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The digital transformation of the music industry through applications of blockchain technology

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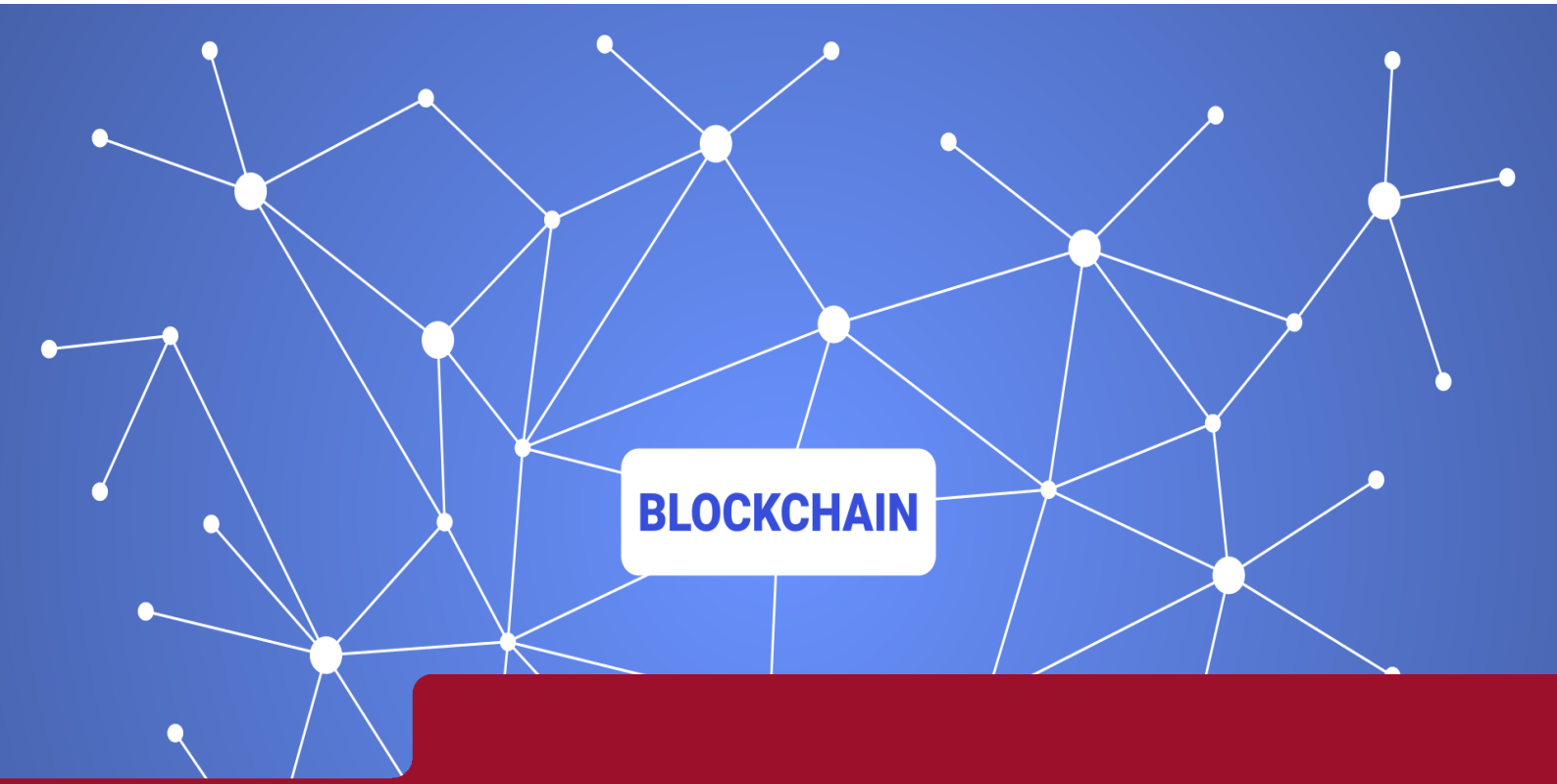

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Abstract

The digital transformation of the music industry through applications of blockchain technology

