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GILBERTO PASCHOAL DE PAULA FILHO

INTEROPERABILITY, BLOCKCHAIN AND INNOVATION:
Open Music Initiative's case for a networked phonographic industry

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Applied Thesis presented to Escola de Administração de Empresas de São Paulo da Fundação Getulio Vargas, as required to obtain the title of Professional Master in Management for Competitiveness.

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Advisor: Prof. Dr. José Luiz Kugler

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ABSTRACT

As recorded music industry begins to regain financial traction in a digitized market, it still faces the dim reality of high transaction costs, low levels of transparency and asymmetric information contexts. Artists, rights holders and entrepreneurs alike are constantly dealing with the difficulties in making business based on creative works. In the academic scene we still face a shortage of case studies on the topic, with most of the research being focused on theoretical analysis or technical experiments. This paper assays Open Music Initiative (a non-profit that involves academic institutions and major music and media organizations) as a comprehensive effort that can establish a cross industry standardization of technical protocols and metadata in order to create interoperability, fostering technological innovation and new businesses.

Keywords: Phonographic Industry; Interoperability; Blockchain; Music.

RESUMO

Enquanto a indústria fonográfica começa a recuperar sua saúde financeira num mercado digital, ela ainda enfrenta uma realidade com altos custos de transação, baixos níveis de transparência e cenários de assimetria de informação. Tanto artistas como detentores de direitos e empreendedores têm que lidar constantemente com as dificuldades de se fazer negócios com base em criações. Em termos acadêmicos, ainda há poucos estudos de caso sobre o assunto, com a maior parte das pesquisas baseando-se em análises teóricas ou experimentos técnicos. Este artigo aborda a Open Music Initiative (uma organização sem fins lucrativos que envolve instituições acadêmicas e grandes empresas de música e mídia) como um esforço abrangente capaz de estabelecer uma padronização de protocolos técnicos e de metadados no nível da indústria, fomentando inovação tecnológica e novos negócios.

Palavras Chave: Indústria Fonográfica; Interoperabilidade; Blockchain; Música.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
API	Application Protocol Interface
CD	Compact Disc
GRD	Global Recording Database
IFPI	International Federation of the Phonographic Industry
ISRC	International Standard Recording Code
ISWC	International Standard Musical Work Code
LP	Long Play
OMI	Open Music Initiative
RIAA	Recording Industry Association of America

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1. INTRODUCTION

Music industry has been one of the most explicit examples of an economic sector completely disrupted by recent technological change. From Pro-Tools and mp3 to Napster, iTunes and the streaming services, the digitization of the whole value chain has made artists, publishers, labels and other incumbents struggle to find sustainable means of getting properly remunerated for the creative works. To put it in economic terms, technology lowered the barriers of entry to creation and distribution of musical content – scarcity has given place to abundance, giving birth to “the ground zero of the Long Tail explosion” (Anderson, 2008, p. 99). Nonetheless, as this paper will demonstrate, emerging technologies can be explored in the search for new ways of monetizing the recorded music business.

Being an industry prone to experimenting with new formats and media, the phonographic industry as a whole has firstly adopted a digital format in the transition from the LP (long-play analog vinyl) to the CD (digital compact disc) during the 1980's. That was a change at the industry level that, on the one hand, has brought changes to the audience (more music space in one disc, alleged higher fidelity sound) and to the industry as a whole (cheaper media costs at its peak, in the mid 1990's); but, on the other hand, has kept the same business model untouched: a material media, sold individually mostly as an *album* (a bundle of tracks, with printed information and an paper art cover as a package). “Global sales (units) of CDs—the most popular format— fell in 2001 for the first time since its introduction in 1983.” (Zentner, 2006, p. 63). This fall had a direct relation with the fact that the real digital disruption came in the late 1990's, with the increased popularity of three technological factors combined: the expanded broad-band internet connection, which enabled a faster and more robust web of users; the mp3, a small compressed audio file format that was 1/12 the size of the CDs' wav format, which made it easier to be sent and received across the internet; and the peer-to-peer sharing softwares, that enabled its users to easily copy and download one another's music files. As put by Christensen (2015), “disruption describes a process whereby a smaller company with fewer resources is able to successfully challenge established incumbents business” (p. 4). This was a case in which technology students offered a lowered quality product (mp3 files with unreliable sound quality, mostly absent of metadata or artworks), but in a networked crowdsourcing model that, at the same time, broke the mandatory *bundle of songs* physical album standard and brought the price of

recorded music technically to zero - putting the whole business in a state of disbelief, not knowing what to do about it. The year of 1999 is a landmark for the industry, being the one in which RIAA (The Recording Industry Association of America) first sued Napster (a company created in June of that very year), the most popular music sharing software of a time when physical sales accounted for 100% of the phonographic industry's reported revenues. At that point, Napster had had the fastest software adoption in history, according to Mediamatrix and Associated Press (2000) and was already being funded by venture capital.

The first effective technological response to the file sharing/piracy issue did not come from the recorded industry itself, but from a technology major company: Apple's iTunes. Created as the regular and official source of music for the iPod device, in iTunes Store users could buy songs independently, with higher sound fidelity files and reliable metadata at an affordable price. "By 'unbundling' the album, Apple undermined the core of the recording industry's business model: no longer would consumers need to purchase an entire album if they only wanted one song, a huge blow to record company revenues" (Hesmondhalgh, Meier, 2018, p. 1564). Although many incumbents resisted the idea of conceding power and dollars to Apple – which would even set the US\$0,99 price standard for a track - in time the majority of labels would offer their catalog at iTunes Store. It was launched in 2003, before "the rise of a mature media ecosystem of smartphone platforms and the popularity of wi-fi and 3G data services that allowed for more ubiquitous networks. Without this ecosystem, subscription services simply were not mobile." (Anderson, 2014, p. 75). For the last decade, with that infrastructure ecosystem in place, and largely relying on cloud computing, another technological model has gained space as the audience's favorite music source: the streaming services. Without the necessity of buying or downloading files, the business model would change from selling property to offering access (on subscription, *freemium* or advertising based models). This business model settled itself with the aim of solving two problems at the same time: eradicating piracy, once users would have access to a huge catalog of legal music without the necessity of downloading and organizing files; and paying due royalties to artists and rights holders, since a growing base of paying users would provide the financial resources among an advertised-based free service with restricted functions, mostly similar to a more customized radio. As we will see later, those issues were only partially solved, since the amount of money paid per stream is close to zero (with only hit songs with millions of plays being financially interesting) and the irregular uploads of music still being a

