How Technology Changes Monetization of Musical Digital Assets

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INTRODUCTION

This thesis explores how blockchain technology might affect the music business. The music industry and its current difficulties are briefly described in the first section. In the second section, blockchain technology is described along with its features and possible uses in the music business. The advantages of blockchain technology for artists are covered in section three, including the capacity to maintain creative freedom, boost income, and be fairly compensated for their contributions. The ecosystem of the present music industry, which includes record companies, publishers, and streaming services, is the subject of Section 4's in-depth discussion of the potential effects of blockchain technology. In section five, the issues raised by the introduction of blockchain technology are discussed, including the necessity for a consistent protocol, potential negative impacts on artist promotion, and difficulties with micropayments. Lastly, section six emphasizes the significance of creating intellectual property laws and legal frameworks to safeguard the interests of all parties involved in blockchain-based transactions. Overall, this thesis emphasizes the vast potential of blockchain technology to change the music industry, giving musicians more autonomy, transparency, and ownership over their work, as well as the possibility of increased revenue and streamlining the ecology of the sector. To enable the successful application and adoption of blockchain technology in the music industry, substantial difficulties must be overcome.

The flow of this thesis goes as follows: Section 1 establishes that conventional artistic assets are primarily used for distribution purposes. Section 2 discusses the motivation for changes in the music industry. Section 3 provides an overview of music NFTs and their potential to revolutionize the music industry. Section 4 discusses how artists and investors can monetize music in these marketplaces, and Section 5 explores how blockchain companies monetize musical assets and manage platforms. Section 6 offers the author's viewpoints on the future of the music industry with blockchain technology, highlighting its promising potential while also discussing concerns about its implementation on artists and the industry as a whole. Finally, section 7 concludes the thesis.

SECTION 1: Conventional Artistic Assets Are Mainly Used For Distribution Purposes

The conventional art world has significantly changed in recent years. First, in the past, the main source of revenue for the music industry came from the sale and distribution of

physical copies of music, such as CDs or vinyl records. However, the rise of the internet and smart devices gave rise to digital streaming platforms; the industry has shifted towards streaming as the primary mode of music consumption. This has led to a change in focus from traditional distribution methods towards new music consumption and the ownership of music intellectual property as a valuable asset that can generate significant revenue through licensing and royalty payments. Such transition is demonstrated in the graph below:
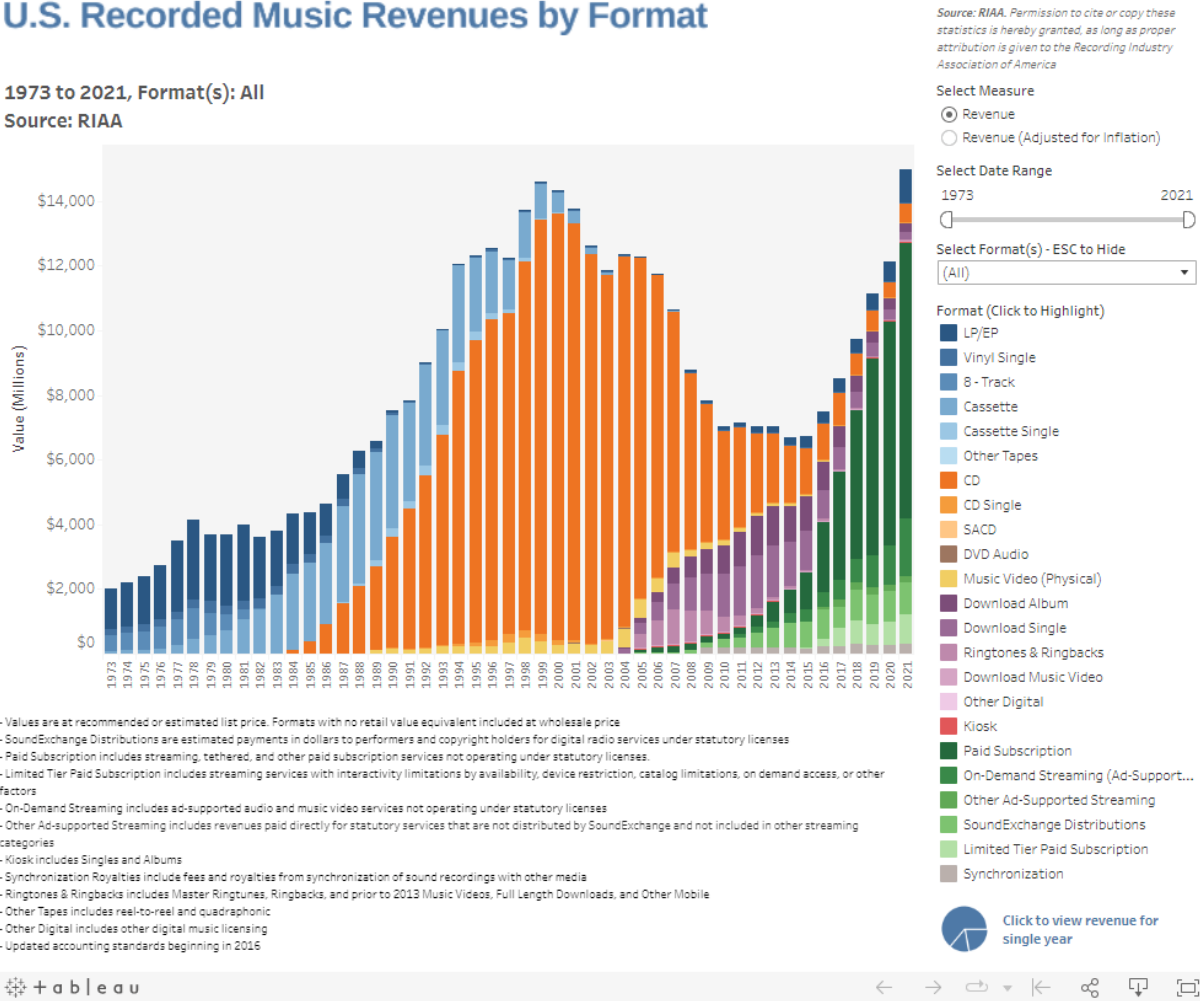
In addition, creators served as both the main artists and the exchange's intermediaries, using art assets primarily for distribution. The emphasis has switched to ownership and investment in creative works, though, with the emergence of non-fungible tokens (NFTs), which makes the conventional art industry undergo a substantial transformation. The main purpose of art assets in the past was dissemination, and people served as both the creators and the intermediaries in the trade process. With the reorientation of focus, the emphasis has changed

from access to creative works to ownership and investment in them. NFTs enable artists to sell their goods directly to consumers without the use of intermediaries.

By establishing a market for digital creative assets like music, movies, and images, NFTs have revolutionized the art industry. Anyone can now own a piece of ownership in a digital good and benefit from it, thanks to this new approach. As a result, there are now more opportunities for both art enthusiasts and artists to profit financially from their work in the longer term.

SECTION 2: Motivation for Changes

Moving on to the driving forces behind the changes we have seen, it is critical to comprehend why the asset class of music royalties has grown more desirable to investors. The consolidation of the music industry is one of the key elements influencing this change. The top three record labels and music publishers control a sizable share of the market, making up the tiny group of large businesses that dominate the music industry. Despite concerns about the negotiating strength of artists and the variety of musical genres raised by this concentration, it also offers investors the chance to profit from the prospective returns of music royalties.

According to Music & Copyright's annual survey of the music business, in 2021, a ~ 70% market share for music recordings is held by the three biggest record labels: Universal Music Group (32% market share), Sony Music Entertainment (21.7%), and Warner Music Group (16.7%).

| (%)	Physical		Digital		Physical/digital	
	2020	2021	2020	2021	2020	2021
UMG	25.8	26.8	34.1	33.3	32.1	32.0
SME	21.3	18.5	20.5	22.6	20.6	21.7
WMG	10.5	11.4	17.6	18.2	15.9	16.7
Independents	42.4	43.2	27.9	25.9	31.4	29.6

Note: totals may not add up to 100% due to rounding.

