corporate developer can allow for polls to gauge user preferences and accept such results as binding, but there is no obligation for them to do so.

A centralized governance structure may be able to more quickly make decisions to manage the in-world economy by making changes to the monetary system, land policy, or incentive mechanisms. But this governance system requires users to trust that the developers will act in the community's best interest and keep their word about policies that give value to a community. A developer looking to make money could add more plots of land to a world if users have no voting rights to prevent such an act.

DAO-governed with assigned voting rights
A decentralized metaverse could include governance in the form of a DAO. The DAO would vote to make decisions on everything from limits on land parcel holdings to changes in the world's physics. In a DAO with assigned voting rights, the right to vote is assigned based on a factor such as the amount of land a user holds.

A DAO can be slower than a centralized structure, especially in times of economic crisis. Time needs to be given for users to have a chance to vote.[55] It is in some ways like comparing the speed of governance in a

direct democracy to an absolute monarchy: it is not the fastest form of governance. But it can be more democratic to take decisions pertaining to land policy or airdrops with input from the users. Users may see a land airdrop that increases interest in the platform as a risk worth taking even if it reduces the scarcity of land. That said, a lack of engagement in the DAO can lead to decisions being made by a smaller number of users that are not representative of the whole group.
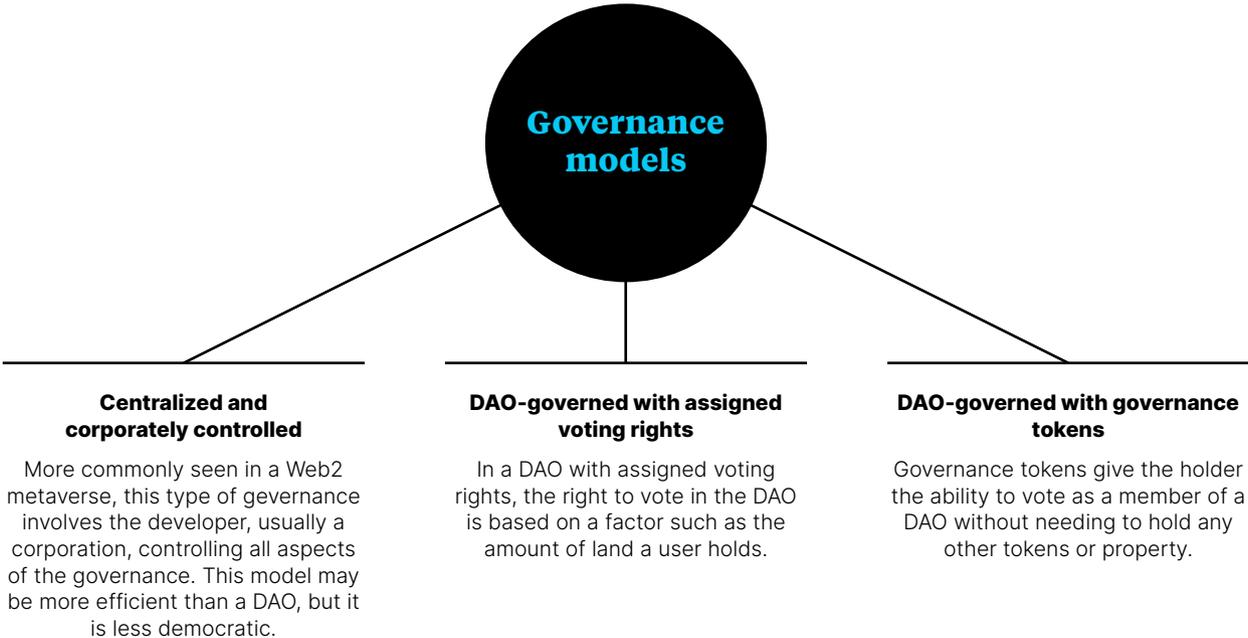
DAO-governed with governance tokens
This model grants voting rights to holders of the DAO's governance token. Holders need not be users owning in-world land.

Instead, the governance tokens have a value of their own that can be traded. Governance tokens in a popular world are likely to be of significant value as changes to the rules can have material effects on the value of in-world land and other property.