source of loss, due to piracy itself or wrong authorship attribution. And it is also important to notice that, in a decentralized market context, with many different players, there is a lot of friction in the paying process, with many incumbents playing different roles such as composers, lyric authors, editors, aggregators, streaming platforms, record labels, authors' rights associations and so forth. Once we face a market reality based on micro transactions, every penny that is lost counts negatively for those who rely on what is paid.

It is also interesting to notice that, from the LP to the streaming services models of consuming music, technology has had a central role in shaping the context in which the consumer listens to music and how it is distributed. First of all, we have a clear path from a domestic context during the LP era (when the phonograph was the center of the recorded music consumption) to a more pervasive, both social and individualized context, in which the constant availability of music is a reality. As described by Oestreicher-Singer and Zalmanson (2013), the multiple forms of interactions provided by the social aspects of music have a key role in how users engage with the platforms, which also are always improving their ability to provide more personalized content based on human or computer based curation strategies. On that basis, new opportunities for innovation may be opened, including the different usages of the large amounts of users data (Drott, 2018).

1.1 Objectives and methodology

Our objective is to analyze an ongoing project that proposes the usage of technology as a means to solving what has been shown as the key challenges for the recorded music business:

- fostering new forms of monetization for the industry as a whole;
- lowering friction, costs of transaction and information asymmetry through the value chain;
- diminishing money loss due to piracy and wrong authorship attribution.

That being said, this research aims to answer the following question: how emerging technologies can be usefully applied at the industry level to solve structural problems in the recorded music business? Based on documental analysis and public data, its objective is to study an ongoing innovative project in terms of potential usage of technology and its feasibility.

The lack of transparency in the recorded music business is a limitation of this research, since the main incumbents in the industry do not publish detailed information on their results. Our main source of financial and quantitative data on the recorded music business for this research is the International Federation of the Phonographic Industry, the most reliable source of information in the industry due to its worldwide presence, with more than 1400 members and historic relevance of its reports and promotion of recorded music. Paradoxically, this limitation is a source of motivation for this study, since it is a structural deficiency in the phonographic industry that is being addressed by the initiative analyzed in this article.

2. OPEN MUSIC INITIATIVE

This section explores how the recorded music industry has historically tried to reduce friction by betting on an unified and centralized database, a model that has not worked. And how OMI proposes a new, decentralized model based on an industry level standardization in semantic and technical terms.

Open Music Initiative is a non-profit created in the realms of Berklee College of Music's Institute for Creative Entrepreneurship, in a partnership with Context Labs and IDEO Design. With the aim of integrating different parts of the music industry around some common playing field on the usages of new technology, the idea is to create consensus over formats and procedures in order to establish a new market reality, on the basis of transparency and proper value attribution. Launched in 2016, the enterprise was able to congregate most of the big incumbents in the recording industry, including the three major record labels (Warner, Sony and Universal), digital platforms (Spotify, YouTube, Netflix, Pandora, Napster, Soundcloud, SiriusXM), editors and aggregators (BMG, CD Baby, Fermata Entertainment, The Orchard), tech and telcom companies (Intel, Avid, Viacom) and universities (NYU, Northwestern, MIT Media Lab, Drexel, Queensland University of Technology) among many other companies and startups, establishing a diverse and comprehensive environment in which the core values of the project seem feasible in an industry level basis – that is: establishing an open-source technical protocol and metadata standard to generate industry level interoperability; applying Blockchain technology as a means of transparency and disintermediation; fostering new business models that can generate revenue in innovative ways. (Panay et al., 2018)

Historically speaking, the music industry has already undertaken some endeavors trying to facilitate the access to information regarding compositions and phonograms; and flopped. Once some of the main problems identified in the whole industry value chain are the excess of friction in the paying processes and the difficulty in identifying, negotiating with and paying rights holders properly, there have been timely efforts to create databases that could have been the axes of the market as a whole, such as the International Music Joint Venture, the International Music Registry and the Global Repertoire Database, all of which have failed in delivering their promises (Milosic, 2015). They all seem to share a common pattern that can explain their incapacity in delivering: the concept of one centralized database to which everyone would have to recur. This centralization would be a huge power shift, one big enough to make incumbents

prefer to continue with things as they were, including the fact that many intermediaries would lose their business model in that new reality: "...collection societies feared losing revenue from operational costs under a more efficient GRD. Another reason could be a dispute over control of the global database" (Milosic, 2015). In that sense, recorded music industry has a long and spread value chain, something that hinders the realization of any unified base.

Besides, there are way too many music information databases around the world with different data structures, a major hurdle to any centralizing enterprise. In recent times, one successful effort in standardization was the creation of the ISRC (International Standard Recording Code) and ISWC (International Standard Musical Work Code), widely implemented in order to recognize both recorded music and compositions. They both have been the official ID sources for phonograms identification and attribution, based on which digital platforms report numbers of streams and/or downloads and, consequentially, make the proper payments. Nonetheless, there are no validation systems that can prevent information errors, duplicity or lack of consistent data, a gap that leaves many rights owners on the margins of the financial side of the business.