Source: *Music & Copyright*

Continuing the topic of how interesting music royalties are as an investment, it should be noted that investors are growing more and more interested in the returns on music fees, especially in an environment with low dividends and interest rates. Investors are looking for strategies to increase their returns on investment in the present market environment without

taking major risks to their wealth. For instance, in 2022, the yield on the US 10-year treasury was 3.35%, that on the S&P 500 dividend was 1.71%, and that on the Vanguard High-yield Corporate Bond (VWEHX) was 3.17%. Meanwhile, in comparison, music royalties could seem like a more desirable asset type. For instance, according to statistics from 2022, Hipgnosis Songs Fund's (SONG) dividend yield was 6.36%, while the average yearly return on investment for catalogs sold on Royalty Exchange's platform was better than 12%. Due to their high-income potential and low link to macroeconomic performance, these examples show that music royalties are a more alluring investment choice in the current market environment. As a result, more investors are considering the possible financial returns of investing in music royalties.

In the past, there hasn't been a noticeable connection between recorded music and music publishing data and overall spending patterns. By contrasting the recorded music industry's 15-year collapse brought on by piracy and its subsequent comeback powered by streaming, Goldman Sachs illustrates this lack of a link between the two variables (PCE). Recorded music spending has exceeded Personal Consumer Expenditure (PCE) growth by a factor of 2.4x since 2016, according to Goldman's "Music in the Air" study below:

Low Correlation of Record Music Spend with Personal Consumer Expenditures (PCE): 1994-2019
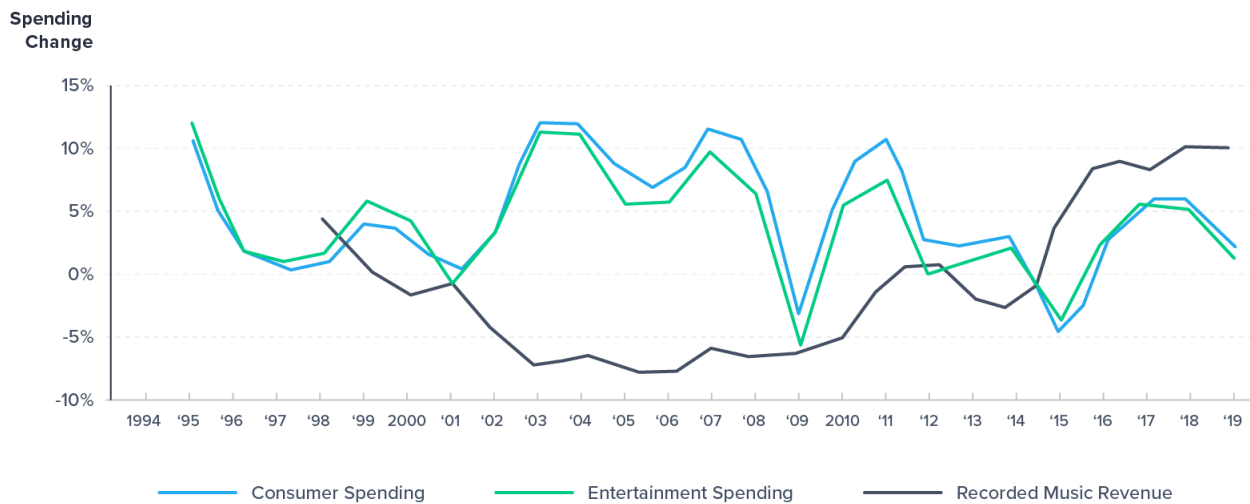
Source: Euromonitor, Goldman Sachs Investment Research

As music royalties continue to be a desirable asset class for investors, there is an increased focus on the strategies that active investors use to enhance the value of music

intellectual property. Two key strategies include finding creative licensing opportunities for existing music IPs and decreasing the cost and payment timing of royalty collections. The first strategy involves searching for creative licensing possibilities for previously existing music IPs. In order to find fresh licensing opportunities in a variety of media, including video games, movies, TV, advertising, and cover songs, labels, publishers, and royalty funds can search their present song catalog. Using this strategy, investors can increase the potential revenue from their musical intellectual property. The second strategy tries to lower the price of royalty collection and the frequency of payments. Many different middlemen, including collection agencies and organizations, are frequently involved in the intricate money flow from end users to the owners of music intellectual property rights. Cash flow concerns arise since it may take these collectors six to twelve months or longer to pay the right holders. Song management is possible for labels, publishers, and royalty funds.

Continuing the discussion on strategies to increase the value of music intellectual property, the following section will focus on the application of blockchain technology for monetizing digital music assets. The use of blockchain, as exemplified by Audius, will be examined to demonstrate how it can streamline the monetization process by removing the need for intermediaries. Through this analysis, the potential benefits and drawbacks of blockchain technology for music monetization will be evaluated.

SECTION 3: Music NFTs and the Decentralized Method

In this section, I will look at the rise of web-3 streaming services along with the growing acceptance of non-fungible tokens and how music built on blockchain works through the analysis of Audius.

A. Blockchain Technology

The need for new models and alternatives in the music industry has been intensified by the emergence of Web3 and the growing acceptance of non-fungible tokens (NFTs). A decentralized infrastructure that promotes peer-to-peer (P2P) interactions has been created by the growth of Web3 streaming services, particularly the use of non-fungible tokens (NFTs). By doing away with intermediaries that now hold a sizable amount of authority, like Spotify and Apple Music, these technology improvements offer a new avenue for independent musicians to retake control of their creativity and monetary remuneration. According to a Citigroup report in 2017, since just 12% of the $43 billion the music industry generates each year is paid to

musicians, it is clear that new business models are absolutely necessary. Therefore, the introduction of Web3 streaming services and NFTs into the music industry has the potential to alter the established order and give artists more financial stability and independence. The image below can better demonstrate how Web 2.0 streaming services compensate artists:

ňft now

Platform	≈ Pay per stream	≈ Streams to earn $1
Amazon Music	$0.004	250
Apple Music	$0.007	143
Spotify	$0.004	229
Soundcloud	$0.003	305
YouTube Music	$0.008	125
Pandora	$0.00133	752
Napster	$0.019	53
Deezer	$0.003	333
iHeartRadio	$0.017	59

While many people continue to use Apple Music or Spotify for their audio needs, a few extremely potent Web3 streaming platforms and NFT markets have recently gained notoriety and taken the world by storm. As they provide strong new opportunities to build community, exchange music, and even get paid in crypto on the blockchain, these platforms are extremely beneficial for independent musicians. Peer-to-peer (P2P) interactions have risen thanks to the Web3 streaming services' decentralized infrastructure, particularly NFTs. In doing so, these technologies assist independent artists in regaining control over their work—and their payment —by minimizing involvement or even getting rid of intermediaries like Spotify and Apple Music, who now hold all the power.

B. Music Built on Blockchain- Music NFT (Audius as an Example)

In order to understand how a web-3 streaming service works, I provide an analysis of Audius as a typical example, from which other platforms can be built on a similar fundamental base platform. First, before looking at Audius, we need to know that NFT is a non-fungible token that denotes the possession of a digital asset on a blockchain. For musicians, music built on blockchain can be seen as a Music NFT, which stands for an audio track or file in a high-quality

format, such as MP3, WAV, or OGA. On the web-3 service platform, the benefit of adopting NFT for music is that the blockchain will continue to store all of the information about the music file. There are records of information like the file's originator and whether or not it is a limited-edition music file. This makes it easier to establish who owns the music files so that nobody can change the NFT's ownership information. NFTs also give musicians a lot more flexibility than conventional streaming services.