Since its introduction in 2008, the blockchain technology has been hailed as the one that could revolutionise many different industries. The music industry underwent several changes in the last 20 years as a consequence of phenomena such as music piracy, digital music and music streaming. Many considered the blockchain technology the solution to the many issues the music industry is facing. However, while the technology has been around for more than 10 years, and despite the enthusiasm of scholars and experts, little has been done to actually implement blockchains in the industry, especially by its biggest players. The resulting question is if and how the technology could change the music industry. This research starts by looking into previous studies on the blockchain technology, on the music industry and on the possible intersections of the two: from there the most popular suggested applications of the blockchain technology are extracted and presented in interviews to people working in the music industry. The goal of the interviews is to understand if the issues that the suggestions aimed to solve are real, and if the suggested applications are thought to be actually useful. The results are also compared with considerations from previously analysed papers, and showed a general interest in the blockchain technology and in the belief that it could help solve some issues of the music industry. At the same time, it was found that the technology is considered too young to be employed at the present time, with most people reckoning it is a technology that could have an impact in 10-15 year time.

Sammanfattning

Den digitala omvandlingen av musikbranschen genom tillämpningar av blockchain-teknik

Sedan år 2008 har man trott att Blockchain teknologin skulle kunna revolutionera många olika industrier. Exempelvis trodde man att blockchain kunde vara lösningen på många problem som musikindustrin hade. Musikindustrin har gått igenom många olika förändringar under de senaste 20 åren som en konsekvens av piratverksamhet inom musikvärden och musik streaming. Även om denna teknologi funnits i över 10 år och varit mycket uppskattad av forskare och experter, så har det inte skett så många insatser för att försöka introducera blockchain i industrin, speciellt från de stora aktörerna. Frågan är om och hur teknologin kan förändra musikindustrin. Denna forskning analyserar tidigare studier i blockchain och i musikindustri, och om det kan finnas en koppling mellan dem. De mest kända tillämpningarna av blockchain kommer att presenteras, tillsammans med intervjuer med personer som jobbar i musikindustrin. Målet med intervjuerna är att förstå om problemen som teknologin vill lösa verkligen existerar, och om dem föreslagna lösningarna verkligen kan hjälpa.
Resultaten jämförts också med tidigare studier som visar intresse för blockchain teknologin och tror på att den ska hjälpa. Ibland visade det sig att denna teknologi tros vara för ung för att bli applicerad i nutid, och majoriteten tror att den kommer ha en större betydelse om 10/15 år.

The digital transformation of the music industry through applications of blockchain technology

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ABSTRACT

Since its introduction in 2008, the blockchain technology has been hailed as the one that could revolutionise many different industries. The music industry underwent several changes in the last 20 years as a consequence of phenomena such as music piracy, digital music and music streaming. Many considered the blockchain technology the solution to the many issues the music industry is facing. However, while the technology has been around for more than 10 years, and despite the enthusiasm of scholars and experts, little has been done to actually implement blockchains in the industry, especially by its biggest players. The resulting question is if and how the technology could change the music industry. This research starts by looking into previous studies on the blockchain technology, on the music industry and on the possible intersections of the two: from there the most popular suggested applications of the blockchain technology are extracted and presented in interviews to people working in the music industry. The goal of the interviews is to understand if the issues that the suggestions aimed to solve are real, and if the suggested applications are thought to be actually useful. The results are also compared with considerations from previously analysed papers, and showed a general interest in the blockchain technology and in the belief that it could help solve some issues of the music industry. At the same time, it was found that the technology is considered too young to be employed at the present time, with most people reckoning it is a technology that could have an impact in 10-15 year time.

INTRODUCTION

The music industry underwent more changes in the last 20 years than in the previous 50, with a long period of decline that followed the rise of internet, and a re-growth in recent years as Fig.1 shows .

In the late '90s the first platforms that allowed users to download music free of charge started to appear: lack of regulation and lack of means to control the phenomenon almost brought the industry to its knees.

After decades where the only ways to listen to music was over the radio or by buying physical supports (vinyl and CDs), the consumers were introduced to digital formats that no longer required them to buy