With this historical background in mind, OMI's enterprise has a pivotal difference from what came before: instead of relying on a centralized model, it bets on a decentralized one, viable on the basis of both technical and semantical interoperabilities. The idea is to connect the yet isolated data silos where copyright and other legal and authorial information reside. Since most of the major forces in the industry are bonded together in the project, their decisions are widely expected to determine the future path of the market. "Industry level standardization serves to integrate the company level standards and unify them in the interests of the industry as a whole" (Verman, 1973, p.98). Along with this factor, this seems to be a classic case in which network externalities play a major part in establishing a new industry reality: "These standards fuel beneficial network externalities in two ways. First, and most directly, the standard makes it possible to share information with a larger network (without the need to convert the data from one format to another). Second, and indirectly, the enhanced ability to share data attracts still more consumers using this format, further expanding the available network externalities." (Shapiro & Varian, 1999, p. 229). As also put by Shapiro and Varian, "In a very real sense, the product that is expected to become the standard will become the standard." (1999, p. 14) With that in mind, the feasibility of a decentralized and interoperable architecture has a key role on the initiative as a whole.

2.1 Interoperability

It is important to examine the semantic and technical foundations for an interoperable networked data ecosystem. As expressed by ETSI (European Telecommunications Standards Institute), “Interoperability is the ability of two systems to interoperate using the same communication protocol. (...)the ability of two or more systems or components to exchange data and use information.” (Veer & Wiles, 2008, p. 5). To achieve seamless integration in OMI’s case, there are two fundamental dimensions of interoperability to be cleared: technical and semantic, both of them being key assets to the decentralized model.

In regarding technical interoperability, OMI has already developed a comprehensive API (Application Programming Interface) open-source architecture that enables communication among different rights holders databases, streaming and download platforms, aggregators and other incumbents. When operating in scale, this architecture, despite being decentralized, is expected to provide access to information in a much faster and reliable way, diminishing transactional costs in an economically sustainable model. Just like in the previous centralized attempts, the idea is to make research and negotiations easier and more direct, diminishing the role of intermediaries who have historically been the downside of any serious effort. As also noted by Shapiro and Varian, “(...)an incumbent supplier may prefer to see a new technology die from lack of standardization, hoping to prolong its profits from older technology.” (Shapiro & Varian, 1999, p. 228). In that sense, the fact that major editors and aggregators are taking part in Open Music Initiative is an important indicator that the ideals of transparency and disintermediation may be achievable. As long as the API model is largely adopted, authors rights licensing market may enter a new phase, that would configure itself as a cooperative marketplace in which music sellers can offer data about their goods.

When it comes to semantics, there’s a bigger challenge, due mostly to the lack of a standardized data structure implementation besides ISRC and ISWC, which haven’t been enough to effectively organize the world’s enormous music catalog in a consistent and detailed manner. “Semantic data is brought through the definition of a common set of ontologies that describe the entire system’s entities but also the data items produced, exchanged and consumed by these entities.” (Alaya et al., 2015, p. 36). Nonetheless, this is an issue faced by many other industries, including other artistic languages such as cinema and visual arts. In both these cases there are examples of standardizing efforts in terms of data, closely related to maintenance of archives -

both digital and physical – with its many particularities and difficulties in terms of data structure and usage. In that context, the adoption of linked open data models has emerged with the aid of web established protocols developed to increase search results. One example is IMDb (Internet Movie Database), that serves as a reference for the movie and television markets for a variety of purposes, from e-commerce (sharing synopsis, cast and other information for cinemas, streaming services and stores, for example) to academic research. Although IMDb does not offer an open API for automated queries, it is simple to access and retrieve data from their web application. Another good experiment, in a more restricted context, was Tate Britain's OpenART project. Using a specific part of Tate's XVII and XVIII centuries art pieces, a group of curators, historians and tech researchers designed ontologies and controlled vocabularies that would describe relevant information not only about each art work, but also the whole art scene of that period, marking up relations between artists, merchants, buyers and so forth. Once the work was completed, since the database was structured as linked open data, the archives were available for research, online display and reuse. As described by researcher Julie Allinson, involved in the whole process, "Open Data in its broadest sense means data that can be made publicly available under a license that permits and promotes wide use. In our context, it also means data exposed in a format that allows other applications to explore and use the data." (Allinson, 2012, p. 43) In that sense, as she also puts it, "Hooking up with existing datasets and authority sources could enhance the London Artworld data and make it more linked and linkable." (2012, p. 47). As such, the concept of Linked Open Data is being explored in different areas such as music itself (Gracy et al., 2013) and the more comprehensive concepts of digital libraries (Agosti et al., 2016; Campo et al., 2014; Hallo et al., 2016; Latif et al., 2016) and archives (Marcondes, 2017; Rademaker et al., 2013; Zapounidou et al., 2017).

For a more extensive approach, the creation and adoption of Schema.org as an online standard for the semantic web provides a good starting point from a commercial perspective, since its actualization model is pragmatically based on usage and results of online queries. "(...) mature Web applications such as web search are increasingly seeking to use the structured content, if any, to power richer and more interactive experiences. These developments have finally made it vital for the Web and application developers to be able to exchange their structured data in an interoperable fashion." (Brickley et al., 2016, p. 47). As such, Schema.org is already being used as a means for data exchange in a musical context, mostly in the case of information about

concerts (dates, venues, artists, ticket prices, to name a few ones), allowing different web pages or engines to share the same data consistently. But for the sake of recorded music metadata, the need is for highly detailed information, in order to provide each musician, composer or producer his or hers fair share of value - from singers, soloists and conductors to authors, bands or orchestra members. Since “big data makes common schemas even more necessary” (2016, p. 44), a decentralized shared data architecture that aims to comply with billions of tracks can’t do without a syntactic and semantic structure based on authoritative, reliable and traceable sources, which brings us to an emerging technology that promises to solve those issues.