A DAO with governance tokens has similar benefits and drawbacks to a DAO with assigned voting rights. Where governance tokens can make a difference is in how representative the DAO is. Assigned voting rights can theoretically give one vote per user, but governance tokens can enable a user to obtain more than one vote, possibly concentrating power in a smaller group with itsown interests.

Exhibit 4: Governance Models in the Metaverse

Governance models

Centralized and corporately controlled

More commonly seen in a Web2 metaverse, this type of gevernance involves the developer, usually a corporation, controlling all aspects of the governance. This model may be more efficient than a DAO, but it is less democratic.

DAO-governed with assigned voting rights

In a DAO with assigned voting rights, the right to vote in the DAO is based on a factor such as the amount of land a user holds.

DAO-governed with governance tokens

Governance tokens give the holder the ability to vote as a member of a DAO without needing to hold any other tokens or property.

Source: Oliver Wyman Forum

Future implications

Q: What are considerations for financial services products in the metaverse?

As we discussed in our previous paper, metaverse-native financial products are beginning to emerge. These include physical-to-digital products, like metaverse mortgages based on an individual's real world credit history; digital-to-physical products, like fiat loans using NFTs as collateral; and purely digital products, like in-world NFT loans for in-world currency. Each of these will require different types of infrastructure. This calls for adapting the existing 5C credit framework to the metaverse: collateral, character, capital, capacity, and conditions.[56]

Collateral
Expanding acceptability of NFT and metaverse goods as collateral requires not only ensuring they can be traded, but also knowing how these digital goods should be priced. The price of NFTs today are highly volatile, as evidenced by the average sale price of an NFT dropping from $6,800 in January 2022 to $412 in June, according to NonFungible.[57] Without a broadly accepted pricing model for NFTs to take certain characteristics and assign a fair market value at a given time, be they a Bored Ape Yacht Club piece of digital art or an NFT house, loans based on NFTs may risk being undercollateralized due to pricing changes. Financial institutions must be mindful of the elements that make one NFT more valuable than another to successfully enter the digital-to-physical metaverse financial services realm. A pricing model would answer the question of what makes an NFT project more valuable than another.

Character
Knowing about the person to whom you are giving a loan is important in deciding whether to grant the loand and determining the interest rate. Typical components of a credit score are relevant in the metaverse, but this would require some form of integrated identity to connect a metaverse persona to a physical world person. If metaverse users want to separate their real-world identities from their virtual identities (or even have multiple virtual identities), making such a connection could diminish their desire to

Expanding acceptability of NFT and metaverse goods as collateral requires not only ensuring they can be traded, but also knowing how these digital goods should be priced.

use the metaverse. Other elements of a user's character, such as adherence to the code of conduct within a metaverse platform, can play a unique role.

Capital

In this case, capital is a user's holdings of NFTs and other digital assets that could help to pay off a loan in the event the collateral value crashes. Putting up a greater amount and value of digital assets to back the loan could result in more favorable loan terms for the borrower.

Capacity

The capacity to repay a loan is generally a function of a person's debt relative to income or wealth. While a loan fully collateralized with an NFT results in less risk to a lender (unless the value of the collateral crashes), there may be an income component to the metaverse through P2E gaming. A user can theoretically use their P2E income to pay back a metaverse loan (or even a physical world loan). The P2E income can increase their capacity to take on debt as it provides a history for lenders to review and possibly place a lien on in the event of default.

Conditions

As with any loan, the conditions for how it will be used matter to lenders. If the loan is for an NFT project that the lender believes in (or conversely, dislikes), it can result in different loan terms. This also can reflect a lender's feelings about a certain metaverse world as loans to be used in worlds and platforms that have healthily functioning

ecosystems and price stability are riper for lending than those that are failing.

Q: What are the risks in getting involved in Web3?

