A PRELIMINARY REVIEW OF BLOCKCHAIN IN THE MUSIC INDUSTRY

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Abstract

Musicians in the music industry are the primary content creators, and yet, have little to no control over their musical works after assigning their rights and management to third party intermediaries such as record labels, performance rights organizations, and publishers. Before the rise of file sharing platforms in the 1990s, this scenario was the norm for all musicians as record labels controlled nearly all facets of the music industry from musician funding to distribution and even royalty payment collection. Many thought file sharing platforms such as Napster and LimeWire, which we deem "the first wave of disruption," would wrestle control of the music industry from record labels to musicians, but that has not occurred as of this writing. The rise of blockchain-based interventions in the music industry, which we have termed the "second wave of disruption," may finally lead the music industry to transition to a musician-centered ecosystem, with few if any intermediaries, and bring musicians and fans/consumers closer than ever before. Despite the various promises of blockchain technology, the use of blockchain is primed, and dare we say, destined, to change the music industry. Though, with any such change, there will be issues that must be properly managed to ease the transition from legacy systems to blockchain-based systems ("Legacy-to-Blockchain"). There are many issues pioneers in this field will have to face stemming from the music industry itself and the inherent limitations of blockchain technology, but in doing so, we recommend that blockchain-based intervention projects and pioneers implement six strategies to counter these issues and bring the blockchain-based music industry into fruition.

keywords: music, blockchain, distributed, ledgers, licensing, decentralize, musician, artist, file, sharing, governance, education, cryptocurrency, token, platform, smart-contract, metadata, royalties, ico

Contents

1 Introduction

Before the rise of Napster, the first major file sharing service for music, if people wanted to listen to their favorite or new artists, they generally had to buy music records wholesale (all the songs, i.e., an album) from a music retail store and were limited to listening to songs through physical media (e.g., CDs, Cassettes, Mixtapes).[32, 62]. Once Napster came out, no longer did anyone need to visit their local music retail store to buy music records, much less pay for those records, now anyone who downloaded Napster could share and download digital music files—*for free*—as compared with paying $10-15 dollars for an album.[32, 23]. Napster's rise may or may not (the record labels and RIAA believe it did) have led to a significant decline in physical music record sales, but since its debut in 1999, physical media sales have sharply declined, causing the music industry's undeniable shift from physical distribution to digital distribution.[58]. The most notable part was that was all done without any say from the major players in the music industry at the time.[58].

The rise of Napster also coincided with the rise of digital music piracy, specifically from Napster users sharing their digital music files with other users, without the copyright owner's permission, which in turn led to numerous lawsuits against Napster from the major players in the music industry.[62]. The transition took the music industry aback, having to figure out how to transition to digital distribution while fighting digital music piracy.[23].Though Napster eventually dissolved, the transition to digital distribution was set in place and has continued to hammer the music industry.[23]. The music industry, based on Recording Industry Association of America (RIAA) reports and analytics, reported revenue losses each year from 1999 to 2009 as the digital transition continued to grow.[23].

The distribution channels then started to become dominated by technology companies who created their own digital music marketplaces instead of the physical distribution channels (record stores, radio stations, music publishers, record labels, and trade associations), which was firmly cemented with Apple's release of iTunes in 2003-2004.[5].iTunes rise coincided with the decline of brick-and-mortar music record stores and divisions such as Tower Records as the everyday consumer realized they could download their music legally or illegally at a lower price than at retail stores.[23, 1]. With music retailers slow to adapt to consumer's changing preference for digital music even as "more people [listened] to recorded music," iTunes was able to fit that niche and become the preeminent digital music retailer for digital music files.[23, 28]. iTunes cemented its position thanks to providing: 1) an easily understandable and navigable digital marketplace; 2) offering single tracks; and 3) integrating iTunes with their portable MP3 player, the iPod.[23, 28].

The rise of file sharing has only been compounded by the rise of streaming.[58]. Streaming services have also continued to rise since 2013, accounting for about 30% of music industry revenue, and leading to record labels and musicians losing revenue.[58]. Poignant in this discussion is the impact of the first wave of disruption on musicians. [58]. Musicians have suffered reduced revenue from file sharing because of fewer physical media sales, and from streaming services which pay pennies for licensing works on their platforms.[15]. However, the number of musicians that primarily rely on revenue from licensing of musical records is very small (6%), with the majority of revenue coming from live entertainment (28%), with most of the impact on the major music industry players themselves (record labels, radio stations, trade associations).[15, 58, 37].

Funny enough, the majority of complaints regarding the introduction of digital technology has come from the major record labels, the gatekeepers, while musician themselves have mixed opinions on digital technology, with most believing they now have more control over their music.[37]. Furthermore, even for those musicians who rely heavily on music licensing (where music piracy plays the biggest role), e.g., composers, the amount of revenue from non-copyright/licensing sources is almost half of their licensing revenue.[37]. For musicians overall, the transition to digital distribution has had less of an impact on their revenue, and has even

helped them some artists, such as Ed Sheeran, gain a following and eventually becoming a mainstream artist.[22].