The table below provides a comparison between the Traditional Method and Blockchain-Built Music Platform:

Characteristics	Traditional Method	Blockchain-Built Platform
Convenience of tracking	Tracking royalties is a tedious and time-consuming process that involves several parties and human reconciliation.	Simplifies tracking and provides a visible, irreversible record of ownership and distribution.
Control of royalty payment	The decision-making of intermediaries affects the timing and accuracy of royalties payments.	Automated royalty payments made possible by smart contracts ensure prompt and precise distribution.
Pros and cons of 3rd party involvement	While important for copyright management, third-party middlemen (such as record labels and collecting societies) can be expensive and cause payment delays.	Disintermediation lowers expenses and enables more direct interactions between consumers and artists. To handle their rights and earnings, artists may need to take on additional responsibility and work.

1) *Overview of Audius uses the Ethereum blockchain as a decentralized platform*

At the high level, users can listen to the tunes for free after the artists post them. To become an artist on Audius, there are no prerequisites or voting requirements. Anyone may register, add tracks and artwork, and begin.

The three user types that make up Audius are artists, listeners, and node operators.

Content nodes and *discovery nodes* are the two subcategories into which nodes are further subdivided. For the benefit of the artists, the *content nodes* host and oversee content.

The music and metadata that are uploaded to the Audius blockchain are instead indexed by *discovery nodes*. This makes it quick and simple for users to search for musicians or songs. Although it is entirely optional, artists can also act as content nodes.

Considering users' and listeners' perspectives, similar to Spotify and Google Play Music, Audius provides high-quality streaming at 320kbps. Audius has more than 100,000 artists on board despite being a relatively new platform. Mike Shinoda, Skrillex, Wuki, Odesza, Skrillex, Diplo, Disclosure, and numerous others come to mind. Of course, users are completely free to listen to all of these musicians and their tracks. Additionally, users have a rare chance to influence the direction of the site with the voting privileges they receive from owning AUDIO. A fan-artist collaboration is also available on the platform, where users can contribute covers or remixes of original songs in exchange for AUDIO tokens.

Some more specific characteristics of Audius are as follows:

i. A web-based streaming platform designed for all musicians, not just those with labels, is available. The music-sharing technology Audius is decentralized, community-owned, and artist-controlled. For artists to publish, monetize, and distribute their work directly to fans, Audius offers a blockchain-based substitute to the market's streaming platforms.

ii. Create a following, post updates on your efforts, and upload finished songs for global consumption.

iii. Without needing to leave the platform or sign a record deal, create, expand, and monetize.

iv. Audius's user base is divided into three groups based on their demographics: service providers, artists, and fans of content. There are some users who check all three categories.

- Musicians share stuff with their fanbase by uploading songs, making albums, and so forth.

- Users stream music, make playlists, subscribe to and follow artists, and share material with their social networks.

- Service providers provide music streaming, app traffic, and network security.

The team promises that musicians will always be able to disseminate their songs without paying a cent. Audius does not deduct a percentage of the money that artists make, in contrast to

the majority of other music streaming services. The group described the workings of Audius in their white paper. This includes:

- A token economy supported by artist tokens, the Audius platform token ($AUDIO), and third-party stablecoins.
- A music and metadata sharing ledger and decentralized storage system.
- A content track encryption system combined with a user-specific proxy re-encryption key unlocking method that is programmable.
- A decentralized governance mechanism that gives artists, node operators, and fans the ability to vote on protocol changes and upgrades both individually and collectively.
- A discovery protocol that enables users to quickly query metadata.

Artists are compensated by the platform in $AUDIO for ranking on the Audius charts through a rewards scheme. The remaining 10% goes to investors who fund the Audius network, while musicians are eligible to earn 90% of the revenue in AUDIO.

2) *Audius uses Ethereum-based ERC-20 tokens (AUDIO) to enable community governance.*

i. <u>What are ERC-20 tokens?</u>

According to the Blockchain Council, an ERC-20 token has the following characteristics:
- ERC-20 tokens are a type of cryptocurrency built on the Ethereum Blockchain.
- They are digital tokens that can represent anything from shares in a company to virtual assets in a game.
- ERC-20 tokens are unique because they follow a standardized set of rules and guidelines.
- These guidelines ensure that any token built on the Ethereum Blockchain will work seamlessly with any other ERC-20 token, making it easy for developers and users to interact with them.
- ERC-20 tokens have become the de facto standard for creating new tokens on the Ethereum Blockchain, with the majority of tokens on Ethereum being ERC-20 tokens.
- This standardization makes it easier for developers to create new tokens and for users to interact with them, as they all follow the same set of rules.

- Additionally, ERC-20 tokens have enabled the creation of decentralized applications (dApps) on the Ethereum network, which has the potential to revolutionize industries.

That to say, Audius uses Ethereum-based ERC-20 tokens (AUDIO) to enable community governance. This benefit means that users, music producers, and node operators can suggest and vote on protocol updates that ensure the platform's continued growth and success. As an ERC-20 token, AUDIO follows a standardized set of rules and guidelines, ensuring seamless compatibility with any other ERC-20 token on the Ethereum Blockchain. This standardization has made it easier for developers to create new tokens and for users to interact with them. The AudSP protocol simplifies music distribution, while Content Nodes ensure that music is always available. With these features, Audius is able to offer a decentralized platform that empowers musicians and listeners alike.

ii.   <u>AUDIO Token Value</u>

In terms of value, in order to effectively distribute AUDIO to the most active members and increase platform value, Audius leverages on-chain analytics and a continuous token issue. The popularity of decentralized music streaming services as a whole and the widespread use of Audius can also be seen as evidence of its worth. The primary payment method, the platform's reward currency, a unit of value that may be staked, and the native token of the network is AUDIO. AUDIO can be exchanged on the live cryptocurrency market, and traders can profit from the spread between the purchasing and selling prices. The picture below demonstrates more about the history of the AUDIO token's value:
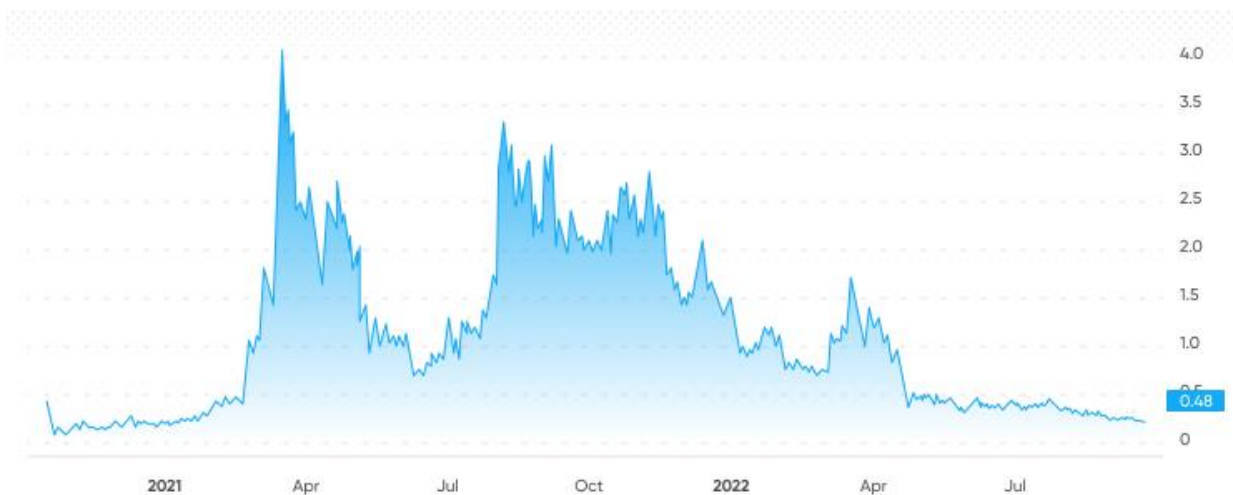
In October 2020, AUDIO was first listed on the open market and initially traded for roughly $0.48. It quickly declined to below $0.20, but during the particularly bullish period for cryptocurrencies in the first few months of 2021, the token rebounded brilliantly, hitting an all-time high of $4.99 on March 27 of that year. Following a time when it dropped below the dollar in the middle of the year, it began to decline in price and peaked above $3 in August. But after that, it started to decline steadily, and it ended 2021 at $1.60. Since May 2022 until now, the AUDIO token price has been pretty consistent at approximately $0.3

iii.   How Many Audius (AUDIO) Coins Are in Circulation?