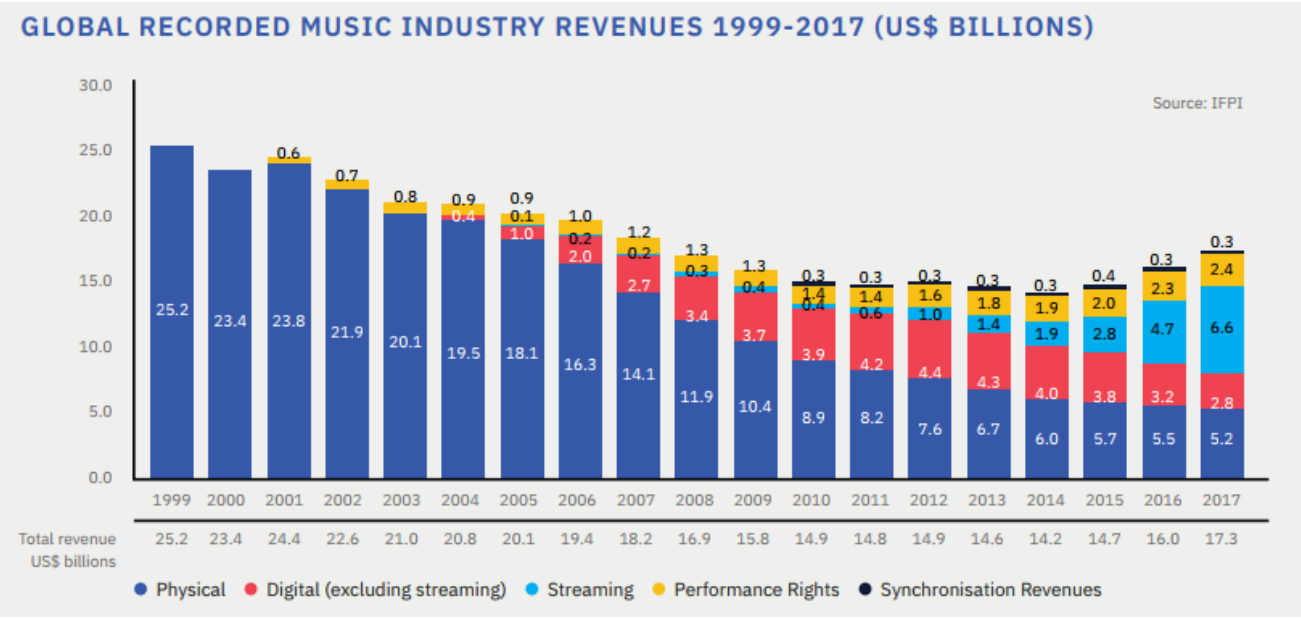

Figure 1: The graph shows the decline, and recent re-growth, in revenues of the recorded music industry in the period 1999-2017

music; some, like Apple with iTunes, tried to fix the issue by selling digital music, but the declining trend did not stop.

It was only thanks to the streaming technology that the music industry stopped its decline and started to grow again: in 2008 [1] the industry recorded its first revenues due to the streaming, and in 2015 the global recorded music industry revenues grew compared to the previous year for the first time in 14 years.

In 2017 for the first time digital revenue accounted for over half of the total recorded music industry revenue worldwide.

While streaming platforms like Spotify managed to reverse the declining trend of the previous years in the music industry, it also brought about some problems that still need to be faced.

At the end of the 2000s [3], around the same time that Spotify launched, the blockchain technology was invented.

The technology was created in support of the cryptocurrency Bitcoin, but its founding structure could be applied to other products and it was theorised to be potentially transformational in many different fields.

The music industry was no exception and over the years some papers have been published on the matter, with the first blockchain-based products starting to be launched in the last few years [11].

This research will look into the theorised applications of the blockchain technology, and on the already existing concrete applications of it, to see what could be actually achieved with this technology.

Particular attention was given to the evaluation chapter, where people from different sides of the industry were interviewed to gain an insider knowledge on the matter and to compare the different perspectives of people who would be affected by the introduction of this technology.

LITERATURE RESEARCH

The basis to this report are provided by previous researches and articles on three areas that that are reviewed in this chapter: the music industry, blockchain technology, and blockchain technology applied to the music industry.

Researches on the music industry were studied to identify issues within the industry that could find an advantage from the use of blockchains, while the technology was studied to get a better understanding of its possible areas of applications and its limitations.

Finally, previous studies on the applications of blockchains to the music industry were analysed to see what applications of the technology have already been theorised by previous researchers; furthermore, theories from different studies were compared to see which ones have a wider consensus, what the experts disagree on and what still needs to be elaborated on.

The music industry

The biggest complaint of the last twenty years in the music industry concerns the profits coming from recorded music.

Starting in the late Nineties/early '2000, piracy caused a downfall of sales eroding greatly the profits of artists and labels; that declining trend was reversed in the last decade with the rise of streaming services.

Spotify todays accounts for 38% [1] of the recorded music profits, but while it offered an alternative to piracy that allowed musicians and labels to make some money, it still caused many complaints.