The first wave of disruption helped reduce record labels absolute control over the distribution of musical records.[46]. However, the first wave of disruption was not able to adequately return value to musicians, the content creators, and left musicians still needing intermediaries, such as the streaming and digital marketplace platforms we know today such as Spotify and iTunes. [46, 84]. Now that blockchain technology is gaining popularity in the media, general public, and with major companies in nearly every industry, it may be the beginning of the "second wave of disruption" that will lead the music industry to divest itself of intermediaries and bring about a musician-centered ecosystem where musicians interact with their fans and consumers directly.[46, 36]. Further, that it may be the push for musicians to develop their own technologies or to become familiar with technology and business models they can use to support themselves or rather than relying on others to create the system.[37, 13]

2 Music Industry Ecosystem

The music industry is involved in the creation, manufacture, and distribution of music (compositions and sound recordings).[79]. The primary content creators are musicians (both songwriters and performers), whose works and rights are managed by various parties discussed *infra* in Section 2.1. [79, 69]. However, even though there are many parties, the music industry is run by an oligopoly comprised of three major record labels, Universal Music Group, Warner Music Group, and Sony Music Entertainment, who own about seventy percent (70%) of the revenue market share.[79, 69]. The music industry is a very complex web of intermediaries between musicians, the content creators, and their fans, the content consumers, which has led to a variety of issues discussed *infra* in Section 2.3.[79].

2.1 Participants

The current music industry is comprised of the following primary members:

- Recording labels;
- Producers;
- Promoters;
- Publishers;
- Artist & Repertoire;
- Radio Pluggers;
- Distribution Companies;
- Publicists and Public Relations (PR) Agencies;
- Performance Rights Organizations;
- Digital Marketplaces; and
- Streaming Platforms.

2.1.1 Record Labels

Recording labels are companies whose primarily role is to "record and exploit sound recordings." [79]. Generally, recording labels will focus on exploiting the master recording, which is a musician's authorized sound recording.[79]. Traditionally, recording labels would facilitate the production of sound recordings by: 1) investing early on in musicians and recordings to hopefully recoup costs from music distribution; 2) paying for the manufacturing of sound recording copies, marketing and promotion of records to radio stations and the press; and 3) distribution to retail stores.[79]. Record label's prior role cemented their ability to control the manufacture and distribution of music to the public.[79]. However, the role of recording labels has changed with the onset of digital music files.[79]. No longer is it cost- or time- intensive to create musical records because once a digital music file is created, it can easily be redistributed at little to no cost.[79]. Now, record labels last stranglehold is on their ability to promote and market artists to major music distributors and platforms such as Spotify, iTunes, and radio stations.[79]. The major record labels are Universal Music Group, Warner Music Group, and Sony Music Entertainment. [38]. Other than the three major labels, the largest share of record labels are independent labels.[64]. The revenue market share as of 2016 breaks down as follows:

- Independent record labels have 31.3% of the revenue market share as of 2016;
- Universal Music Group currently has 28.9% of the revenue market share as of 2016;
- Warner Music Group has 17.4% of the revenue market share as of 2016; and
- Sony Music Entertainment has 22.4%.[64].

2.1.2 Music Producers

Music producers manage an artist's production of music, ensuring that deadlines are met and the production stays within the allotted budget.[65]. Further, music producers also assist artists with their song arrangements, and generally are called upon to help turn the artist's vision from an audio standpoint into something a record label would be willing to accept and promote.[65].

2.1.3 Music Publishers

A music publisher is generally a company involved in music licensing.[65]. The music publisher will ensure that artists are receiving their duly earned royalties, such as when an artist wants to cover another artist's song, the publisher would ensure the artist and the songwriter are collecting their royalties.[65].

2.1.4 Music Promoters

Music Promoters can be divided into two categories: 1) live event promoters; and 2) music marketers.[65]. A live event music promoter is an individual who promotes live entertainment events, such as concerts.[65]/. The promoter will rent the venue and schedule artists to perform for guests or attendees.[65]. A music marketeer is a member of a record label who markets an artist's music to the public (social media, "online and offline press and radio,") to generate exposure and hopefully, get the artists' music plugged on the radio, covered on music blogs and magazines, and featured on iTunes and Spotify.[79]

2.1.5 Artist & Repertoire

An Artist & Repertoire ("A&R") is a record label employee responsible for scouting and signing new musicians to the record label, and nurturing the musician's talent and music to become commercially viable.[79].

A&R's generally focus on the last part, working with new musicians to make their music commercially viable (finding the right audience, balancing the artist's individual freedom with the marketable artist's mold, etc.).[79]. A&R's will help musicians ensure their work is commercially viable while helping musicians find their artistic direction regarding music or branding.[79].

2.1.6 Distribution Companies

Distribution companies generally work on the behalf of record labels.[79]. Distribution companies will distribute musical records in either physical or digital formats, with the latter the most popular.[79]. Physical musical records are still being processed, such as compilations, vinyl records, and CDs.[79]. Record labels will generally ship physical copies to territorial distributors (N. America, S. America, Europe, Africa, Asia, Australia and New Zealand), who will then distribute in their own regions.[79, 1]. Record labels will often divide the physical distribution rights from the digital distribution rights.[79]. Instead of distributing to regional distributors, record labels will distribute records to digital marketplaces such as iTunes and Spotify.[79].

When a record label decides to distribute digital music records, it has a couple options: 1) coupling physical and digital distribution with the same distributor; 2) negotiating deals with each digital marketplace; or 3) "working with a digital distributor."[79]. Independent labels take many different routes, such as distributing on their own platform or through automated digital distribution services.[79]. Labels then account for distribution, which is generally done on a quarterly basis, with that of distribution companies, which may have a different schedule. For example, "TuneCore account on a monthly basis."[79]. Distributors will either take a flat fee or a certain percentage of sales as commission for each record they distribute and can determine when the record will be publicly distributed.[79]. Thus, reducing the amount musicians can receive as income in the long run (if the fee is percentage-based).[79].