Legal uncertainties represent one important risk for Web3 as many questions about jurisdiction and intellectual property rights must be answered. There are technical and operational challenges that compound these concerns. These issues will likely take a long time to resolve, and without a workable resolution, the future of Web3 may be imperiled. For example, ledgers must be able to comply with court orders to reverse transactions in the event of unlawful activity. Hacks and cybersecurity issues also must be guarded against, although these are hardly issues limited to Web3. P2E games that have faced destructive hacks in recent times underscore this fact—one recent hack led to over $650 million in losses for a top P2E game.[58]

One leading NFT marketplace stated that 80% of the NFTs created using a free minting tool were spam, scams, or other frauds.[59] As of now, given capacity constraints, blockchains do not store actual digital assets, merely the internet links to them. This is a technical issue that may be solved in time, but for now investors in the metaverse should know what their NFT purchase actually entails.

Making sizeable, public investments in risky Web3 endeavors that end up failing presents reputational risk for those getting involved and promoting them, beyond any monetary losses. For those seeking to get involved in

the Web3 ecosystem, perhaps it may be best to invest in the projects where there is a clear advantage to Web3 systems over existing Web2 solutions.

Q: What does a Web3 metaverse mean for policymakers and executives?

Policymakers should start paying attention to the metaverse. Everything from property rights to jurisdiction, personal conduct risks to operational concerns, and identity verification to data sharing will need a regulatory framework. The exact policy concerns and necessary responses will depend on what platform and cross-platform models become dominant. On one hand, a future may emerge like the current Web2 version with metaverse platforms that are centralized and retain control over how avatars and digital goods are exchanged. On the other hand, the pure Web3 vision of the metaverse may come to fruition, opening an array of questions over its marketplaces and the business practices needed to maximize value and provide a positive user experience. Existing frameworks may be applied to the Web2 version, but if the Web3 vision prevails, policymakers would be well served by thinking about how they can make it better for users.

There are countless open questions involving the economic risks of NFTs, consumer protection issues, and prudential issues for incumbent developers, individual creators, and metaverse users that will have to be thought out. These present new types of risks for executives and policymakers. Price

stability in the physical world is managed by governments and central banks, but in the future virtual worlds may need to manage their own inflation crises, creating another layer of inflation risk for individuals.

The Web3 metaverse may suffer from some of the same issues as Web2 if governments do not draft adequate regulations to protect consumers. Executives looking to get involved in Web3 will benefit from clear regulation and standards to build and prosper with innovative, interoperable business models that encourage investment. Policymakers and executives need to get to work to turn the metaverse's value-building potential into reality.

References

1. See Crunchbase, "VCs Will Spend Billions More to Make the Metaverse a Reality"

2. For a longer discussion on the definition and its origin, see for example Harvard Business Review, "What is Web3?"

3. For example, this is the case with Decentraland's Polygon Layer-2 scaling solution for Ethereum.A sidechain is a mechanism that serves as a bridge between two blockchains, allowing for the transfer of assets. It can help to reduce traffic on the main chain which increases transaction speeds while lowering costs, but it may suffer from security concerns.

4. Some blockchains develop standards that can be used to enhance how certain tokens are exchanged, ascribing certain properties to the transaction. This could be useful in the case of royalties. However, if those standards are not set at the blockchain level, it then becomes up to the marketplaces to develop that functionality. See Ethereum.org, "ERC-721 Non-Fungible Token Standard"

5. See VentureBeat, "NFTs have a royalty problem"

6. For a discussion of the difference between EIP (Ethereum Improvement Proposal) and ERC (Ethereum Request for Comments), see Anett on Medium. As Anett states, the main difference between EIPs and ERCs is that EIPs are defining mainly Ethereum Core functions and ERCs are defining decentralized application layer functions and designs. ERC is one of category of EIPs but ERCs are the most used EIPs.

7. See Ethereum.org, "EIP-2981: NFT Royalty Standard"

8. See Investopedia, "Hard Fork (Blockchain) Definition". A hard fork (or hardfork), as it relates to blockchain technology, is a radical change to a network's protocol that makes previously invalid blocks and transactions valid, or vice-versa. A hard fork requires all nodes or users to upgrade to the latest version of the protocol software.