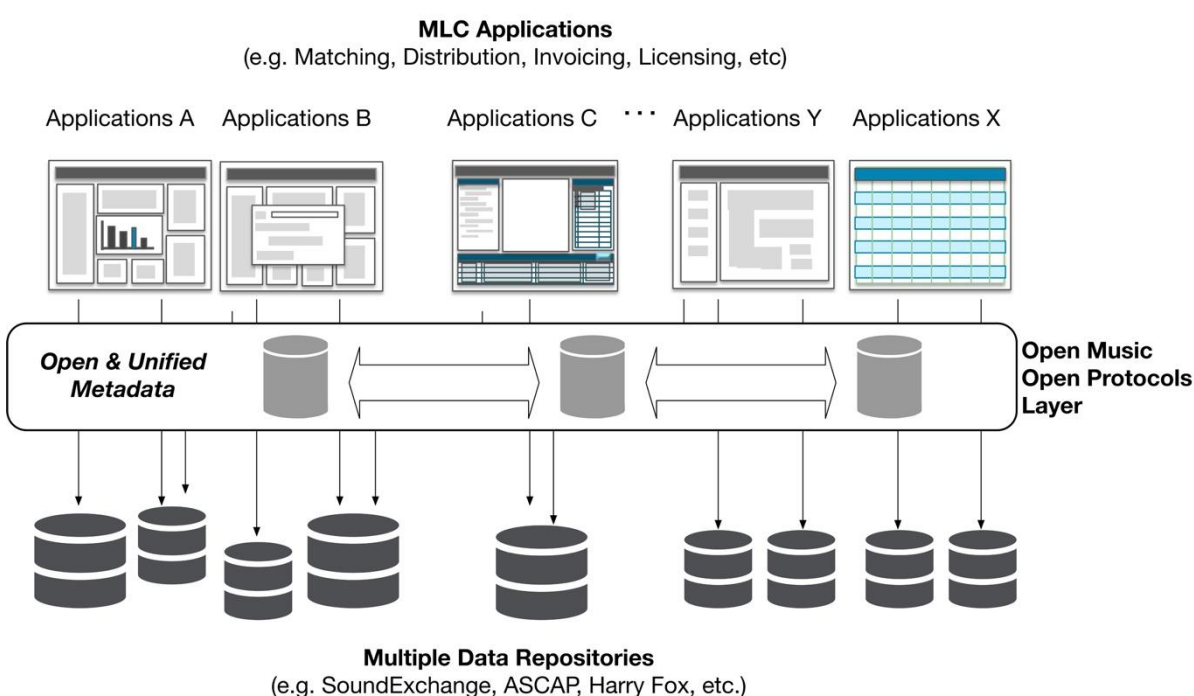


Fig 1: Open Music Initiative's integration diagram. Source: Open Music Initiative.

2.2 Blockchain

Within this scenery, in recent discussions (Beaven & O'Dair, 2017; Heap, 2017; Tapscott & Tapscott, 2017) Blockchain has been presented as a promising tool to bring back control over musical products, as displayed by the different experiments which have already been developed using the technology.

Due to its structural characteristics, Blockchain is being experimented by early adopters as the vehicle for many different applications in a wide variety of industries, having been appointed by Gartner Institute as one of the 10 Technological Trends for 2018 (Gartner, 2017). Mostly known as the underlying technology infrastructure that supports Bitcoin and other cryptocurrencies, Blockchain is basically a computing model that relies on decentralized networks to establish a distributed ledger with no need of trusted third parties to validate its records, “a structure for storing data in which groups of valid transactions, called blocks, form a chronological chain, with each block cryptographically linked to the previous one.” (Orcutt, 2018a, p. 25). This concept is the axis of the theoretical immutability of the records stored on a Blockchain, which is based on two aspects: “a cryptographic fingerprint unique to each block, and a ‘consensus protocol’, the process by which the nodes in the network agree on a shared history.” (Orcutt, 2018b, p. 40). Alongside with immutability, the decentralized architectural model brings redundancy, as every node - that is, an connected user of the blockchain solution - keeps with itself a copy of the data block, increasing its integrity and availability levels.

It is, then, fair to state that “(...)the technology itself is about creating one priceless asset: trust. (...)it could drastically reduce the cost of trust by means of a radical, decentralized accounting.” (Casey & Vigna, 2018, p. 12). And we assume that, in this context of a new paradigm of data storage, what is meant by reducing the cost of trust is precisely disintermediation: “the removal of middlemen such as banks or collection societies from transactions decreases transaction costs and risks associated with presence of such intermediaries.” (Savelyev, 2018, p. 551). In music industry's case, Blockchain has been theoretically validated since its features are coherent with the market's needs: due to its basic disintermediation capabilities as a distributed ledger, the technology would be the ultimate friction reducer when it comes to payments and rights attribution (Nowinski & Kozma, 2017) - the distributed ledger could bring control and disintermediation on a disruptive scale.

Guaranteeing uniqueness and ownership of data may also be two of the most important promises of Blockchain, since it is the basic condition for rights holders to effectively manage their intellectual properties. Nowadays “creators and rights holders cannot see how, where, and how much their work is being used. There is a need to establish clear ownership of digital content and use rights, and facilitate payment processes where required.” (Holtzman et al., 2017, p. 461).

Another important issue, as pointed by Henry Jenkins, is that “...much of the mass-media content encountered on YouTube and other such platforms is unauthorized – not so much user-generated content as user-circulated content.” (Ford et al., 2013, p. 15). When such content becomes available on the web in such manner, “metadata is usually absent regarding who owns the content, if it is possible to use the work, any limitations, and a mechanism for payment due.” (Holtzman et al., 2017, p. 461). IFPI (International Federation of the Phonographic Industry) research has already shown that 94% of all the takedown requests in 2015 were related to repeatedly unauthorized uploaded recordings in already notified sites and platforms (IFPI, 2017). In a sense, once a music file is part of a Blockchain, it will be regarded as the official record for that track, being able to carry all information with the security of being the original source. Also in that sense, the concept of proved uniqueness may be the crucial guarantee of its originality, both in artistic and legal terms. And in collective works, the concepts of traceability and immutability provide the proof of authorship in a timely manner, guaranteeing participation in the life of that individual track.

2.3 Innovation

From a business perspective, all the effort applied in establishing OMI's directives is aimed at fostering an increase in financial results related to music circulation. Thinking of digitized, web based models, "there are three general categories for creating value that can be monetized, including selling real things, selling virtual things, and selling access." (Clemons, 2009, p. 19). During the last couple of years of progress in OMI's work, Berklee has organized Labs in which students, with monitoring professionals from many of the companies involved in the project, developed business ideas, some of them already working on the web.