2.1.7 Publicists and Public Relations (PR) Agencies

Publicists & Public Relations (PR) agencies ('Publicists') in the music industry are responsible for generating online and offline press for industry players, and controlling public sentiment. [79]. Publicists will "[push] releases or an artist to online blogs and offline magazines, securing interviews, feature placements, reviews and other forms of press." [79]. Most Publicists have established connections in the music industry, and the press generally prefer to communicate with them than other industry players.[79]. Generally, Publicists are hired on a territorial basis, with services set for "either a continuous or per-project basis." [79]. A continuous project basis would generally require a retainer fee, which is often the case for larger, more popular artists.[79]. Independent labels will often choose to work with Publicists on a per-project basis for a flat fee.[79].

2.1.8 Radio Pluggers

Radio pluggers (also known as radio promoters or song pluggers), convince radio show-hosts or program makers to play a musician's music.[79]. A radio plugger's success is generally based on their reputation and relationships with program makers and show hosts.[79].[1] Radio pluggers try to keep a track in rotation, i.e., the musical record is playing on the radio.[79].[2] "When a track is in 'light rotation' it gets around 5-15 weekly plays, 'medium rotation' is 10-25 and 'heavy rotation' is 20 or more.[79]. Consistent radio play leads to exposure, radio chart positions, which in turn drive sales and an artist's demand."[79]. Radio pluggers either work independently or for record labels, on a territorial basis, like music distributors.[79]

[1](A retainer fee is to ensure the availability of the Publicist for when any new issue or request arises).
[2](A flat fee is a one-time, non-variable fee).

2.1.9 Performance Rights Organizations

Performance Rights Organizations (PROs) are organizations that keep track of how often a musician's work has been played and the amount of royalties due to the copyright holder.[84]. Musicians often assign their rights to PROs for this service.[84]. The major PROs are American Society of Composers, Authors, and Publishers (ASCAP), Broadcast Music Inc. (BMI), and SESAC.[84, 63].

2.1.10 Digital Marketplaces

Digital marketplaces are online stores where musicians can publish their music, and consumers can purchase and download digital music files.[76]. One of the major advantages with digital marketplaces for musicians is that they can control the distribution of their music.[76]. Major digital marketplaces include Apple iTunes, Google Play Music, Amazon Music, Deezer.[76]

2.1.11 Streaming Platforms

Streaming platforms are platforms where users can stream musical recordings from various catalogues, on-demand, for free or at cost.[25]. Streaming platforms provide various services to their users such as music discovery, custom playlists, integration with third party services, and access to exclusive releases from musicians.[25]. Major streaming platforms include Spotify, Pandora, Apple Music, Amazon Music, YouTube and Soundcloud.[25].

3 Issues Identified

We identified five major issues affecting the music industry: 1) licensing, rights management, and royalty payments[3]; 2) intermediaries; 3) piracy; 4) musician autonomy; and 5) self-funding.[13, 52, 8, 29].

3.1 Licensing, Rights Management, and Royalty Payments

Licensing issues tend to revolve around owner attribution, the formulation of royalty payment structures, and third party uses of a work.[13]. Owner attribution issues often arise when multiple parties such as musicians, record labels, producers, and publishers could all have some ownership interest in the musical recording (composition and/or sound recording), especially when a musician samples works from other musicians.[8]. Ownership attribution issues can become extremely complex given that a copyright owner in a musical composition or sound recording has a bundle of rights under the U.S. Copyright Act:

1. "to reproduce the copyrighted work in copies or phonorecords;
2. to prepare derivative works based upon the copyrighted work;
3. to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending;
4. in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly;

[3]Grouped together because their basis often arise out of the same legal violations

5. in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly; and
6. in the case of sound recordings, to perform the copyrighted work publicly by means of a digital audio transmission."[4]

Furthermore, keeping track of all licenses and assignments of rights under copyright is a nigh impossible task with very few ever being recorded with the U.S. Copyright Office.[47]. Moreover, licensing issues become or are becoming even more apparent with the rise of streaming because an author ("copyright owner") has the exclusive right under 17 U.S.C. 106(6) to "perform the copyrighted work publicly by means of a digital audio transmission."[6, 8].These issues arise for streaming services because they engage in the transmission of digital audio (from their server to your computer) and may be required to have compulsory ("mechanical") licenses under the copyright act to publicly perform an owners work.[5]

Royalty payments are payment made to a copyright owner in exchange for a license ("permission) to use their work.[8]. Royalty payment issues arise out of the owner attribution issue because an appropriate royalty payment scheme cannot be fashioned without knowledge of the identity of all the owners of copyright in the work.[8]. In creating a royalty payment scheme a person who creates a work that samples another musician's work may inadvertently forget to make royalty payments to a copyright owner in the work.[8].

Lastly, a third party's use of the work can lead to licensing issues because the third party may not understand what the appropriate license and/or royalty payments for their intended use (e.g., commercial v. personal use).[8].