Looking at the number of coins in circulation, a total of 1 billion AUDIO tokens were initially issued by Audius, of which 41% were distributed to founders, 36% to investors, and 18% were used to support network expansion. In accordance with a vesting timetable, these tokens are expected to eventually unlock. In order to honor node operators, the AUDIO token was released with a 7% inflation rate. The community can choose how the coin emission should be allocated, though, as AUDIO is a governance token. 990,636,746 tokens are available for use right now.

iv.   How is the Audius Network Secured?

To ensure security, Audius uses a process called proxy re-encryption to grant access to music files to paid users along with a decentralized governance, where users of the network can stake AUDIO to get more tokens and voting power. To be more specific, if an artist wants to grant only certain users access to their work, they must use a process

called proxy re-encryption because protocol AudSP makes encrypted files available to everyone. A request is issued to the artist on behalf of the fan when they start streaming a song, and this request may include money or documentation that a certain condition has been satisfied. Following that, a content node generates a proxy re-encryption key that is unique to the fan and can be used to decrypt the encrypted material using the fan's public wallet address and the private key used to encrypt the track. In this manner, on-demand streaming is made possible while limiting access to music files to those that are paid for by the artists. All users of the network are eligible to stake AUDIO and run nodes in exchange for benefits from the continuous token issuance. The Audius network is made more democratic by the ability of AUDIO shareholders to propose and vote on platform updates.

V. How to Choose an Audius Wallet

The cryptocurrency Audius (AUDIO) is listed on a number of exchanges, including Binance, Coinbase, KuCoin, and Gemini. Owners of AUDIO can trade their tokens for USD or other cryptocurrencies that can be converted to USD by selling them on any of these exchanges. Both Binance and Coinbase offer wallet services to users of cryptocurrencies, including users of the AUDIO token. The AUDIO tokens that users buy on these exchanges are then placed into the exchange wallet, where they can be held or exchanged for fiat money or other cryptocurrencies. Similarly, when customers sell AUDIO tokens on these exchanges, the sales revenue is placed into a customer wallet, from which customers may later withdraw money to their bank account.
To demonstrate more, choosing an Audius wallet depends on the user's needs and previous experience with holding cryptocurrencies, like audio tokens. Several wallet options are available for holding cryptocurrencies like audio tokens. The user's needs and previous experience influence the wallet they select, which are demonstrated in the table below with the pros and cons of each wallet type:

Wallet Type	Pros	Cons
Hardware Wallets	Safest method for storing cryptocurrencies offline.	Pricier and necessitate technological expertise; perhaps better suited to seasoned users
Software Wallets	Free and easy to use; available as smartphone or desktop apps.	Less secure than hardware wallets; better suited to people with less experience or fewer audio files.
Online/Web Wallets	Free and easy to use; accessible from multiple devices.	Less secure than hardware or software wallets, hot wallets are maybe better suited to store smaller amounts of cryptocurrencies or for users who engage in more frequent trading.
Kriptomat	Enables the trading of audio tokens and offers enterprise-grade security and user-friendly functionality.	Supports just audio tokens, and customers entrust a third-party service provider to maintain their audio tokens.

SECTION 4: How artists and investors can monetize music in these marketplaces?

After going through the technical details of developing and offering music NFTs on blockchain marketplaces, it's time to turn our attention to the revenue streams open to both artists and investors. In this part, we'll look at the different ways that artists can use blockchain technology to make money, like getting royalties from NFT secondary sales and accepting Bitcoin as payment. We will also go over the funding options open to people interested in fostering the expansion of the music sector using blockchain-based platforms. We may better comprehend the possible effects that blockchain technology may have on the music industry as a whole by looking at these monetization options.

A. Selection of Platform/Marketplace for Musicians to Create and Sell NFTs

Musicians can choose from a variety of sites when it comes to selling NFTs. For those seeking to build collections, OpenSea and Rarible are two of the most well-liked NFT marketplaces for music. OpenSea gets a 2.5% cut of transactions rather than charging, listing, or

minting fees. Rarible, on the other hand, is a multichain exchange that enables minting across multiple blockchains and doesn't charge gas or minting fees but instead gets a 2.5% cut of all transactions. SuperRare, Foundation, and Zora are all viable choices for people looking to sell a single NFT, and each has its own pricing and commission costs. It's crucial to take into account the listing characteristics of each site before making a choice.

Platform	Minting Fee	Gas Fee	Commission on Sales
OpenSea	No	Yes	2.5%
Rarible	No	No	2.5%
SuperRare	No	Yes	3%
Foundation	No	Yes	15%
Zora	No	Yes	No commission

Source: Growth Chain - Blog - Music NFT Marketplaces

To provide more detailed guidance, using different online platforms like Rarible and OpenSea, musicians can now make their own non-fungible tokens in the age of NFTs. A step-by-step manual is provided for musicians interested in developing NFTs for Rarible.com to help with the creation process and subsequent monetization of NFT sales.

1. The "Create" button is positioned in the top right corner of the page.
2. Choose whether to produce one or several collectibles. The musician will be required to pay a single minting cost for a single collectible. For a single minting price, they can publish many versions of the same NFT for different collectibles.
3. The title, description, royalties, properties, alternate text for NFT, and price for each instance of NFT should all be entered by the musician after the audio file has been uploaded.
4. Create NFT by connecting wallets such as MetaMask.
5. Pay the marketplace 2.5% fees plus the petrol costs to put the NFT on sale. Artists can pay the charge using the MetaMask wallet.

With a 30MB maximum file size limit, platforms like Rarible allow musicians to make and sell NFTs. It's essential to remember that depending on the platform, different information may be needed. Musicians can use a collection of procedures to create and market their distinctive digital assets in order to monetize NFT sales.

B. Details of 5 Most Popular Blockchain-Built Marketplaces/Platform for NFT Music

Statistic as of April 2023

OpenSea

Launch year: 2017

- Supported blockchains: Ethereum, Polygon
- Supported payment methods: 200+ digital payments, including Ethereum, USDC, DAI, Solana, etc.
- Monthly platform visitors: 1.5M+

Community:

- Twitter: 2M+ Followers
- YouTube: 41k+ Subscribers
- Instagram: 1.1M+ Followers
- Discord: 230k+ Members

As the largest NFT marketplace, OpenSea enables creators to sell a variety of NFTs, including music, digital art, collectibles, and domain names. They offer a minting tool for musicians and artists to generate and sell music NFTs, and they have a section specifically for music NFTs. The technology also enables customized NFTs that generate royalties from sales on the secondary market. Big names like The Weekend, Snoop Dogg, and Imogen Heap are included in the music NFT collection of OpenSea, an organization that supports independent musicians and artists.

Mintable

Launch year: 2018

- Supported blockchains: Ethereum and ImmutableX
- Supported payment methods: ETH
- Monthly platform visitors: 229k+

Community:

- Twitter: 67k+ Followers
- Discord: 32k+ Members

By using Mintable, authors can freely mint their digital creations on the blockchain. A large variety of tradeable assets, including a huge collection of musical works, contribute to the NFT marketplace's popularity. For its active user base, it offers a variety of auctions. You may smoothly generate and sell NFTs thanks to the user-friendly marketplace.