Open Music Initiative Summer Labs show some notable initiatives, with their processes and development documented in blog posts on Medium platform (medium.com/the-open-music-initiative). The range of propositions goes from hardware development (*Mark* is a wearable that curates music based on desired moods, compatible with streaming services) to georeferencing technology (*Beam* offers geographically based curated music), virtual reality (*The WaveVR* develops immersive experiences based on songs and related content) and multimedia art (*Soso* creates installations and interactive sculptures that mix sound and data visualization). On that basis, many experiments and discussions are underway on the topic of curation being a major factor for user's engagement, be it exclusively human curated music or with the help of algorithms and AI.

Outside of the OMI, there are also plenty of experiments. In *Peertracks*, Blockchain technology already makes instant payments possible, directly from fans to artists, with smart contracts – "a computer program stored in a blockchain that automatically moves digital assets between accounts if conditions encoded in the program are met" (Orcutt, 2018a, p. 25) - instantaneously splitting the shares to each right owner involved in the track, including performers, authors and producers. Startup *Ujo Music* also made an experiment with British singer and songwriter Imogen Heap's track "Tiny Human", using a platform called *Mycelia* that is also able to create a data package that includes lyrics, images and copyright information. (Heap, 2017). In that sense, emerging technologies have enabled new businesses, yet in their infancy.

	How it is	How it is expected to be
INTEROPERABILITY		
Standard Metadata	<ul style="list-style-type: none"> - Different data structure - Insufficient Data - ISRC / ISWC 	<ul style="list-style-type: none"> - Unified Structured - Detailed Information
API	<ul style="list-style-type: none"> - Siloed, isolated DBs 	<ul style="list-style-type: none"> - Interconnected, searchable network
Validation	<ul style="list-style-type: none"> - Not validated - Based on names of artists or tracks, inconsistency 	<ul style="list-style-type: none"> - Unique ID for validation
BLOCKCHAIN		
Uniqueness	<ul style="list-style-type: none"> - Duplicity of data 	<ul style="list-style-type: none"> - Unique ID for validation
Property Rights	<ul style="list-style-type: none"> - Dispute over ownership, wrong attribution 	<ul style="list-style-type: none"> - Proof of uniqueness - Historic ledger
Smart Contracts	<ul style="list-style-type: none"> - Friction, intermediaries 	<ul style="list-style-type: none"> - Disintermediation, micropayments
INNOVATION		
Streaming	<ul style="list-style-type: none"> - Digital Platforms: Youtube, Spotify, Deezer, Tidal, Amazon 	<ul style="list-style-type: none"> - Different initiatives integrated: wearables, curatorship, new artforms

Table 1 – Summary of OMI's Proposals

3. MARKET ANALYSIS

This section examines the phonographic industry economical and technical landscape. After all the turbulence in the beginning of the twentieth first century, the music industry finally seems to have found ways to remonetize itself in a digitized context, as shown in Figure 1. According to IFPI, 2015 was the first year to show a slight increase of revenue in the recorded music market (from US\$ 14,5 Billion to US\$ 15 Billion) after two decades of continuous market shrinking. It was also the first year in which digital income has surpassed physical sales (45% against 39%) – in 2005, physical sales still represented 90% of a US\$ 20 billion market (IFPI, 2017). In the meantime, though, the industry’s status quo hasn’t really found a way to thrive in this (not so) new scene as it once did in the vinyl and CD eras: “despite three years of consecutive growth, revenues in 2017 were still 68,4% of those in 1999” (IFPI, 2019). The 2018 revenue reports show that the market is still rising up, with a 9,7% global revenue growth (2019).

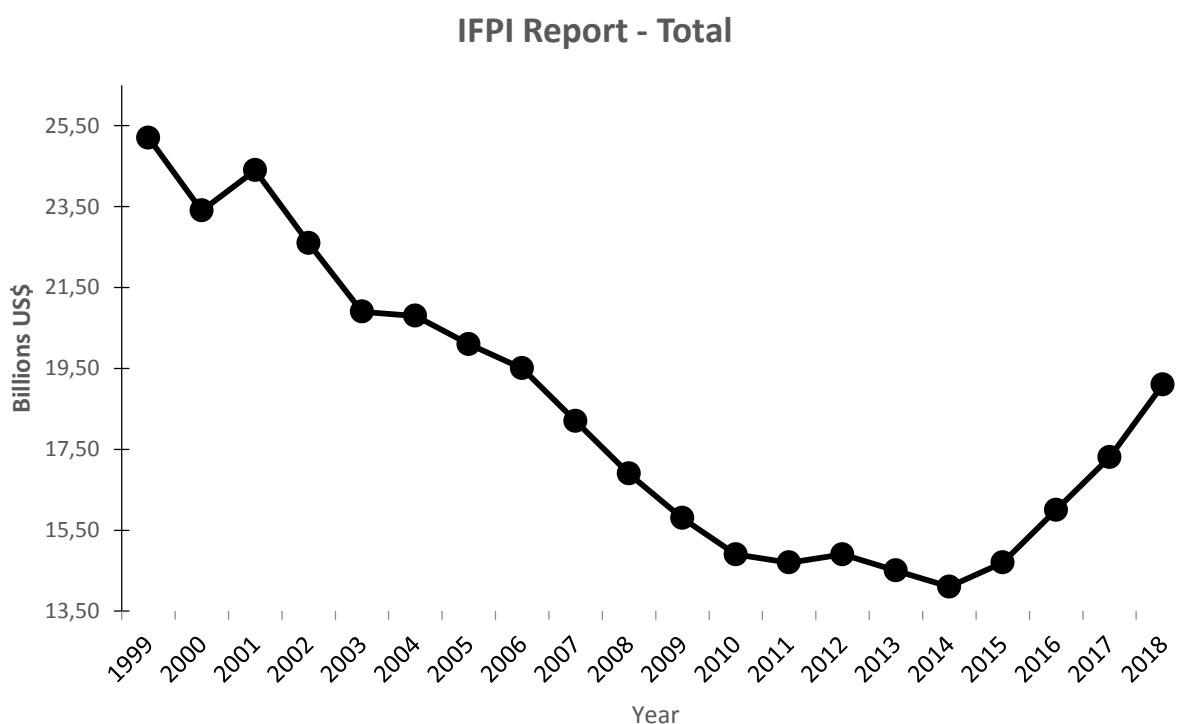


Fig. 2: Phonographic Industry’s Total Revenue Per-Year. Source: IFPI (2000-2019)