3.2 Intermediaries

As discussed *supra*in the Introduction section, the music industry was tightly controlled by record labels before the emergence of file sharing platform such as Napster.[6] Since the 1990s, their influence has waned, but record labels and many other intermediaries still play an active role in the music industry.[8]. The major issue arising from intermediaries is musician compensation, specifically that artists receive a smaller compensation than they should because intermediaries take a cut before it reaches the artist.[13, 29]. The long, slow collection chain of royalty payments inhibits a musician from receiving full compensation for use of their work.[13, 29, 8]. This chain causes musicians to not receive about twenty to fifty percent of their royalty payment, as reported by Berklee's College of Music Institute for Creative Entrepreneurship Transparency and Money Flows report.[13, 29]. Other than the lack of full compensation, musicians are given little to no transparency (i.e., lack of monitoring) on how their royalty payments are split up by this labyrinth of intermediaries or even whether the royalty payment, they were supposed to receive actually went to someone else.[13, 29]. Another concern is when intermediaries become so intertwined with each other that the convoluted royalty chain can no longer be changed.[34, 24]. For example, a large majority of Spotify's shareholders before becoming a publicly traded company in its' direct listing were major record labels, even though for many Spotify was independent from the major record.[34, 20, 59, 31, 16].

3.3 Piracy

Piracy is an issue for the music industry for many reasons, but specifically it is: 1) reduced cost of musical works; and 2) author attribution.[13].

[4] 17 U.S.C. § 106.
[5] 17 U.S.C. § 106.
[6] *See supra*Section.I.

First, Napster's rise in the late 1990s has led to the price of musical recordings to drop significantly.[1]. Even though the rise of initial file sharing programs hurt physical media sales (e.g., CDs), their effect has also extended to the very notion that musical recordings itself has value.[13]. Piracy has led to the consumer mindset that musical recordings should be priced at little to no cost.[75]. Most music consumers do not pay for music, especially for streaming services such as Spotify where a large majority of users are on the free tier.[75]. More so, users who do not want to pay for a musical work have many workarounds, such as copying, sharing, or scraping digital music files from various sources.[13]. The loss in value stems from file sharing platforms making musical recordings no longer scarce, a digital music file can be copied and shared millions of times without a noticeable loss in quality.[32].

Second, piracy is a major issue regarding author attribution for the copying and creation of derivative works under 17 U.S.C. 106.[32]. Beyond merely copying without consent for their own private use, a user may copy to "sample" an artist's work in their own production without the consent of, or payment to, the content creator(s).[13].

3.4 Musician Autonomy

A musician's autonomy and control of their own work and careers often becomes an issue when intermediaries get involved.[27]. As highlighted by Imogen Heap, intervention the Grammy-award winning artist and an advocate for blockchain-based interventions in the music industry , musicians are often uninformed on how their record labels negotiate licensing agreements (especially royalty payments) with streaming services such as Spotify, and their careers are controlled at the whims of their record labels.[27]. This was a major reason why Imogen Heap cut ties with her record label and started self-managing her music.[27]. Furthermore, musicians cannot represent themselves as they see fit while under contract with a record label, nor can a musician get in direct contact with prospective clients or partners. [67].

3.5 Self-funding

Self-funding is an issue for musicians who want to forego signing with a record label.[38]. A musician can pursue self-publication, a la Imogen Heap, but it is a very difficult road to undertake.[38]. Most musicians cannot afford to personally pay for all the expenses, or may not have an extensive network of contacts for promoting their work.[38]. Furthermore, it is time-consuming because you have to manage all the accounting and payments.[38]. However, this must also be balanced with the fact that a musician who self-manages keeps all their rights (copyright and all), takes all of the profit (if any), and success is based on the musician's own efforts, rather than a third party's.[38].

4 Projects

The blockchain-based music industry is comprised of various stakeholders touching on nearly all aspects of the traditional music industry. The blockchain-based intervention projects we have identified as of writing are:

- UjoMusic;
- Musicoin;
- SingularDTV;
- Tokit;
- Current;

- Res()nate;
- Mycelia;
- Choon;
- GRMTK;
- Musiconomi;
- Volareo;
- Vezt;
- Our Music Festival;
- Aventus;
- Lava;
- JAAK;
- PeerTracks;
- Dot Blockchain;
- Mediachain;
- Creativechain;
- Token.fm;
- VOISE;
- LBRY;
- Revelator;
- Opus;
- Decent;
- Custos; and
- Musiclife.[61, 53, 35, 72, 9, 3, 33, 11, 49, 43, 83, 7].

A description of each project would unnecessarily extend this article and instead, we shall refer you to Singular DTV's article, "The State of Music and Blockchain, 2018," included as Exhibit A in the appendix that provides an overview of the first twenty projects, Allen Bargfrede's article, "Music & The Blockchain Tech," included as Exhibit B, that provides an overview of the twenty-first and twenty-second projects, and Daan Pepijn's article, "Five ways blockchain tech is going to rock the music and movie industries," included as Exhibit C, that provides an overview of the twenty-seventh to twenty-ninth projects.[61, 3]. The majority of these projects are open-source and constantly encourage contributors and volunteers from all walks of life so if you want to contribute, refer to their GitHub repositories.

5 Pioneers

Prominent pioneers in the blockchain-based music industry are: 1) Imogen Heap; 2) Phil Barry; 3) Cédric Cobban; and 4) Benji Rogers.[36, 39].

Imogen Heap is a Grammy-award winning artist and technologist, who aims to promote the use of blockchain technology in the music industry to remedy the issues she has faced in the industry.[27, 7]. Imogen Heap is the creator of the Mycelia project, which provides educational resources for musicians to understand

blockchain technology and how to implement blockchain in their lives.[45]. Imogen Heap was also the first artist to publish a musical record, Tiny Human, as a smart-contract on the Ethereum blockchain.[42, 50].

Cédric Cobban is the founder of PeerTracks, Inc. and creator of SounDAC.[36, 17]. Cobban entered the distributed ledger space in 2011 and by applying his knowledge of Austrian economics, created PeerTracks and SounDAC to create a protocol or system for rights management and royalty payments for artists that are less reliant on traditional record labels and streaming services.[36].