Audius

Launch year: 2019

- Supported blockchains: Ethereum and Solana
- Supported payment methods: $Audio
- Monthly platform visitors: ~8M+

Community:

- Instagram: 44k+ Followers
- Twitter: 143k+ Followers
- Discord: 37k+ Members

Audius is a platform for sharing and streaming music that uses blockchain technology to decentralize the music business. Artists can use the $AUDIO token to sell NFTs on its NFT marketplace. Audius enables musicians to interact with their fans, create creative compositions, monetize their music, and provide collectors with special perks. Additionally, it enables users to link their Audius profile to their music NFTs on Solana and Ethereum. The platform works with well-known performers like Deadmau5 and Rezz. Despite being relatively young and only having 7.5 million users—a small portion of the 445 million music streamers worldwide—the venerable Rolling Stone magazine has already lauded the platform as a Spotify competitor.

Zora

Launch year: 2020

- Supported blockchains: Ethereum and Zora Protocol
- Supported payment methods: ETH, wETH
- Monthly platform visitors: 110k+

Community:

- Twitter: 90k+ Followers
- Instagram: 22k+ Followers
- Discord: 23k+ Members

Zora is a protocol that enables artists to publish and market their digital works using a single unique token that can be resold with the original owner earning a percentage of the proceeds with each resale. Zora advertises itself as a gas-efficient protocol with no costs and promises fast cross-platform royalty payments. Zora's toolbox for creating NFTs has been acclaimed and used by many crypto organizations, including publishing startup Mirror and collective FWB.

Rarible

Launch year: 2020

- Supported blockchains: Ethereum, Polygon, Solana, Flow, ImmutableX and Tezos
- Supported payment methods: Cryptocurrencies, Stable Coins, and Credit Card
- Monthly platform visitors: 9.7M+

Community:

- Twitter: 491k+ Followers
- Instagram: 290k+ Followers
- Discord: 56k+ Members
- YouTube: 4.5k+ Subscribers

Rarible is among the first and greatest NFT exchanges for the trade of music NFTs. Actually, the users of this platform own and run it. The RARI digital token holders control Rarible's decentralized infrastructure. Using the RARI token, users can mint music NFTs on Rarible. Rarible not only supports music albums but also other NFTs, including books, movies, and digital artwork.

When it comes to fees, Rarible levies a 2.5% fee on each and every transaction that occurs on its marketplace. The site also provides up to 10% in royalties, which elevates it to the top of the NFT music marketplaces for musicians. The NFT marketplace also offers the choice of paying for music NFTs with a debit or credit card. Additionally, it supports a number of blockchains, giving users access to a wide range of music NFTs.

C. Requirements and Procedures for Listing and Selling Music NFTs on Blockchain Marketplaces

As previously stated in this thesis, musicians typically receive only 12% of the revenue generated by production labels from their music. However, NFT platforms offer a more equitable solution: a standard fee of 2.5% of the sale price going to the platform and the remaining revenue going directly to the artist. This has proven to be a successful means of income generation for musicians, particularly during the pandemic when touring income had been greatly reduced. There are three types of listings that musicians can utilize on NFT marketplaces, including fixed-price listings, declining-price listings, and highest-bid auctions, as below:

Type of Listing	Description
Fixed-price listings	The easiest method of listing NFTs. The fixed price, currency, and listing expiration date are all chosen by the musicians.
Declining-price listings	Setting a start and an end price allows musicians to sell their NFTs above the going rate. In order to entice interested purchasers, they must determine the time between the start and final prices.
Highest-bid auctions	The highest-bid auctions with a time limit can be set by musicians. The NFT is acquired and sold to the highest bidder. Functions similarly to the eBay platform.

To sell music NFTs on blockchain marketplaces, musicians need to create an account, connect their digital wallet, prepare to pay "gas fees," select which songs to include, create the music NFT collection, and determine unique and valuable features that would appeal to buyers. Once the NFT collection is listed for sale on the marketplace, the musician simply waits for a buyer to purchase the collection and receives payment upon completion of the transaction.

1. Create an account on an NFT marketplace and connect your digital wallet loaded with Ethereum.
2. Determine if the NFT marketplace is invite-only or requires artists to submit an application.
3. Prepare to pay "gas fees" to create and mint an NFT collection.
4. Decide which songs you want to include in the NFT collection and select cover art.
5. Create the music NFT collection.
6. Determine the unique and valuable features of the NFT collection that would appeal to buyers.
7. List the NFT collection for sale on the marketplace.
8. Wait for a buyer to purchase the NFT collection.

9. Receive payment for the NFT collection.

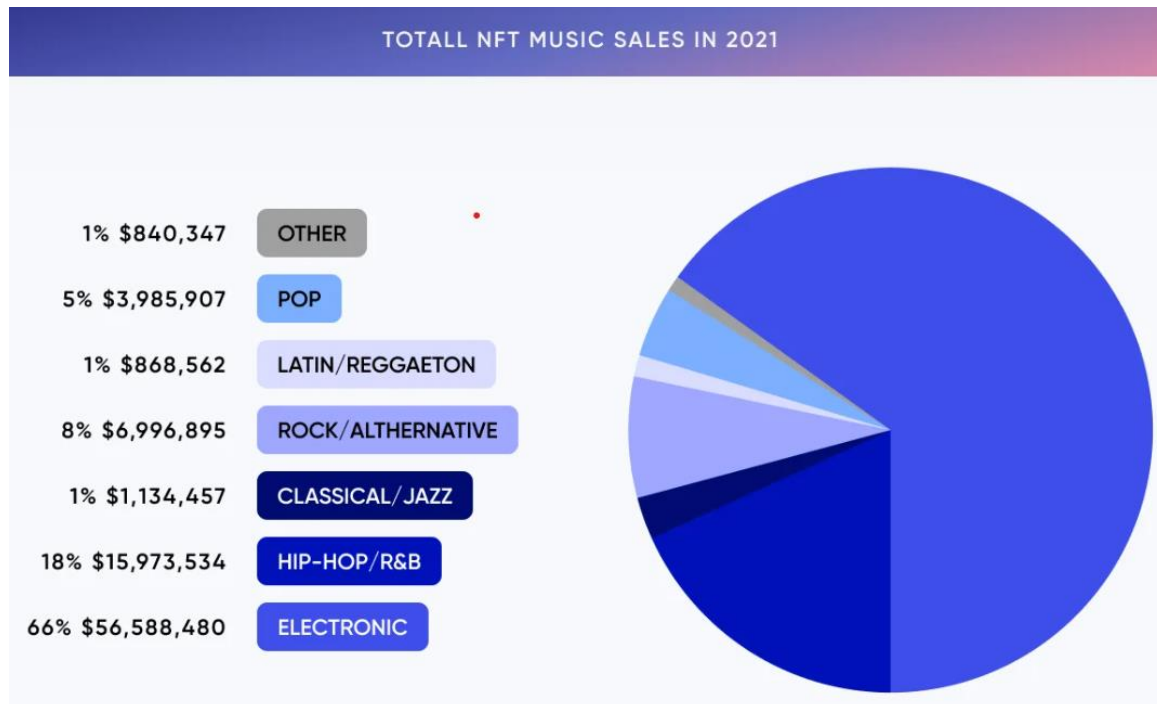## D. How Artists Make Money on These Platforms

Moving forward from discussing the requirements and procedures for listing and selling music NFTs on blockchain marketplaces, it is important to understand how artists can monetize their work on these platforms. Markets for NFTs such as OpenSea and Rarible offer artists the opportunity to earn royalties from subsequent NFT sales, providing a means for creators to be compensated through secondary sales. This implies that whenever the NFT-owned music is sold, its owner or creator is compensated through secondary sales. The artist sets this percentage when he mints his music NFT. In addition to this, the use of cryptocurrency, such as AUDIO coins, offers several options for generating income, including (1) running content or discovery nodes on the Audius platform, (2) investing in tokens, or (3) taking advantage of an estimated annual return which are illustrated below:

1. Users can run a content node or discovery node: A computer that stores and serves up copies of audio tracks, metadata, and other information for the Audius platform is referred to as a content node in this context. Users who operate content servers are compensated with AUDIO tokens for their contributions to the network. A computer known as a discovery node aids Audius users in finding new music on the app. Users who manage discovery nodes are compensated with AUDIO tokens for offering this network function.