In the meantime, there's an undeniable urgency for all incumbents to increase their online revenue, since the digitization process is irreversible, with physical albums being regarded as objects of cult for niche markets on the long tail economy. One anecdotal fact that may be proof of that for all of those related to jazz, classical and experimental music, is that German label ECM, one of the most respected in contemporary music since the 1970's, has finally surrendered to digital streaming platforms, after years of resistance. "ECM was long a holdout against streaming services that have to contend with bandwidth limits and non-optimal soundcards in computers and phones, as well as deals that minimize the value of music. But as of Nov. 17, everything on ECM will be available through the major streaming services" (Pareles, 2017).

As shown in Figures 3 and 4, streaming undoubtedly has been the driving force for the market growth in the last four years, changing the business model from *music-as-a-product* to *music-as-a-service*. In 2018, there was a remarkable 34% growth in overall streaming revenue and a 32,9% growth in paid streaming revenues (IFPI, 2019), with the technology alone being responsible for 46,9% of global revenues. Nielsen reported in its Music-360 2014 study that 164 billion tracks were streamed on-demand among different audio and video platforms, showing a remarkable growth from 2013's 106 billion (Rethink Music, 2016). But that growth got even steeper in 2018, reaching 611 billion streams, "a sizable 49% increase over the same time period in 2017" (Nielsen, 2019). According to RIAA (2018), in the first half of 2018 streaming was responsible for 75% of the US market revenue, followed by digital downloads with 12%. Deloitte estimated that subscription music services would reach more than 150 million subscribers by the end of 2018 (Deloitte, 2017), with Spotify alone having announced 207 million users, 96 million of which are paying subscribers (Spotify, 2019).

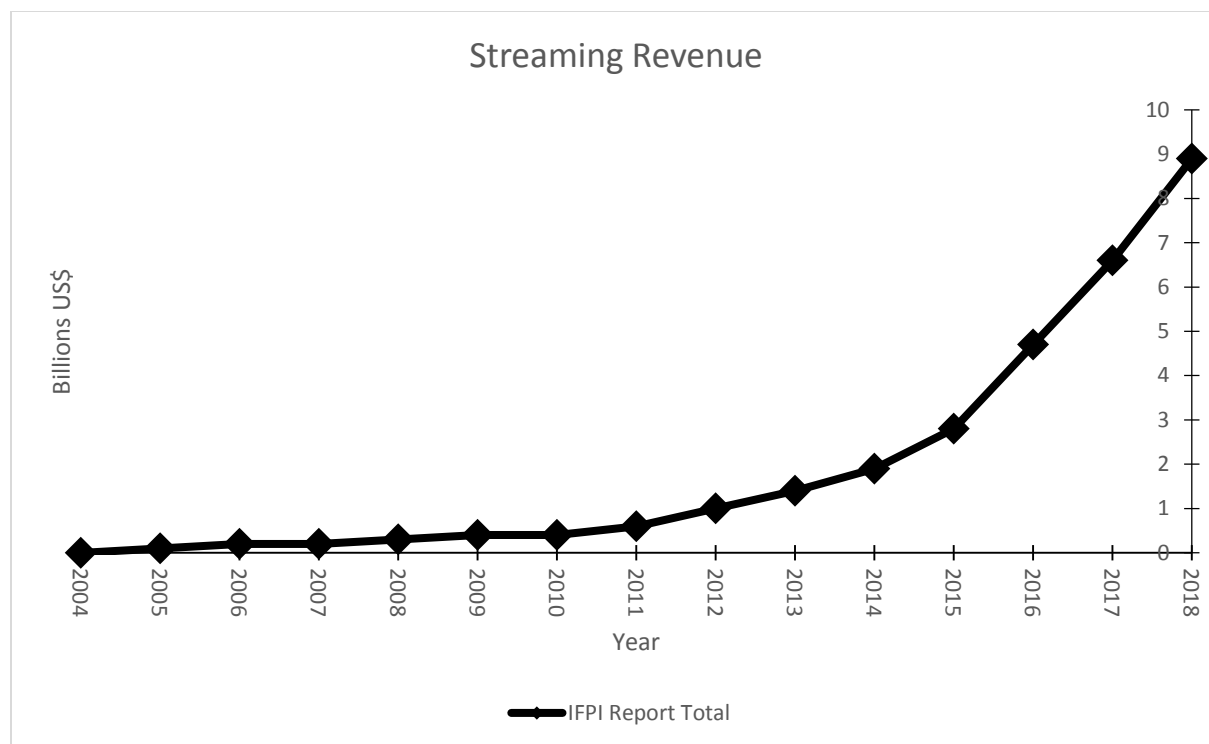


Fig. 3: Phonographic Industry's Streaming Revenue Per-Year. Source: IFPI (2006 – 2019).