Phil Barry heads UjoMusic, a decentralized rights management and royalty payments platform, and is passionate about the potential for blockchain technology to return or convert the music industry into an artist-centered ecosystem.[36].

Benji Rogers, co-founder and Chief Strategy Officer for Dot Blockchain Media, and co-founder of PledgeMusic, constantly works on business and technology models to bring musicians and artists directly to their fans or in direct transactions or interaction with fans.[39, 51]. Rogers co-founded Dot Blockchain Media with the idea of taking PledgeMusic a step further by creating a rights management intervention by encoding digital music files in a special ".bc" file format that carries author information as metadata.[54, 3]. Further, that if the digital file is ever changed, that it is clear that the file is no longer the or authenticated file. [54, 56].

Musicians who market themselves on blockchain-based platforms include:

- Imogen Heap;
- Grammatik;
- Giraffage; and
- RAC.[41, 42, 73].

6 Blockchain-based Interventions

Blockchain technology can provide a variety of transformative, remedial or mitigation interventions in the music industry. We have identified nineteen interventions spanning author attribution, content monetization, disintermediate royalty payments, music publication, music distribution, music streaming, transparency, piracy, media consolidation, musician funding, digital music scarcity, and ticketing.

6.1 Author Attribution

6.1.1 Intervention 1: Simple Recordation

A blockchain-based intervention can ameliorate issues regarding author attribution by simple recordation on the blockchain, thereby providing an immutable and irreversible ledger of uniquely identified and timestamped digital music files.[14]. This intervention makes it possible to create a global register of copyrighted and public domain musical works.[14].

6.1.2 Intervention 2: Metadata

Blockchain-based interventions can ameliorate issues regarding author attribution by including metadata in all digital music files containing the following information:

- Author;

- Licensing;
- Ownership; and
- Audio.

Projects working on the above intervention are Dot Blockchain Media.[56, 26].

6.1.3 Intervention 3: Digital Watermark

Blockchain-based interventions can ameliorate issues regarding author attribution by including, in addition to author information in the metadata, a digital watermark evincing where the digital music file came from.[57, 35].

Projects working on or have analyzed this intervention are Digimarc Corporation and Custos.[57, 35].

6.2 Content Monetization

6.2.1 Intervention 1: Smart-Contract for Royalty Payments

Blockchain-based interventions can ameliorate issues regarding royalty payments by incorporating a smart-contract, whereby every time a user plays a record, the smart-contract will distribute cryptocurrency to the musician.[14]. Alternatively, a smart-contract may also ask for users to provide a certain amount of cryptocurrency to the smart-contract address, whereby they can play the digital music file, and the cryptocurrency sent to the smart-contract will be redistributed to the musician.[14].

Projects working on this are Musicoin.[44].

6.2.2 Intervention 2: Smart-Contract for Music Licensing

Blockchain-based interventions can ameliorate issues regarding music licensing for various uses such as derivative works, synchronization licenses, mechanical licenses, and ensuring compliance with compulsory licensing schemes under multiple copyright frameworks.[14, 8].

Projects working on this are JAAK, Dot Blockchain Media, PeerTracks.[54, 30, 48].

6.3 Disintermediation

6.3.1 Intervention 1: Musician Peer-to-Peer Platform

Blockchain-based interventions can ameliorate issues regarding musician and consumer interaction by providing a peer-to-peer (P2P) platform where musicians can interact directly with their fanbase and potential partners, without the need for intermediaries.[14, 27]. Furthermore, fans can directly support the musicians they like by directly compensating them every time they listen to their work.[14].

Projects working on this are Tokit, Musicoin, Musiconomi, and Opus.[33, 73, 44, 61].

6.3.2 Intervention 2: Musician Tokenization

Blockchain-based interventions can ameliorate issues regarding fans monetarily supporting their favorite musicians by allowing musicians to "tokenize" themselves.[73, 60]. When a musician tokenizes their persona, the token functions as a means of payment and fundraising by requiring fans to use said tokens to play their music, purchase merchandise and tickets, provide donations, and for a plethora of other uses.[74]. Fans who like a musician would buy their tokens whereby the more popular an artist comes from plays, the higher the value of their token.[74].

Projects working on this intervention are Tokit and SingularDTV.[74, 73, 61, 60].

6.3.3 Intervention 3: Musician Crowdfunding

Blockchain-based interventions can ameliorate issues regarding musician funding for specific projects on a platform where investors can crowdfund musical efforts (e.g., equipment, staff, marketing, travel, lodging) in exchange for a certain percentage of rights in the duly created musical work based on the amount they invested.[3, 78]. This crowdfunding method is akin to an Initial Coin Offering (ICO), but instead of funding a company's newest service or product, investors are funding a musician's creation of new musical works.[3, 78]. Ideally, a musician will delegate which rights are given in exchange for a certain amount of investment and investors will be entitled to collect royalties based on their rights percentage.[3, 78].

Projects working on this are Vezt.[78]

6.4 Music Publication and Distribution

6.4.1 Intervention 1: Identity Control

Blockchain-based interventions can ameliorate issues regarding music publication and distribution by requiring musicians to register and verify on a platform, and once verified, can publish their music on the blockchain, which may or may not be open and freely accessible.[68, 77].