2. Invest in hopes of the token's appreciation: Users can purchase AUDIO tokens in the hope that their value will increase and that they will be able to resell them for a profit in the future at a higher price.

3. Take their tokens to make an estimated 7% annual return. However, in order to run a server, you need a minimum of 200,000 AUDIO tokens, which are currently valued at $0.28 per token.

Furthermore, success stories from musicians such as Kings of Leon, Steve Aoki, Snoop Dogg, Eminem, Nas, Mig Mora, and Iman Europe provide insight into the potential revenue streams available through music NFTs. **Kings of Leon,** with the release of their NFT album on Yellowheart, generated over $2 million in sales, with $500,000 going to Live Nation's Crew Nation to assist live music crews during the pandemic. **Steve Aoki** created A0K1VERSE, an NFT passport program that allows for two-way communication between artists and fans by providing users with complimentary tickets, merchandise, members-only events, and more. **Snoop Dogg, Eminem, and Nas** are a few other well-known musicians who have successfully embraced NFTs. **Mig Mora** created Spottie WiFi–a rap project despite only having

200 Spotify listeners at the time, earned $192,000 in 60 seconds by selling NFTs associated with an artist's identity. Finally, **Iman Europe**, a singer/songwriter, increased her monthly income from $300 from streaming earnings to $60,000 from five music NFTs.

The NFT marketplaces are also a new venue for more generic music tastes by artists, with sales reported by genres in 2021 from the graph above, with Electronic dominating at 66%, followed by Hip-hop/R&B at 18%, and Rock/Alternative at 8%.

TOTALL NFT MUSIC SALES IN 2021

1% $840,347 — OTHER
5% $3,985,907 — POP
1% $868,562 — LATIN/REGGAETON
8% $6,996,895 — ROCK/ALTHERNATIVE
1% $1,134,457 — CLASSICAL/JAZZ
18% $15,973,534 — HIP-HOP/R&B
66% $56,588,480 — ELECTRONIC

Source: 4IRE

E. How to Ensure a Guarantee of Payment

In addition to discussing the process of listing and selling music NFTs, as well as how artists can make money on these platforms, it is essential to consider how payment can be guaranteed. To address this concern, platforms can implement procedures such as smart contracts, escrow services, reputation systems, KYC/AML compliance, and cryptocurrency payment. These measures provide security, trust, and automation, making the payment process more efficient and secure for both artists and buyers. To ensure the fair payment of artists on blockchain-based platforms, there are several measures that can be implemented as below:

Measure	Description	Advantages
Smart contracts	A digital agreement between the artist and the buyer that automatically releases payment once conditions are met.	Provides a secure and automated way to guarantee payment.
Escrow services	An intermediary service that holds payment until both parties fulfill their obligations.	Provides a trusted intermediary to ensure that both parties are protected.
Reputation systems	A system that allows users to rate and review each other to build trust.	Helps to ensure that only reputable parties are involved in transactions.
KYC/AML compliance	A compliance process that prevents fraudulent activities.	Provides a secure and trustworthy platform for artists and buyers.
Cryptocurrency payment	Accepting payment in cryptocurrency, which provides anonymity and security.	Avoids issues with price volatility and offers a level of anonymity and security.

F. To Verify the Identity and Authenticity of the Artists to Ensure Royalty Payment on Their Platforms

In general, it is crucial to confirm an artist's legitimacy and identity in order to make sure that royalties are paid to the proper individual or organization. Blockchain-based music platforms can assist in lowering the risk of fraud and guaranteeing that artists are fairly compensated for their work by utilizing a number of technologies, including KYC verification, digital signatures, blockchain-based identity verification, and smart contracts:

Verification Method	Description
KYC (Know Your Customer)	Artist offers identification from the government as well as personal data for verification.
Digital Signatures	Artists authenticate their work and demonstrate authorship by using a distinctive digital signature.
Blockchain-based Identity Verification	The artist's identity is verified using biometric data using protocols integrated into the blockchain.

Smart Contracts	Using predetermined criteria, such as tying an artist's digital wallet address to their confirmed identity, automatically pay royalties to the right artist.

G. How to Protect the Artist from Cyberattacking/ Hacking

The table below summarizes methods for defending artists from cyberattacks and hackers on blockchain-based music platforms:

Methods	**Description**
Encryption	Encrypting data and conversations with secure methods and protocols to prevent unauthorized access.
Multi-factor authentication	Requiring two or more forms of authentication, such as a password, a biometric factor, or a security token, in order to access accounts.
Permissioned access	Denying unauthorized users, such as verified artists and labels, access to specific platform areas.
Auditing and monitoring	Using auditing and monitoring tools, such as user activity tracking, access log reviews, and security audits, to spot suspicious activities and take appropriate action.

H. Who Will Buy This NFT Music Asset?

It's crucial to delve further into the prospective buyers of these assets as we go deeper into the subject of music NFTs. Fans of the artists can now become shareholders in the businesses that represent their favorite artists by purchasing NFTs, in addition to supporting their favorite musicians through donations. This is a fascinating trend that has the potential to shake up the traditional consumer model and offer artists a new way to increase their monetary, symbolic, and cultural value. We will look at who would be interested in buying music NFTs in this area, from individual fans to major organizations.

Fans as Investors: Alumnus of Berklee and digital marketing manager Ryan McCulloch sees the growing practice of consumers purchasing NFTs as a win-win situation for both fans and artists. By purchasing NFTs, fans can become shareholders in the companies that represent their preferred artists and receive financial, symbolic, and cultural value. This dynamic poses a threat to conventional consumption and offers an alternative to the oppressive record label business model that has historically harmed artists. While record labels have

historically served as investors, they frequently did so at the expense of artists, leading to the exploitation of artists like Prince, Taylor Swift, Frank Ocean, and TLC through their contracts. Independent record labels, on the other hand, now provide more advantageous contracts that improve commercial partnerships.

Fans as fans: Before music NFTs were common, people frequently supported musical endeavors through direct donations and crowdsourcing. It wasn't always the case, though, and some artists were able to completely fund their initiatives through donations.

Furthermore, with a variety of interests in buying the NFT music asset, the potential buyer is also diversified and comprises both individuals and organizations.

Potential Buyer	Characteristics
Music fans and collectors	Interested in owning rare or unique items related to their favorite artists or genres.
Investors	Looking for profitable investment opportunities and potential hedges against inflation.
Music industry professionals	Interested in using the asset for marketing or promotional purposes, or as a way to invest in emerging artists.
Crypto enthusiasts	Part of a growing community interested in owning unique digital assets, including NFTs.

However, some concerns do exist. The key distinction between purchasing an NFT and making a donation to a crowdsourcing campaign is that the former is a gift made without expecting anything in return, whereas the latter is an investment made with the expectation of profit. Benji Rogers, a professor of music business trends and strategies at Berklee Online and co-founder of the digital strategy firm Lark, claimed that the future of the music business is in the relationships between artists and their fans and selling fans a digital image for $100 with the promise that it could one day be worth more could potentially damage those relationships if the NFT's value falls.