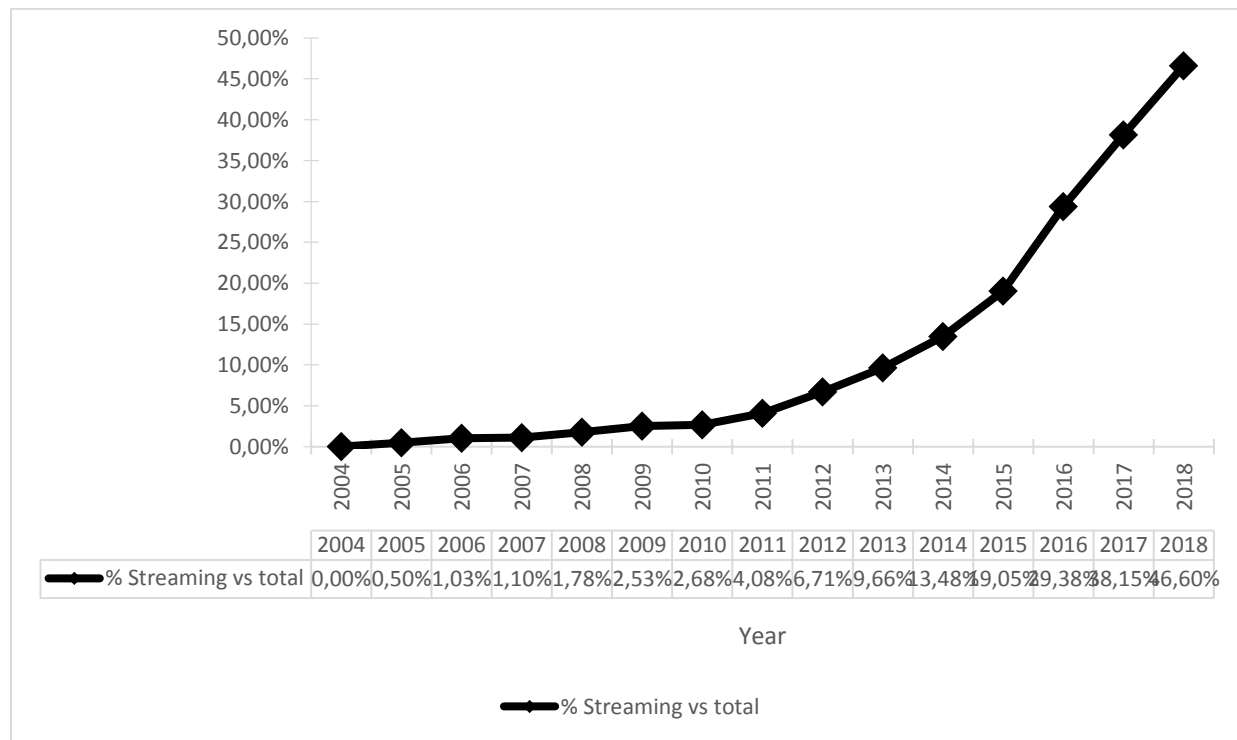


Fig. 4: Phonographic Industry's Streaming Percentage Revenue Per-Year. Source: IFPI (2006 – 2019).

In 2018, all the major streaming platforms became more integrated with products as virtual assistants and wearables, taking part in the different technological ecosystems that seamless connect aspects of everyday life: “Pandora, Tidal, and Apple Music all appeared on Amazon Echo and Alexa devices; Apple Music made its way to Android Auto and Android tablets; Pandora Premium came to Google Home; Spotify launched on the Apple Watch; Amazon Music is now available on Android TV; and SoundCloud tracks can now be shared to Instagram Stories.” (Deahl, 2018)

Despite the fact that industry’s reports show an increase in the income from digital consumption, it also shows a lot of friction in the payment processes, with way too many intermediaries retaining a large share of the revenue, and a lack of transparency (Rethink Music, 2015). These have been paradoxical times for musicians and rights holders: although the amount of recorded music being produced and circulated has steadily grown each year with a wider and avid audience ready to pay for consumption on different platforms, formats and contexts, it has never been more difficult for the regular artists to make a living on their creations. “Average streaming royalties paid currently range from \$0.005 to \$0.009 USD per interactive stream, depending upon the tier. Non-interactive pays much less, at as low as \$0.0017 per stream.” (Bargfrede, 2017)

SERVICE	Youtube	Spotify	Spotify Premium	Deezer	Tidal
FUNDING TYPE	Ad-Supported	Ad-Supported	Subscription	Subscription	Subscription
AVERAGE PER-STREAM RATE (USD)	\$0.00111	\$0.00121	\$0.00653	\$0.015	0.01573

Table 2 – Main Music Platforms Average Per-Stream Rate.

In an online ambient where micropayments are the most usual source of revenue (pennies per stream, download or any other usage), the minimal the transaction costs are, the more one can experiment with business models. “For online ecosystems, transaction costs are everything” (Farfield, 2015, p. 874). The idea of cost-efficiency, nonetheless, needs to be accurately put in perspective since the adoption of Blockchain as the technological platform for the whole industry brings with it expressive costs that cannot be quantified with precision yet, but that will surely

have financial impact in the incumbents' decision. "Switching costs are the norm, not the exception, in the information economy" (Shapiro & Varian, 1999, p. 110). The effort of converting billions of tracks' records into a new format (including data, legal information and any other type of content) may not be underestimated. Music industry has been through important changes in the last three decades (from vinyl and cassette to CD and from CD to MP3 and other digital formats), and did so in different economical contexts, with money flowing in much more easily than nowadays. A major, industry level adoption of a new technological model will surely require that the economic benefits are immediate and undisputed. As strongly stated by a researcher on this topic, "the state of music-centric Blockchain projects is, in my opinion, at a very critical juncture. It's sort of make or break time. The initial surge of enthusiasm is being tested by a combination of typical 'trough of despair' trajectories and any number of promises without results." (Howard, 2018).

Blockchain itself needs to mature as a technology, facing challenges in its development before being applicable widely, since there are no reliable evidence of its scalability power yet. The concept of interoperability is an important issue here too, since there are many different Blockchain platforms (such as Ethereum, MUSE and Bitcoin) that are not interchangeable in terms of value transactions – "it is perhaps ironic that a technology meant to bring consensus hits a stumbling block on the early need to design rules and standards." (PWC, 2018)

Of those working on these matters, it is important to point out Hyperledger, a joint venture (congregating both tech – IBM, Oracle, Cisco – and financial companies – ABN Amro, J.P. Morgan, BBVA, American Express) that stimulates research to create interoperability for Blockchain platforms, amongst other initiatives, such as creating smart contract engines, distributed ledger frameworks and graphic interfaces. Only in time we will be able to tell how (and how long it will take for) a seamless internet of value will take place.