Several artists, from Pink Floyd, to Taylor Swift, to will.i.am [2], expressed their discontent with the way streaming platforms pay artists, claiming that the current model is unsustainable, especially for younger/smaller artists who do not have millions of streams.

Another issue that some identified with the recent development of the music industry is music licensing [2]: nowadays, a song's ownership is divided between groups, and it does not exist a single comprehensive database of song ownership metadata.

The consequence is that paying the owners of a song requires a search across different limited proprietary databases, causing payments to be delayed, and sometimes even to stagnate in funds that do not reach their rightful owners.

Partly linked to that is the issue of "black box", that refers to royalties that are never paid to their rightful owners because of bad licensing data [6]; due to this problem billions of dollars stagnate in funds not reachable by the artists.

Blockchain technology

Blockchain is the name of the technology that was invented in 2008 as the basis to Bitcoin, a cryptocurrency.

"Blockchain is a shared, trusted, public ledger of transactions, that everyone can inspect but which no single user controls. It is a distributed database that

maintains a continuously growing list of transaction data records, cryptographically secured from tampering and revision." [3]
Because of its nature of secure, immutable ledger of transactions, the technology has been said to be a way to "remove the middle man" in situations where traditionally there are third parties to validate transactions; an obvious advantage to that is the possibility to avoid bank fees in monetary transactions.
While the technology was created to support Bitcoin, and thus to record transactions, any kind of information can be recorded in the blockchain's ledger, from spreadsheet, to logistic information and so on.
An application of the blockchain technology are the so-called "smart contracts", contracts which rules are encoded and executed across the blockchain's nodes [4]: this allows for payments to be made dependent on the state of variables, rendering them faster and smoother.

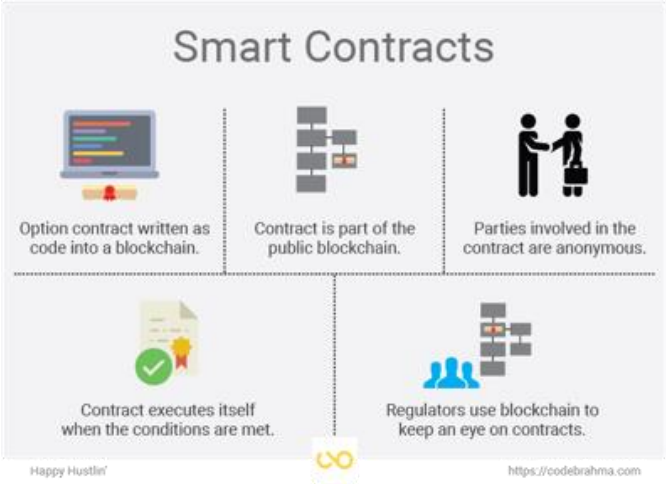

Figure 2: The image explains the way smart contracts work

Recently [5] it has been risen a point on a possible limitation of the blockchain technology: the more transactions are carried on in a blockchain the more blocks are added increasing their size.
The more transaction will make the blocks bigger, and the bigger blocks will require more time to be processed.
As every transaction requires peer-to-peer verification, the process will require more time with a larger number of blocks involved, and it would also take more time at peak times when more transactions are carried out.
Currently Bitcoin can handle around 60 transactions per second, while Visa's peak rate is of 47.000 transactions per second with an average of 8.000 transactions per second [5]; in order for the technology to become competitive with other alternative this limitation should be lifted.
Several solutions to this scalability problem have been suggested and are starting to be used [16].

Blockchain technology in the music industry

Over the past few years, many researchers wrote about the possible applications of blockchain technology in the music industry and, among many theories and suggestions, three uses have had the broadest consensus.
The first one is the creation of a networked database of copyright ownership which would help solving the previously mentioned issues with music licensing [7][8][9][10].
A blockchain-based database would include all the information that are currently sparse in different proprietary databases, and thanks to the blockchain technology all the data would be updated instantly and automatically, and would be available to all users. This application would bring about a series of challenges: who would enter the data? How would the data be verified? And, finally, how could something fluid like copyright (because the ownership of a copyright could change overtime) be managed within an immutable ledger?
The second application of the technology would be the use of smart contracts to manage royalties [7][8][9][10][11]: though them, micropayments could be made making payments quicker and with lower transaction costs.
Currently royalty payments are made a few times a year, but through smart contracts payments could be made immediately after a song is listened.
The third application, or rather effect of the previous applications, is that implementing blockchains in the payments could solve the issues of transparency within the value chain [7][8][9][10][11].
Today it is often difficult for artists to assess how efficiently payments are processed by labels, publishers or collective management organizations; because of the aforementioned copyright information issues, large amounts of revenue often end up outside of the artists' reach in the aforementioned black boxes, where rightful owners of royalty revenue cannot be accurately identified.