SECTION 5: How Blockchain Companies Monetize Musical Assets and Manage Platforms

After delving into the technical details of how blockchain technology might help the music industry in section 4, this section will now focus on how blockchain-based music organizations monetize their assets and administer their platforms. This section will look at the several revenue sources used by blockchain-based music companies to strike a balance between financial success and the growth of the industry, including transaction fees, advertising, premium features, token sales, and collaborations. This section will also examine the elements required to keep a blockchain-based music platform operational, such as the usage of smart contracts, open-source programming, and decentralized blockchain storage that follows cryptographic best practices.

A. How These Companies Generate Revenue

As the thesis mentioned before, transaction fees, advertising, premium services, token sales, and partnerships are some of the ways that Audius makes money. The company's top goal isn't making money, though; it's promoting the music industry's innovation, sustainability, and expansion. 90% of streaming income goes to the artists directly, with the remaining 10% going to those who manage nodes on the platform to help with network growth and security. The business also distributes AUDIO tokens to its staff and early investors while looking into other revenue streams. The table below demonstrates some common business strategies used by blockchain-based music businesses to balance monetary success with the expansion of the sector.

Revenue Stream	How
Transaction fees	Costs for utilizing the platform, such as for streaming and uploading music.
Advertising	Putting up advertisements on the platform or working with brands on marketing initiatives.
Premium features	Allowing customers to pay premium to access advanced services, such as early access to new releases or higher-quality streaming.
Token sales	Offering firm tokens that customers can use as money or as a way to invest in future growth to generate income.
Partnerships and collaborations	Generating income through joint ventures and projects with other music-related businesses, including record labels and artists.

For example, in August 2021, Audius made a massive deal with TikTok. Thanks to this agreement, musicians on Audius will be able to quickly make their tunes accessible to TikTok users for inclusion in their videos. Additionally, musicians will be able to connect Audius to the TikTok audience they have amassed. After Audius's partnership with TikTok was announced, the price of AUDIO surged. In 24 hours, the price nearly doubled, according to CoinMarketCap, and its market value surpassed $1 billion for the first time.

B. What Is Needed to Maintain the Operation of the Platform?

At a high level, using Ethereum's "Distributed App" (DApp) methodology, which calls for a special set of skills to incorporate smart contracts into the backend of a DApp that operates on a decentralized blockchain network, it is possible to create a completely decentralized streaming network for the music industry. Open-source programming, the use of cryptocurrency tokens, and decentralized blockchain storage that complies with cryptographic best practices are important factors to take into account. Community agreement will serve as the basis for any future DApp enhancements. The development approach consists of the following steps:
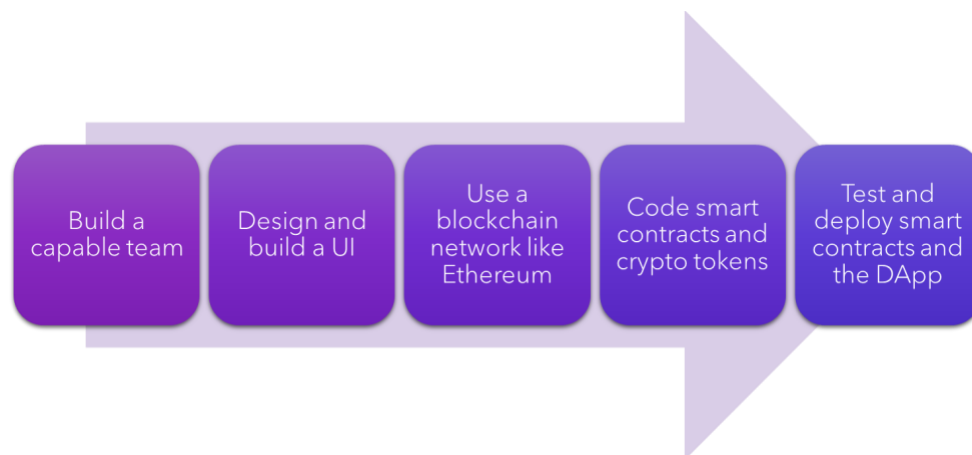
Details of each step will be demonstrated below:

1. *A team to develop a blockchain music distribution platform*
   - Create a team that includes testers, business analysts, UX/UI designers, web developers, and Ethereum blockchain developers.
   - It can be difficult to find competent blockchain engineers, and you might need to teach them specialized blockchain development techniques.

- Consider using tools like CryptoZombies for interactive DApp development training after finishing the Ethereum programming lesson.
- Your team will need this set of skills since Ethereum DApps use smart contracts, which are written in the Ethereum-only Solidity programming language.

2. *Design and build a UI*
- The same processes used to create any other web app will be used for business requirement research, UI design, and front-end development.
- Set up the Ethereum development environment and link your app to the blockchain using Ethereum.

3. *Use a blockchain network like Ethereum*
    a. Create an Ethereum account:
    - You require an Ethereum account and wallet address in order to develop a DApp on Ethereum.
    - Externally Owned Accounts (EOAs) and Contract Accounts are the two different forms of Ethereum accounts, and you require an EOA.
    - Using eth-light wallet, you can build an EOA, but you'll need to make private and public keys and secure your private key first.
    - As the Ethereum network requires Ethereum gas payments, you must purchase Ether in order to deploy your smart contracts.
    b. Install the required DApp development tools:
    - Installing "TESTRPC" and "Ganache" are two crucial tools that are needed for the project.
    - These are simple-to-use command-line Ethereum blockchain clients (CLI).
    - Install, choose a block-mining cycle, and set up additional parameters.
    - "WEB3.JS"
    - The Ethereum blockchain can be contacted using this tool.
    - Install it, then make the "config.js" file and web APIs user-friendly.
    - "TRUFFLE"
    - This well-known tool is used to deploy and test Ethereum smart contracts.
    - It makes testing and deployment simple and provides different directories for various projects.
    - Open "Ganache" after installing these tools, then update "config.js" using your eth-light wallet private and public keys.

4. *Code smart contracts and crypto tokens*

    a. Crypto token

    For transactions between artists and customers, a crypto token is required. A DApp must also have a cryptocurrency token in order to function. When you market your project, you'll want to stay inside the law. Blockchain start-ups offering tokens as investment instruments in the US are required to register those tokens as securities with the Securities and Exchange Commission (SEC).

    b. Code smart contracts

    -   Coding smart contracts is required to build a blockchain music streaming service.

    -   Open-source programs called "smart contracts" contain "If-Then-Else" sentences that run automatically in response to triggers.

    -   According to predefined criteria, smart contracts can transfer cryptocurrency assets, and the outcomes of their execution are recorded on the blockchain.

    -   Smart contracts cannot be altered once they are posted to the blockchain and their execution is final.

    -   The amount of Ether you must pay as gas is determined by how sophisticated the smart contract is; the more complex the smart contract, the more gas you must pay.

    -   It is crucial to thoroughly test smart contracts and have skilled reviewers audit the contracts before testing them in order to achieve early defect discovery.

5. *Test and deploy smart contracts and the DApp:*

    -   Test: Use the MetaMask browser extension and a cryptocurrency wallet to test smart contracts on the Ropsten network. The MetaMask Ether Faucet provides dummy ethers that can be used to test smart contracts.

    -   Deploy: The "gas price" for deploying your smart contracts now has to be paid with the Ether you just bought. Using Ganache, Web3.js, and Truffle will allow you to publish your smart contracts to the Ethereum main net or the main network.

SECTION 6: My Viewpoints About the Future: Promising Potential and Concerns About Implementation on Artists and Music Industry

The success of musicians like Kings of Leon, Steve Aoki, and Snoop Dogg serves as evidence of the indisputable potential of music NFTs to change the music business. As with any new technology, there are, however, issues and difficulties that need to be considered. In this section, I will express my own thoughts on the music industry's great potential for blockchain technology, as well as any reservations I have about its implementation and potential effects on both specific artists and the sector as a whole.