4. FUTURE DIRECTIONS

Based on this analysis, the three pillars of Open Music Initiative - interoperability, blockchain and innovation - are expected to bring disruptive changes to the phonographic business once they are adopted. But the key question is if they will be effectively deployed and how long will it take.

A PESTEL Analysis summarizes the macro-environmental factors related to the project:

Political: in its first years of existence, Open Music Initiative has rallied in favor of laws that bring more transparency into the music business, with focus on authors' rights and intellectual property regulation in the United States. On different countries, although we may face different realities, there is a common pattern of collective associations (for authors, musicians, labels) displaying political power for defending their stances, on many cases as intermediaries that halt the efforts for transparency and disintermediation (Hviid et al., 2017). In that sense, there is a tendency of increasing pressure from artists in the foreseeable future.

Economic: bouncing back from a period of economic decline, the phonographic industry expects to continue thriving in the next years based on digital content consumption. Nonetheless, there is a need for quick financial results, specially for independent and minor artists and labels who depend on economics of scale in a micro-transaction market reality (dos Santos, 2016).

Social: music as a pervasive digital media (Fouce, 2010) has been considered a crucial art form in times of social networks and technological mediated social relations (Oestreicher-Singer, Zalmanson, 2013). In that sense, it is an important factor for establishing identities both individually and collectively, something that can be explored in creating new business models (Dellyana, Simatupang, 2013). All innovative projects proposed on the OMI Labs rely on a permanent social aspect of music.

Technological: OMI proposes a huge technological change at the industry level, with the risks and benefits that may come with it. As mentioned before, to achieve interoperability and disintermediation, the project relies on the adoption of open protocols for exchanging data (both technical and semantical) and on a relatively immature technology (blockchain), whose scalability has been put into question along with all the switching costs involved in the process. Nonetheless, technological change is the cornerstone of the transformative effort. (Panay et al., 2018)

Environmental: in terms of the consumption model, the increased usage of the streaming services and consequent decline in material media production has an impact on the industrialization of music as a product. On the other hand, there is a concern about the environmental impact of cryptocurrencies in terms of a huge need for energy (Miles, 2018), something that may cast a shadow on the large scale adoption of blockchain smart contracts with microtransactions applied to music consumption.

Legal: although the legal factors related to intellectual property have minor variations from country to country, there is international consensus over the foundations of authors rights that enable a large common ground for the application of different business models (Gunther, 2016). In that sense, the main concern for the industry is not about law itself, but on how it must be correctly enforced.

A SWOT analysis, summarized in Table 3, is applied here so as to provide a framework to help assess the feasibility of OMI initiative and its impact on the structural components of the industry.

Strengths	Weaknesses
<ul style="list-style-type: none"> - Congregation of some of the most important incumbents in the industry - Tech industry and academic research support - Open source decentralized model 	<ul style="list-style-type: none"> - Lack of reliable data structure - Immature technology - Extensive and complex value chain
Opportunities	Threats
<ul style="list-style-type: none"> - Business processes acceleration and efficiency - Lower transaction costs - Network externalities within the industry - New business model enablement 	<ul style="list-style-type: none"> - Operational and technical switching costs - Institutional adoption barriers - Pressure for immediate financial results

Table 3 – Open Music Initiative SWOT Analysis

In its third year of existence, the Open Music Initiative has been on a long process of bringing information and thought to different areas of the phonographic industry, but little of the technical efforts have been actually applied. The recent positive change that the industry has been through, with the increase in revenue and optimism with the streaming services, may bring some aspects of the project to a halt, since the great players of the market seem to content themselves with this

new scenario. The long expected financial results have appeared independently of any substantial change in the market, once the streaming services have been adopted by the public and are still on a rise. With that in mind, it is important to notice that the key players in this market seem to be maintaining the status quo as it is, investing more in developing artists' potential than in reshaping the industry's structure - at least for now.

In terms of technology itself, our evaluation is that, beside the fading hype surrounding Blockchain, Open Music Initiative's goals should be looked at as an ongoing incremental effort. The concept of interoperability is undoubtedly the most important one brought by OMI, not only because it is the baseline for the others, but mainly because, once achieved, it may very likely change the face of the industry by diminishing the levels of information asymmetry and provide increased financial results for the incumbents, specially the small players that struggle to survive in the long tail – new artists, right holders and small labels. This challenge alone is big enough not to be overlooked, and will be in the center of Open Music Initiative's actions. Despite of all the businesses that may emerge from the OMI innovation stimulus, there's a long road to go before they all prove themselves financially viable, if any of them will.

5. CONCLUSION

At the conclusion of this research, we can state that the objective of studying an ongoing project has been achieved. The creation of Open Music Initiative, bringing together the most important incumbents in the market, including tech companies and universities, has brought a fresh view of how technology could be usefully applied on an industry level for the sake of business itself. As of today, the biggest incumbents are reevaluating their stances, once the economic context of the industry is better, with increased revenue and an optimistic perspective.

In the last decades, digital technology has been crucial to constitute the landscape of the phonographic industry in terms of music production, distribution and consumption. Since the complete digitization of the value chain, which shaped a long tail market, the structural problems of the industry had not yet been properly addressed considering the usage of new technologies. As we have seen during this article, technology itself can be a major force for solving the structural problems of the industry, mostly in terms of information asymmetry, with the use of Open Data schemes in an interoperable context based upon agreed on APIs. This distributed recorded music Big Data scenario would facilitate making business, bringing up new

opportunities for content access and negotiation. Blockchain, when ready to be adopted in scale, could also be a solution in terms of disintermediation and bringing authenticity to music files and rights attribution.

The idea of a networked phonographic industry is technologically feasible but, as this study shows, to have a real impact the technology must be adopted at industry level. And in spite of all the change brought by the digitization of the industry, the major incumbents still pull the strings in terms of how or when these key changes will occur. We can conclude that, at this juncture, the possibility of solving the industry's structural problems using technology is a matter of business decisions.

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