A transparent system like blockchain technology could solve this issue.

METHOD

As previously stated, while the paper's goal is to look into the possible applications of the blockchain technology in the music industry, special attention is given to the evaluation in order to establish the validity of the theorised applications.

The first step was to actually identify such applications: while the initial idea was to theorise them from scratch, basing them on the knowledge acquired from the literature about music industry and blockchain technology, it was later decided to work on the theories already suggested in previous articles and papers.

Studying the material collected it became clear that there are a wealth of suggestions on the uses of blockchain technology in the music industry, and there is a consensus on many of the ideas.

Seeing that many experts and researchers already found solutions, and agreed on some of them, it seemed more interesting to bring those ideas to people who work in different sides of the industry who would be affected in first person by them, and record their thoughts on the suitability and the actual usefulness of such applications.

A qualitative approach was chosen as that is the best way to record opinions on a research, and therefore the most indicated for this work.

The interviewees were people working as musicians, in music labels, copyright collecting agencies and streaming platforms.

The questions asked were the following ones:

- Do you feel there is an issue with royalty payments (timing and amount of payments)?
- Do you feel there is an issue with the transparency in the value-chain?
- Are you satisfied with the way streaming platforms pay musicians?
- Many of the benefits of blockchain technology will rely on artists being fully engaged with it, is this something you'd be willing to do, or would you prefer to have smaller profits while leaving all the things not directly related to the artistic side of the music to intermediaries?
- The cryptocurrency market is very volatile and their value values fluctuate a lot: how can they work for musicians when being paid an Ether (for example) could mean a lot or very little depending on the day?
- Many articles say that it could take at least 10 years, maybe 15, for blockchain technology to make a significant impact and to reach a mainstream adoption: do you agree with that estimate?
- Some researchers talked about blockchain as a technology that could possibly eliminate intermediaries between artists and fans: do you see blockchain as a threat to your work?

POSSIBLE APPLICATIONS OF BLOCKCHAIN TECHNOLOGY

Considering the papers published in the past few years that deal with the possibilities of blockchain technology in the music industry, three solutions emerged as the most popular:

- A networked database for music copyright information[7][8][9][10];
- Fast, frictionless royalty payments[7][8][9][10][11];
- Transparency through the value chain[7][8][9][10][11].

Other possible applications were also suggested and will be discussed later.

A copyright information database

As of today, it does not exist a single database that includes the copyright information of all existing songs [8].

While the creation of such a database would require a massive effort, and previous attempts like the Global Repertoire Database failed [8], it would bring great benefits to an industry that currently relies on different, insulated databases which information are sometimes incomplete or incorrect.

The consequence of the present situation is that sometimes royalties cannot be paid because the rightful recipients are not known; those money are known as "black box royalties" and they are estimated to be $2.5 billion [6].

An example of how that happens is when a streaming service like Spotify pays a label to use its catalogue; when the contract ends, if there is a discrepancy between the royalty earned and the initial advance, usually the service let the label keep the money.

That money is not earmarked for any specific artist, so it ends up in the label's hands without being paid to the rightful copyright owners [15].
O'Dair [8] suggests that the copyright information, both those about the songwriters and those about the sound recordings themselves, could be stored on the blockchain.
According to his paper, the big advantage of adopting this technology is that the blockchain would work as a database but also as a network: all the data added to it would be immediately updated automatically, and the information would be available to all users.
Gradually adding copyright information to the blockchain would bring about the creation of a single, comprehensive copyright information database for music.
Some criticisms have been moved to this idea, the main one being that it would be difficult to deal with erroneous information, if mistakes were made with data entered in the blockchain, as it is an immutable lodger by its nature.
It has been also raised the question of who should enter the data, and how they would be verified.
Finally, as copyright information are fluid and the owner of a copyright might change overtime, some [10] objected that storing the information in an immutable ledger could cause problems.