At the high level, I see a lot of possibilities for the music industry in blockchain technology. The music business could undergo a revolution, thanks to blockchain technology, which would increase transparency, get rid of middlemen, and give creators more control over their work. Due to the fact that every transaction on the blockchain is documented and can be traced back to its original creator, blockchain enables artists to be paid fairly and promptly for their work. Additionally, blockchain enables the development of smart contracts that eliminate the need for middlemen by automating the payment of royalties and other costs.

Although the use of blockchain in the music business is promising, there are worries about how it will affect individual artists and the sector as a whole. My first concern will be on *licensing issues and challenging the status quo*. While a small percentage of musicians, such as Imogen Heap and Zoe Keating, have used blockchain as a tool to release tracks with more control over the conditions of their creative work, blockchain-ready artists are still in the minority. Although distributors, record labels, and other intermediaries have established terms, including requirements for payments and use, it is not yet apparent what threshold of artists will be large enough to upset the current quo. My second concern will be on *artist promotion*. While blockchain may provide creators a greater voice and interest in the money made from their works, it is unclear yet to what extent they can advertise and promote their works independently of conventional agencies, such as publishers or record labels. There are worries that some artists who would otherwise benefit from the support of agents may actually earn less money as a result of self-publishing or self-promoting their work. My third concern will be *'On-chain' versus 'off-chain' storage*. There are still unanswered questions regarding the location of the creative media's storage—will it be on the blockchain itself, as metadata, or as access keys? The ability to directly upload creative content to the blockchain may be limited by current technology, and retaining only the metadata of the content raises questions about where and how the creative data will be distributed. My fourth concern will be about the *methodology for micro metering/micro monetizing*. Since Bitcoin was not initially intended to support micropayment

capabilities, an off-chain "layer" that manages payments is necessary. My last concern will be on *intellectual-property (IP) frameworks.* Governments and IP-rights organizations will need to establish legal frameworks for transactions made utilizing blockchain technology. While blockchain technology makes it possible to keep track of who owns what, we might still need to rely on conventional enforcement methods to protect property owners' rights, particularly when contracts are broken.

For Audius, specifically, I am concerned about how they would manage and ensure the quality of music products posted on the platform meet the community standard, like the way Facebook and YouTube block toxic content. As a new platform that promotes and focuses on *"Giving everyone the freedom to distribute, monetize, and stream unstoppable audio,"* we don't want it to become the place to distribute toxic content that cannot be distributed somewhere else.

SECTION 7: Conclusion

In conclusion, by enhancing openness, doing away with middlemen, and giving creators more control over their work, blockchain technology has the potential to revolutionize the music business. Artists can profit from the secure and decentralized nature of blockchain networks while also increasing their share of streaming revenue by utilizing blockchain-based platforms like Audius. It is unclear how these issues will be solved in the upcoming years, but there are worries about how the adoption of blockchain might affect long-standing players in the music business. Also, despite the uncertainty surrounding the future of music NFTs, cryptocurrency appears to be here to stay based on its increasing acceptance and usage. Although there are some unknowns, it is obvious that blockchain technology offers the music industry a promising path for development and innovation. It will be interesting to watch how this technology develops in the future. Therefore, whether they choose to create, purchase, or sell music NFTs, it is imperative for professionals in the music industry to educate themselves on the potential of these NFTs as it can enhance their business knowledge and potentially provide a new source of income.

APPENDIX

Web3: "Web versions" are a common way to describe how the internet has changed. The original Internet generation, known as Web 1.0, was essentially a one-way street where users could only consume material. On the other hand, Web 2.0 brought about social media, two-way communication, and the capacity for individuals to produce and distribute information. The "decentralized web" or Web 3.0 is the current iteration of the internet. It is built on blockchain technology and enables decentralized platforms and apps (dApps) that are not under the authority of a single organization or corporation. With potential uses in a variety of industries, including finance, healthcare, and entertainment, Web 3.0 provides a new degree of security, transparency, and trust in online interactions. For an artist, this offers new ways for fan engagement, increased creative freedom, and the capacity to make money directly from their fanbase. Web 3.0 has the ability to completely change the music business by giving artists more creative freedom and a more fair distribution of profits.

Blockchain: Blockchain is like a digital notebook where everyone can write down what they own or what they did. But instead of one person having control over the notebook, everyone who writes in it gets a copy of the same notebook. This makes it harder for someone to cheat or change things without anyone noticing. In the music industry, blockchain can be used to keep track of who owns what, like songs or concert tickets, so that everyone knows who has what and there are no disagreements. It also makes it easier to get paid for your work and to protect artists' creations from being copied without your permission.

Music NFT: Non-fungible Tokens (NFTs) are unique digital valuables that are displayed as a token on a blockchain like Ethereum. The uniqueness of each token in NFTs, which means that no two tokens are precisely alike. Think about it in this way "***Anyone can take a picture or go see the Mona Lisa, but only one person owns it. NFTs exactly the same way, with the underlying token proving ownership of that digital good. "Everybody sees it, only one owns it".*** In music, an NFT is comparable to a music authenticity certificate. It's a digital token that demonstrates the uniqueness and originality of the music an artist has composed. It's similar to a unique seal of approval that demonstrates an artist's music's value and prevents duplication or copying. Similar to how consumers would buy and exchange concert tickets or branded items, anyone may buy and trade NFTs for music.

Smart Contract: Smart contracts are self-executing contracts in which the terms of the deal between the buyer and the seller are incorporated directly into the program. Because they are programmable and part of a blockchain network, they may automatically carry out certain tasks when certain criteria are satisfied. For NFTs, a smart contract can be utilized to specify

ownership and transfer of the particular digital asset. The smart contract can set guidelines like who is allowed to transfer the NFT, when it can be transferred, and how much money the seller would get from the sale. The transfer of the NFT is automatically carried out and ownership is given to the buyer as soon as the smart contract's requirements are satisfied.

Node: A node is a computer that is linked to the network and holds a copy of the whole blockchain ledger. Every node in the network keeps a copy of the blockchain, and they all cooperate to verify and confirm transactions. Nodes help to maintain the network's decentralization and security and can be run by individuals, groups, or businesses. In basic terms, a node is similar to a computer that assists in keeping track of all transactions that take place on the blockchain network.

Content Node: To store and relay audio content (tracks, mixes, etc.) streamed on Audius

Discovery Node: To index and hash data like user profiles, playlists, and followers

Smart contract + node in a blockchain: In a blockchain system, a smart contract is a self-executing contract with the terms of the agreement between a buyer and a seller being directly written into lines of code. Nodes on the blockchain network run and execute these smart contracts automatically, ensuring their integrity and security.

When it comes to the music industry, a music creator can use a smart contract to program the terms of the contract with an investor, buyer, or platform for the distribution of their music. The smart contract can be hosted on a blockchain network, and once it is executed, it will be stored on every node on the network, ensuring its immutability and transparency. This means that the music creator can distribute their music, ensure that they receive payment in a timely and transparent manner, and retain ownership of their work.

Therefore, the smart contract acts as the legal agreement between the music creator and the buyer or investor, while the node ensures the security and execution of the contract on the blockchain network.

Transaction fee (gas fee): gas fees are a critical component of blockchain networks as they incentivize miners to validate transactions and smart contracts. They are paid in cryptocurrency and are measured in units of gas, which reflect the computational effort required to execute a transaction.

Dapp: Dapp refers to a decentralized application that runs on a blockchain network. A Dapp is built using smart contracts. Unlike traditional apps that run on centralized servers controlled by a single entity, Dapps are decentralized and run on a network of nodes that are spread across the globe. This makes them more resilient to hacking and censorship. Dapps can be used for a wide variety of purposes, from creating decentralized marketplaces to managing digital identities. In

the context of this thesis, Dapps are being explored as a potential solution for creating new revenue streams and increasing transparency in the music industry.

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