9. See Privacy HQ, "Less than half of NFT owners feel their NFTs are secure"

10. See NBCNews, "People are selling themselves their own NFTs to drive up prices, report finds"

11. See Oliver Wyman Forum, "The New People Shaping Our Future"

12. See CoinMarketCap, "A glimpse into Play To Earn (P2E) in Southeast Asia with ASPO World"

13. See Harvard Business Review, "Why Build in Web3?

14. See Yahoo, "Cryptoverse the Bonfire of the NFTs"

15. See Dropstar.org

16. See Binance Academy, "What is Decentraland (MANA)?

17. See BigThink, "Why the metaverse can't exist without a blockchain"

18. See Not Boring by Packy McCormick, "Tokengated Commerce"

19. See OCC Interpretive Letter 1170, July 2020

20. See DataDrivenInvestor, "NFTs 101: Primary and Secondary Markets"

21. Ethereum had 95% of the market as of 2021, and as of February 2022 was close to 80%. See Securities.io, "Ethereum (ETH) Price Recovers Strongly, Surges Toward $3,200"

22. DappRadar, accessed July 10, 2022

23. DappRadar, accessed July 10, 2022

24. See Wired, "How to Buy and Sell NFTs (If You Must)"

25. See CoinDesk, "Decentraland Launched Dapp Portal With Polygon to Bypass High Gas Fees"

26. See Finematics, "Ethereum Layer 2 Scaling Explained"

27. See Decentraland, "Second Layer Blockchain"

28. See Medium, "What are the Drawbacks of Layer-Two (Off-Chain) Blockchain Solutions?"

29. See OpenSea, "How do timed auctions work?"

30. See NicheGamer, "OpenSea accepts credit cards through MoonPay"

31. See CoinTelegraph, "Ethereum gas fees drop to lowest levels since August 2021"

32. See OpenSea, "What are gas fees on Ethereum?"

33. See Solana Compass, "Why Are Solana's 'Gas' Fees For Transactions So Low?"

34. See Protocol, "NFT fees are too high. Here's how to fix them"

35. See NerdWallet, "Want to Buy Ethereum? Here's What to Consider"

36. See Medium, "Top 6 NFT Marketplaces – All you need to know"

37. See Medium, "Top 6 NFT Marketplaces – All you need to know"

38. See TechCrunch, "For a limited time Coinbase's new NFT marketplace will waive transaction fees"

39. See PosterGrind, "How Much Does It Cost to Mint an NFT?"

40. See PosterGrind, "How Much Does It Cost to Mint an NFT?"

41. See Protocol, "NFT fees are too high. Here's how to fix them"

42. See OpenSea, "Which blockchains does OpenSea support?"

43. See Fasset, "A Guide on How to Choose the Right Blockchain for your NFT Project"

44. See Wall Street Journal, "NFT Sales Are Flatlining"

45. See Caughtin4K, "The secret inner workings of an NFT Pump & Dump Group"

46. See The Platformer, "Why gamers hate crypto, and music fans don't"

47. See Boardroom, "Crypto Airdrops Explained"

48. See GrowthChain, "Everything you Need to Know Before Launching an Airdrop Campaign for your Blockchain Token or NFT"

49. See The Block, "Play-to-earn game Axie Infinity: Where does the money come from?"

50. See Huobi, "The relationship between monetary policy and tokenomics"

51. See New York Times, "1,760 Acres. That's How Much More of Manhattan We Need"

52. See Medium, "An Analysis of Play-to-Earn"

53. See The Diplomat, "How North Korea Might Exploit New Video Games for Crypto"

54. See U.Today, "SHIB's Metaverse: Rewards from Land Event Sales Might Soon Be Available, Here's When"

55. See Tally.xyz, "DAO Governance: Challenges, Ideas, and Tools"

56. See Investopedia, "5 C's of Credit"

57. See Yahoo, "Cryptoverse the Bonfire of the NFTs" https://fortune.com/2022/03/04/nft-bubble-market-crash-price-value/

58. See CoinTelegraph, "The aftermath of Axie Infinity's $650M Ronin Bridge hack"

59. See OpenSea on Twitter, Januaryt 27, 2022

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