Projects working on this are UjoMusic and Mediachain.[77, 40]

6.5 Streaming

6.5.1 Intervention 1: Pay Per Play

Blockchain-based interventions can ameliorate issues regarding musician royalty payments on streaming platforms by creating a smart-contract that rewards musicians for every play of their music.[44, 48]. This intervention allows for advertisement free streaming where users can listen to music for free while musicians receive compensation for every play of their music.[44, 48].

Projects working on this are Musicoin and PeerTracks.[44, 48].

6.6 Transparency

6.6.1 Intervention 1: Public Blockchains

Blockchain-based interventions can ameliorate issues regarding transparency in the music industry by requiring blockchain-based platforms to run on public, permissioned or permissionless blockchains.[14]. If done so, then anyone involved in the music industry will have the ability to easily verify:

- Musicians are receiving their duly earned royalty payments
- Whether a musical work samples another musical work
- The creators of the musical work
- The owners of rights in the musical work
- Whether a musical work has been licensed by a specific party and for which specific use.[14].

6.7 Piracy

6.7.1 Intervention 1: Positive Incentives

Blockchain-based interventions can ameliorate issues regarding digital music piracy by providing incentives ("carrot") for users to consume and share using a blockchain platform their blockchain platform.[4, 36]. Users will be incentivized to use the blockchain platform because they will be rewarded tokens for consumption and for every redistribution of the digital music file.[4, 36]. This incentive-based protocol should reduce the prevalence of digital music file piracy because users receive greater benefits from redistribution, as compared with traditional file sharing where redistributors do not receive any rewards. [4, 36].

Projects working on this are Bittunes.[4, 36].

6.8 Ticketing

6.8.1 Intervention 1: Ticket Authenticity

Blockchain-based interventions can ameliorate issues regarding ticket authenticity. Tickets can be created and transferred on the blockchain as a token, thereby providing an immutable and irreversible record of ticket ownership and transfers thereof.[3]. This intervention will mitigate against ticket fraud by requiring all ticket holders to send their ticket token to a specific address or verifying ownership of the address storing the ticket token before they enter an event.[3]. Furthermore, access control measures can be implemented to only allow the identity associated with the ticket, i.e., the ticket purchaser, from using the ticket to enter an event.[3, 18].

Projects working on this are Aventus and Our Music Festival.[19, 61].

6.8.2 Ticketing Fraud Intervention 2: Secondhand Sales

Blockchain-based interventions can ameliorate issues regarding secondhand sales.[19]. How a ticket is resold can be controlled through a smart-contract which will determine when and how a promoter, venue, artists, or other secondary seller can resell tickets.[18]. Furthermore, the creator of the tickets can set maximum and minimum caps of ticket prices, whitelist certain addresses, and many other options to reduce fraud with secondhand sales.[18]. Also, this can provide transparency and prevent the promoters themselves from colluding with scalpers to rip off resale purchasers such as Ticketmaster's recent fiasco.[18, 71].

Projects working on this are Aventus and Our Music Festival.[19, 61].

6.9 Media Service Consolidation

6.9.1 Intervention 1: Unified Platform

Blockchain-based interventions can ameliorate issues regarding registration and consumption of music on multiple disparate media services by creating a single platform, wherein consumers can listen to music from multiple media services and receive cryptocurrency in exchange for engagement.[10]. Furthermore, by rewarding consumers with tokens for engaging on the platform, consumers can use their cryptocurrency to purchase premium features on the platform. [10]. This enables fans to afford premium services while ensuring consumers appreciate the workings of the platform.[10]. Lastly, by consolidating media services, musicians can receive royalty payments from multiple services on one platform.[10].

Projects working on this are Current.[10].

6.10 Alternative Funding Schemes

6.10.1 Intervention 1: Universal Basic Income

Blockchain-based interventions can ameliorate issues regarding musician's having enough funds to continue making music by implementing a Universal Basic Income (UBI) scheme where musicians on the platform all receive a certain amount of cryptocurrency simply for being registered and uploading their musical works.[44].

Projects working on this are Musicoin.[44].

6.11 Services Ecosystem

6.11.1 Intervention 1: Unified Services Platform

Blockchain-based interventions can ameliorate issues regarding whether an artist has access to the necessary services to grow their brand and exploit their music.[60]. A blockchain platform can provide these types of services to musicians by providing decentralized applications (dApps) tailored to musicians' needs.[60].

Projects working on this are SingularDTV.[60].

6.12 Audio Devices

6.12.1 Intervention 1: Platform-integrated Devices

Blockchain-based interventions can ameliorate issues regarding musical devices playing musical recordings.[80]. This can be accomplished by having a blockchain and Internet-of-Things (IoT) intervention that integrates musical devices (e.g., speakers) with blockchain-based streaming platforms.[80]. By doing so, musicians can receive royalty payments either by the consumer or from the platform for every play of their musical work, while allowing for consumers to play their favorite music anywhere they want, such as in a park, business building, theater, etc.[80].

Projects working on this are Volareo.[81].

7 Intervention Issues

Blockchain interventions can disrupt the music industry to bring about a musician-centered ecosystem, but in doing so, will have to manage old and new issues to ensure the intervention achieves its objective.

We have identified nine primary implementation issues:

1. Legacy-to-Blockchain;
2. inaccurate data;
3. musician awareness of blockchain;
4. ineffective governance models;
5. traditional industry funding of blockchain interventions;
6. malicious actors;
7. vibrant and diverse ecosystem;
8. multiple copyright frameworks; and
9. major musicians are under contract with major record labels.