Royalty payments

Royalty payments can be problematic for artists today as it takes long time for them to be paid out.
They are usually paid yearly, half-yearly or quarterly and in the digital, modern world that might seem outdated.
Employing blockchain technology could change that as the technology could enable the use of smart contracts. "A smart contract is a program that runs on the blockchain and has its correct execution enforced by the consensus protocol" [12]; within this program any kind of rule can be embedded, and this comes handy in the context of royalties.
With smart contracts all the information needed to pay royalties to their rightful recipients could be stored within the blockchain, automatizing the payments: every time a song is streamed or downloaded the right amount of money would be automatically be transferred to the copyright owner/s.
The low cost of cryptocurrency transactions would make this kind of small payments (as the money made by an artist for a single stream is in the order of a fraction of a cent) possible; these payments are known as "micropayments".
O'Dair [8] objects that the discussion on the royalty payments timing does not consider the fact that "artists tend to be paid in advances", with the labels paying the musicians and keeping the royalties money until they are even; as O'Dair himself notices, however, there are artists who do not receive large sums in advance, or do not receive money at all.

Transparency through the value chain

With the royalty payments being done through the blockchain the transparency through the value chain would increase.
Today most artists do not know the exact path that the money generated by their music follow.
The record labels that finance the artist by supplying them equipment, producing, recording, packaging and promoting their music, retain a large share of the value generated by the music that could be up to the 30%, the largest amount gained by ant actor involved [11].
The artists' share is much smaller and often even unknown to them.
The introduction of blockchain technology would create a more direct connection between artist and consumer, eliminating the intermediaries and increasing the value retained by the artists.
The main obstacle to that is that for the artists under contract with a major label, and possibly not only them, it would be difficult to go straight from creation to blockchain networks, and it would be even more difficult to make their back-catalogue available.
An alternative would be for the label to change its role of intermediary within the chain, instead of completely eliminating it, so to make the shift to blockchain distribution easier.

Other applications

In his paper, O'Dair [11] mentions the Dot Blockchain Music initiative reporting that Benji Rogers is working on a new audio file format that would include all the copyright information together with the actual music. This would be another step, together with the aforementioned copyright information database, in the direction of an easier and more efficient way for people to know the copyright information necessary to pay out royalties. As reported by Fabian [7], Bobby Owsinski objected that as today music is consumed mainly

through streaming a solution like this would hardly be useful. While it is true that the streaming consumption has been growing since its inception, the Global Music Report [1] shows that in 2017 the revenue of digital music (excluding streaming) was of $2.8 billion which, despite being a relatively small percentage of the total revenue, is still a considerable amount of money.

Sitonio and Nucciarelli [11] suggest another application that could be revolutionary: using blockchain technology and smart contracts, in a similar manner to that suggested to automatize the royalty payments, the price of the music could become dynamic. Similarly to what happens in other businesses, like with flight tickets, the price of buying music or streaming it could depend "on the time of the day, streams per person, total number of streams/downloads, and even region of the consumer". That could be done by analysing the data recorded by the blockchain and, for instance, making more expensive a song during the time of the day when it is streamed/downloaded the most, or making it cheaper for those who stream it more often. While the system could be revolutionary, it would be a change unprecedented to something that has been pretty much unchanged since the birth of recorded music (static pricing), so it is hard to tell whether it could be a successful move.

Sitonio and Nucciarelli also explain that transactions being carried on the blockchain would not only increase the transparency of the process, but would also provide a wealth of data that artists and their management could exploit to create new business models based on the positions, demographic and purchase preferences of the consumers. Whilst the idea is interesting, and big data analytics has been proved successful in many businesses like Netflix, a lot of data is already available in the music industry from streaming platforms and social media, so it is not clear how much more data could be gathered through the use of blockchain technology. Those currently available data is already being used in the music industry and, according to Heitner [13], "a dramatic shift is in order for the entertainment industry as a whole" because of its impact.

CURRENT STATE OF DEVELOPMENT

From the early days of blockchain, the technology attracted a great interest in many industries. The music industry was no exception and, besides researches and articles, some of which have been mentioned above, the first concrete applications are already available.