7.1 Legacy-to-Blockchain

Other than the existing issues identified *supra* in Section 3, there are also *transitory* issues that will arise in the Legacy-to-Blockchain phase.[14]. A major issue in the transitory phase will be updating and verifying record-keeping procedures.[14]. For example, the proper transfer of license and author information will be very difficult because of the current industry's lack of proper record-keeping mentioned *supra*.[14]. To make a proper transition, blockchain-based interventions will have to at least do the following:

- rectify inaccurate information contained in current music registry databases; and
- research background information (copyrights, licenses, authors) on all works added to their platform.

7.2 Inaccurate Data

Blockchain and other distributed ledger technologies will always be susceptible to holding inaccurate data on-chain.[21]. Once data is stored on the blockchain, the block containing the inaccurate data is forever on the chain.[21]. Removal of inaccurate data is impossible without destroying the whole blockchain.[21]. For example, a musician may upload a digital music file which incorrectly attributes rights to the musical composition to the wrong composer in the metadata. Even simpler, a musician may misspell or misidentify the name of a content creator with that of another. The file uploaded to the blockchain would be valid, i.e., it meets the rules of the blockchain, but not all participants will know whether the data uploaded was accurate.

However, the concern of inaccurate data can be mitigated by storing a hash pointing to the digital music file on-chain while storing the actual file an off-chain file storage service such as the InterPlanetary File System (IPFS).[21, 66]. Though, unfortunately with this mitigation measure, there is less certainty that a file has not been tampered with or modified without proper authorization.[21, 66].

7.3 Musician Awareness of Blockchain

For blockchain-based interventions to achieve their goal of disintermediation and re-creating the music industry into a musician-centered ecosystem, young, up-and-coming musicians or musicians need to be aware of blockchain technology and associated ecosystems.[45]. Furthermore, musicians also need to understand self-management, business models, and legal frameworks such as copyright.[67, 27]. Musicians need to understand the technology before diving in because of the finality involved with blockchain, and to better prepare themselves for self-management.[14, 67, 45].

Primarily, we believe musicians should understand the following regarding blockchain technology:

- Wallets;
- Public Key Infrastructure;
- Transaction Procedure;
- Mining;
- Smart-Contracts;
- Blockchain;
- Block Explorer;
- Cybersecurity;
- Cryptocurrencies; and
- Tokens.

Regarding self-management, we believe musicians should understand the following:

- Self-publishing Schemes;
- Music Industry Stakeholders;
- Means of Exploiting Works;
- Legal Frameworks;
- Business Models;
- Event Ticketing; and
- Streaming Platforms.

Imogen Heap has taken the initiative in this regard by creating Mycelia, but more needs to be done before musicians should engage fully with blockchain-based interventions.[45, 67, 27].

7.4 Ineffective Governance Models

Intervention issues also arise from ineffective governance models. A governance model that involves a blockchain will ideally be decentralized, but the measure of decentralization will change depending on the aims of the project and stakeholders. An ineffective governance model for blockchain-based interventions in the music industry would be a governance model that meets any of the following criteria (Though, this list is non-exhaustive):

- Does not take input from all stakeholders.[7]

[7] Fans, consumers, musicians, developers, publishers, distributors, etc.

- Treats stakeholders disparately for reasons that do not support the project or secure the network.
- Disables a musician's control of their digital music files after uploading them to the platform.
- Allows for hard-forks without input from musicians.
- Allows for unnecessary centralization of the network, i.e., the creation of oligopolies.[8]
- Creates gatekeepers or barriers to entry for certain musicians that is not in furtherance of the project or securing the network.
- Censors certain musicians because of the content of their music which is not in furtherance of the project or securing the network.
- Prevents musicians from being at the center of the network.

We believe the above criteria should be avoided as possible to allow the Legacy-to-Blockchain phase to be successful.

7.5 Traditional Industry Funding of Blockchain Interventions

A major issue concerns traditional industry players, namely the record label oligopoly, becoming the primary shareholders or funders of blockchain-based intervention projects. As discussed earlier with Spotify, once the record labels have a controlling stake in these projects, musicians will lose their say and once again live at the whims of intermediaries.[9] To prevent this issue, blockchain-based intervention projects should be transparent with their stakeholders and the public about their shareholders and funding sources.

A related issue that may arise is traditional industry players buying musician tokens on a platform such as Tokit and thereby have a controlling stake over the musician's growth.[73]. Another similar issue related to issue discussed beforehand is that traditional industry players will participate in a musician's musical work ICO and have a substantial amount of rights to the musical work on a platform as Vezt.[78].

This issue can be mitigated by requiring traditional industry players, especially major record labels, to whitelist their addresses and requiring them to contract to using only their whitelisted addresses.

7.6 Vibrant and Diverse Ecosystem

The blockchain-based interventions in this space need to be wide and varying to prevent any form of centralization in the field. By keeping the field wide and varying, this will ensure the blockchain-based interventions are continually developing while ensuring a good level of competition.

7.7 Multiple Copyright Frameworks

Blockchain-based interventions will also have to deal with multiple copyright frameworks if they allow musicians to sign up and use their platform from all over the world.[82, 12, 29]. For example, if a musician signs up from Germany, and uploads copyrighted music created in Germany, onto a platform run in the United States, the work will be subject to German and European Union copyright law, not United States copyright law.[82, 12]. This can potentially lead to issues for small blockchain-based intervention projects who may not have a strong understanding of international copyright frameworks.[82, 12].

[8] For example, having a majority of miners work as employees for a nefarious organization.
[9] *See supra* Section.III.