Bittunes[1], Ujo Music[2], Voise[3], Musicoin[4], Resonate[5] are among the streaming platforms based on blockchain technology that have started their businesses in the last few years: they employ smart contracts to pay their artists and promise them much higher compensations. Some of them also allow for the users to tip the artists. These platforms use cryptocurrencies, some already existing like Bitcoin and Ether, some newly created ones like Musicoin; the cryptocurrencies allow the platforms to work because they are necessary for smart contracts to be possible. However, they also slow down the adoption of the services as the purchase of cryptocurrencies is not as user-friendly as the payment of a platforms like Spotify. Gerard [14] explains that legal options such Spotify found their success by being more convenient than piracy, and the blockchain-based ones are (at the moment, at least) much harder to be used. O'Dair [8] notes that according to Silver these platforms will struggle to achieve critical mass also because of their separation from the major label system; he also added that some platforms are already quite advanced (Bittunes claims users in 70 countries) but without major artists in their catalogue it is difficult to see these streaming services breaking into the mainstream. While it is easy to see emerging artists joining the platforms, it could be harder for bigger, more successful artists because of their back catalogues being owned by major labels. Among the existing platforms, Ujo Music gained some attention on the wake of the Mycelia project, an experiment of the well-known artist Imogen Heap[6] who used her song "Tiny Human" to demonstrate the possibilities of the blockchain technology. Heap attached many information to the song (key, tempo, lyrics, instruments) and suggested that other information, like which type of coffee was consumed during the recording, could be added creating a potential for sponsorships. The project received a wide attention and is often mentioned in papers [7][8][9][11], but it seems more like an isolated experiment to show the blockchain technology's potential as no other artists really followed her

[1] http://www.bittunes.com/
[2] https://www.ujomusic.com/
[3] https://www.voise.com/
[4] https://musicoin.org/
[5] https://resonate.is/
[6] http://imogenheap.com

example, and Heap herself did not follow up putting more music on the platform. Also, the experiment ended up being a failure from an economic standpoint as the artist's revenue from the song amounted to $133.20 despite the huge press coverage [14].

EVALUATION

To evaluate the ideas previously explained, three people working in different areas of the music industry were interviewed and the answers were analysed together with the evaluations found in the papers studied.

A first relevant data is that, other than the three interviewed, eight more people that were contacted for an interview declined the request on the basis that they considered the technology to be at an early stage where it could not be adopted yet, and as such they did not have worked on it nor have enough knowledge to answer to the interview. While these negative answers do not give specific opinions on the blockchain technology applications researched, they allowed to observe a widespread perception that the technology is not ready yet to be employed. This feeling was detected in some of the papers analysed: Dr Silver [9] suggested that it could take 10-15 years before the impact of the technology becomes relevant; Sitonio & Nucciarelli [11] stressed that the blockchain technology is still in its initial stage and they mentioned that according to the Hype Cycle report we are no less than five years, and up to ten years, away from a mainstream adoption of the technology.

Going into the interviews' answers, Joel Lindström , the Group Manager from STIM, the Swedish Performing Rights Society, rose an important objection to today's situation with blockchains: while the technology could be useful, and in fact he confirmed that they are looking into its possible applications, the current copyright laws are making it difficult for the blockchain technology to be used. The interviewee affirmed that "*developers generally seems to be underestimating the complexity and the challenges of music copyright so far*" so, while from a technological standpoint the technology is already promising, the legislation is what is really hindering its adoption. O'Dair [8] also reports that there are legal and regulatory issues with the blockchain technology; this agrees with Lindström's affirmation that the hard part and main challenge to be faced now is "*changing, globalizing and harmonizing music copyright laws so that blockchain could be a realistic option*". From their role of middlemen, STIM, just like any Performing Rights Society, could be threatened by a technology that many identified as the "intermediary-killer": when asked about this, however, they replied that to do their work you have to "*negotiate with big broadcasters and online platforms*", something not easy to do for individuals on their own, so they do not feel threatened by the technology and they believe blockchain and PRSs will be able to coexist. Going into the streaming platform side of things, the Managing Director of Bittunes, Simon Edhouse, agreed that cryptocurrencies are not for everyone as we are still in its early days, but said that he believes that the early adopters of Bitcoins, among the artists, are those who will make the biggest profits in the long run; he also added that in the future the platform will add other forms of payment together with Bitcoins, even though he did not specify which. A possible obstacle to the success of blockchain-based streaming platforms was found to be the lack of mainstream artists in their catalogue: Edhouse answered to that by saying that "*The Bittunes platform is essentially for all the other non-mainstream artists in the world, because they vastly outnumber the stars and bands with recording contracts*". It seems therefore that the main focus, at least for Bittunes, is on the smallest artists who might make smaller numbers, but who are also many more than the big, mainstream artists. While the focus might be on smaller artists, however, the big ones are not excluded completely from the service as Edhouse added that, "*for the platform to reach a wider audience it would be helpful to have some big name, but it takes time*". He agreed with the idea that it might take 10-15 years for the blockchain technology to make a significant impact and to reach a mainstream adoption and went on saying, "*also because 'What is Blockchain?'.. It is many things to many people and there are many so called 'Blockchains' that are not really blockchains, and what is the value proposition anyway? It has become a buzz word that means many things to many people, but actually it doesn't mean much to the general population. I look forward to the time when the discussion returns to the actual value proposition to users not just some 'magic technological box' that people wheel out to raise money.*". Blockchain technology undoubtably gained a great interest in the past years, both in the industry and in the general public, so the notion that the confusion around the actual functioning of the technology could be slowing down the adoption of the technology is interesting.