7.8 Major Musicians Are Under Contract with The Major Labels

Major musicians are all on contract with the large record labels, which makes it nigh impossible for the biggest musicians in the world to ever consider switching to blockchain-based interventions in the near future.[46]. More so, the major record labels control how most of the public access music. Even with blockchain, it will be very hard to remove their immense control over distribution channels.[84].

8 Research Constraints

During the writing of this review, we were time constrained from delving into other related blockchain-based interventions which may have an impact on the music industry. Notably, we did not have time to research blockchain interventions in the ticketing industry beyond Aventus, general digital marketplace or rights management platforms such as Creativechain and LBRY, blockchain based applications which combine virtual reality with music, video delivery platforms such as Theta and their interaction with blockchain interventions in music, and PROs creating blockchain-based interventions.[70, 55, 2, 7]. Lastly, we did not not assess the potential impacts of the Music Modernization Act.

We suggest that future research should examine additional intervention issues regarding the Legacy-to-Blockchain phase, blockchain interventions in the music industry and their applicability with non-music blockchain interventions and means of improving musician awareness of blockchain.

9 Recommendations

We recommend six courses of action for blockchain-based interventions in the music industry to gain more publicity and firmly cement themselves as the next step in the music industry.

1. Increase musician awareness of blockchain and associated ecosystems.
2. Create effective decentralized governance models.
3. Prevent traditional industry players from having large stakes in blockchain-based intervention projects.
4. Consider creating a consortium for music and blockchain projects, such as R3 consortium for financial institutions.
5. Make efforts to get listed on multiple top 50 exchanges, with the top 10 exchanges being the most preferable.
6. Try to approach young, up-and-coming musicians and independent labels about using blockchain interventions.

10 Conclusion

The rise of Napster and other file sharing platforms have irrevocably or irrefutably changed the music industry or wrestled control from major record labels or irrefutably set in motion the decentralization of the music industry.[32, 23]. This first wave primarily helped wrestle control away from major record labels but forgot the most important player in the music industry . . . the musicians.[27]. The second wave of disruption from blockchain-based interventions will remedy or rectify this by having or transitioning the music industry back to an artist-centered ecosystem.[13].

The current music industry is comprised of stakeholders including:

- Recording Labels;
- Producers;
- Promoters;
- Publishers;
- Artist & Repertoire;
- Radio Pluggers;
- Distribution Companies;
- Publicists and Public Relations (PR) Agencies;
- Performance Rights Organizations;
- Digital Marketplaces; and
- Streaming Platforms.[10]

Unfortunately, this vast array of stakeholders, has led to many issues for musicians.[11] The music industry is plagued by many issues, but for musicians, their issues tend to settle on: 1) licensing, rights management, and royalty payments; 2) intermediaries; 3) piracy; 4) musician autonomy; and 5) self-funding.[12] These issues which were not resolved by the first wave of disruption are now being tackled by blockchain-based interventions in the second wave of disruption. These interventions aim to create a musician-centered ecosystem, that primarily ameliorates issues regarding author attribution and royalty payments.[13]

This second wave, led by blockchain-based interventions like or such as UjoMusic, Dot Blockchain Media, Resonate, Singular DTV, Musicoin, and by pioneers imbued with the passion to make this wave successful such as Imogen Heap, Phil Barry, Cédric Cobban and Benji Rogers.[14] These blockchain-based intervention projects will have a tough road during the Legacy-to-Blockchain phase and a cohort of other issues which every blockchain-based intervention must face.[15] However, if the pioneers stay truthful to their convictions, the second wave of disruption should truly cement musicians at the center of the music industry.

11 About us

11.1 Ledgerback

Ledgerback is a Co-operative creating research and analytics for the future of decentralized communities and technologies (DCT). At Ledgerback, we believe more frequent access to research and analytics will push the adoption of emerging technologies and contineu the decentralization process.

Ledgerback is a diverse Co-operative with many focuses in DCT. One of our primary goals is building a platform for Backers (i.e., our members) to have more frequent access to DCT research, analytics, technology, and individuals to make better insights.

In doing so, Ledgerback plans to offer its members the following benefits:

- Discounted to no cost access to research and analytical resources, decentralized platforms and tools, shows and events, and consulting and advising services.

[10] *See supra* Section.II.
[11] *See supra* Section.III.
[12] *Id.*
[13] *See supra* Section.V.
[14] *Id.*
[15] *See supra* Section.VII.

- A welcoming community of like-minded individuals from various backgrounds and disciplines who are interested in the growth of the cryptocurrency and blockchain universe.
- Member perks including:
  - Access to our Research and Network of Experts
  - Insightful Newsletters
  - Backer Profit-share
  - Other special and discounted services

12 Appendix

12.1 Exhibits

- State of Music and Blockchain, 2018 by SingularDTV.[61].
- Music & The Blockchain Tech, by Allen Bargfrede, republished on Rethink Music.[3].
- Five ways blockchain tech is going to rock the music and movie industries, by Daan Pepijn, published on TheNextWeb.[49].

12.2 Whitepapers & Other Authoritative Material

Here is a shortlist of projects with a whitepaper or other authoritative material:

- Musicoin
- Res()nate
- UjoMusic
- Aventus
- LBRY
- Creativechain
- Dot Blockchain Media
- SounDAC
- MediaChain

This is simply a shortlist and is not exhaustive of all whitepapers or other authoritative material.

13 Feedback

If you have any feedback about this report, please send it to ledgerback@gmail.com.

We welcome all comments, questions and inquiries.

Thank you for reading.

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