Valter Edberg, a Product Owner at Epidemic Sound[7], shared the opinion which comes from a different angle: Epidemic Sound is a company that licenses music for content creators to use as soundtracks of their videos, but they also uploaded their catalogue to streaming services for the users who want to simply listen to the music. As such they would be extensively affected by the two propositions of a networked database of music copyright information, and royalty micropayments done on the blockchain. Edberg went as far as to say that the two, "*royalties and copyright information, who wrote what track, is maybe the biggest [issue] in the music industry as a whole*", and continued explaining that the complexities of the two "*led to this opportunity for labels to grab a power position, they sit and control the supply chain, they control the money that comes back from DSPs [Digital Service Providers] like Spotify, and then they control how they distribute them to their artists*" with the consequence that the artists get a small amount of the money generated by their music. He also explained the reason for the delayed royalty payments: "*you as label distribute the music to different DSPs, not just Spotify, also Deezer, Apple Music, Amazon Music, and we cannot control when they pay out the money*". Because all the streaming services pay out the labels at different times, some monthly, some quarterly and so on, the issue of the timing of royalties payments is complex; he hence agreed that a system that employs real-time microtransactions, a process that by definition is done automatically (the only way to manage such an amount of transactions), could be beneficial. He however wondered how micropayments could concretely by introduced: "*You could create this sort of third-party platform, maybe, that people would use. The problem would be to get all the DSPs and labels to agree to start using it.*". The issue then would be convincing labels and streaming services to use the new system. The conclusion is therefore that microtransactions would be actually useful, could solve what is perceived as an issue by many today, but they should be backed by a business model that would be convincing for all the parts involved. Edberg also chimed in on the idea of blockchain technology as the "intermediary killer", and on how it could be perceived as a threat: he said that artists could upload their music directly to a streaming service, but after that the question would be how they market themselves. This again is something that they could do themselves, but they could also use the help from a third part. The role of labels and such is probably going to shift over the next 10 or 20 years, but the introduction of blockchain technology would not eliminate them entirely, just perhaps accelerate this evolution of their role. He concluded saying, "*I don't see it as a threat, I see it as an opportunity to do something better*".

[7] https://epidemicsound.com

RESEARCH LIMITATIONS

This research has a number of limitations: firstly, as previously mentioned, many of the people that were supposed to be interviewed decline the request on the basis that they did not have enough knowledge on the matter, and/or because they thought it was too early to work on the blockchain technology. While this gives us an idea of the general perception of the technology, a larger number of interviews could have provided more detailed feedbacks on the technology. Secondly, the discussion on the uses of blockchain technology is mostly theoretical as there are few functioning applications at the moment, and none used by major players of the music industry. A widespread concern, detected both in the interviews and in the papers studied, is that the technology might not be suitable for large scale operations like it would be necessary in the context of music streaming. Therefore the considerations of this research might clash with the concrete application of blockchain technology, once (and if) a working prototype is adopted.

CONCLUSION

In conclusion, the research found a number of possible applications of blockchain technology to the music industry. Three of them, specifically, have a wide consensus and many different researchers agreed that they would be transformational to the industry: the creation of a networked copyright information database, royalty payments made with microtransaction on the blockchain, and the larger transparency in the value-chain that the use of the blockchain technology would cause. When brought to people working in the industry, those who would be affected most directly by these changes, the ideas were welcomed with interest, but also with some caution. An important issue that will have to be addressed is that the existing blockchain-based platforms are not very user friendly, especially in the way they manage the payments, and that threatens to keep away the larger,

mainstream userbase. The general perception is that the blockchain technology could live up to the excitement it generated, but that it is too early for it to be adopted and to make a significative impact. The industry's opinion reflect that of the researchers who wrote about the matter.

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