MGI

Master Degree Program in
Information Management

with specialization in

Knowledge Management and Business Intelligence

A DIGITAL MARKETING TOOLBOX ARCHITECTURE FOR THE ELECTRONIC DANCE MUSIC INDUSTRY
The use of digital marketing tools to reshape the
EDM scenery in 21st century

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Dissertation presented as partial requirement for obtaining
the Master Degree Program in Information Management

NOVA Information Management School
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ABSTRACT

The peer-to-peer network and illegal music piracy has been widely adopted by the music community since the start of the 21st century, but with the recent and dramatic rise of digital distribution services and streaming platforms, it is easy to say that technology has had a profound influence on the Music industry. Acting amongst fierce artistic competition and against a monopolistic market, independent electronic music artists are struggling to find the right way to penetrate the market efficiently. In this paper, we propose a toolbox architecture for artists and independent music producers to assist them in choosing the right digital marketing tool for them. This toolbox provides a comprehensive set of different technologies that can be useful in the marketing phase of the music making process. This report also offers a comprehensive approach to the past, present, and future of the music industry, with a focus on the newest trends that took place since COVID, including the use of NFTs. This research will study the technological improvements currently experienced by musicians and eventually measure how these tools have affected their success.

KEYWORDS

Music Industry; Independent Producers; Technology; Marketing Toolbox; NFTs

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LIST OF ABBREVIATIONS AND ACRONYMS

BTC   Bitcoin Token

DAO   Decentralized Autonomous Organization

DSP   Digital Service Providers

DSR   Design Science Research

EDM   Electronic Dance Music

ETH   Ether Token

NFT   Non-Fungible Token

OADP   Online Audio Distribution Platforms

P2P   Peer-to-Peer

PoH   Proof of History

PoS   Proof of Stake

PoW   Proof of Work

SOL   Solana Token

VDF   Verifiable Delay Function

1. INTRODUCTION

1.1. BACKGROUND

Music and our interaction around it are some of the most fundamental and elementary human functions. Humans cannot survive without art, and art cannot survive without humans, as we always strive and have a burning desire to create. Music is unavoidable and has always been an important part of people's lives, whether listening to it, performing it, applying it, or even creating it. It can very much motivate and inspire the mind and spirit. Small details that stimulate our attention could range from a specific theme, a beautiful melody, an entertaining rhythm, or an outstanding performance. An attentive listening session can unravel a whole new world for one, making the experience unforgettable in many cases. Venues and concerts contribute to that experience, adding to fostering the spirit and fulfilling the emotional need. Our favorite playlist or artist has a direct impact on our behavior and emotional response in our everyday life. It has the power to unleash possibly all our emotions from a blink of an eye, and more. One of this art's biggest benefits, most specifically concerts and live music, is its ability to work towards sharpening our senses and state of mind and coordinating our physical expression and abilities. In a more general sense, for an average person, music constitutes an escape and is fundamental to their everyday life.

From Classical Music and Jazz Music to Rap Music and Dance Music, from Operas to concerts, from radios to cinema, the industry has seen more shifts and changes in its value chain since its creation than any other industry. The United States, for instance, saw the introduction of an unprecedented popular, social, and musical movement during the 1950s. Rhythm and blues began to seduce more and more young Americans who were won over by the new frenetic dances (Endres, C., 1995). It was in this context of liberalization of morals that Rock & Roll was born, which is extremely seen as the first popular music created by and for the young generation. New media such as radios and, afterwards, television enabled music to be broadcasted widely and massively in the United States. The vinyl record, the first mass-market listening medium, gave all American households access to new music. Later, it was for Soul music to become popular, reaching even in Europe. In the 1960s, Rock music landed in England, which gave birth to a new genre, Pop Rock, exemplified by artists such as the Beatles and the Rolling Stones. Besides, at the end of the 60s, a new generation of high-powered amplifiers started appearing, and became the number one selling material for manufacturers. The appearance of effects pedals allowed musicians to experiment with new sounds, notably the "distortion" effect. Artists and groups such as Pink Floyd and Frank Zappa are still famous today for their sound experiments. In 1964, the creation of the audio tape, made it possible for the first time to easily record the music you wanted to listen to. And as technical progress became more and more multifaceted, new professions emerged, like the sound engineer, a technician responsible for managing the sound for a show, a television set, a concert, a radio station, a film. In the 70's the Walkman was marketed, which made it possible to "listen to music with a helmet" (Hunt, Mellicker, A., 2008). It has greatly increased the amount of time people spend listening to music each day and has contributed very much into the development of the music industry. In 1984, creation of the sampler allowed the recording of musical themes in order to play it back in a loop to make a new piece. The first computers (the Atari) made it possible to create electronic sounds. Yet, it was widely used in Rap and Electronic music during that time, compared to now, where it's integrated in all musical types. In 1985, the CD (compact disc) was launched. The recorded music industry has experienced then a considerable economic development and has seen a

strong and steady increase in revenues over the last quarter of the last century. By the end of the 1990s, the democratization of computers, the internet and the MP3 format allowed music to be exported and to evolve.

Since the start of the 21st century, new technologies emerge every now and then to drastically redefine the dynamics of the industry on a global scale. With the development of streaming platforms, new media, and tools for quantitative data analysis, technology became a real asset for industry professionals to dissociate themselves from the competition over time. More than a trend, this is an indicator of the stakes of innovation in the music industry. More and more actors, including artists, independent labels, streaming platforms, and event planners are investing in digital marketing tools. Some majors have created a research department dedicated to the analysis of their quantitative data and increasingly acquiring start-ups specializing in this field. In this sense, record companies and brands are constantly experimenting with new technologies that will allow them to optimize their marketing campaigns and reach a new audience. By capturing fans and audiences through different platforms, collecting data on their interests and the types of content they interact with, hyper-targeted content is offered. When acquired, a wide range of data on the fanbase of an artist could lead labels and majors to build digital strategies tailored to the behaviors of the artists' fanbases they work with.

This dissertation will be centered around independent artists related to the electronic dance music (EDM) genre, as this new generation of music producers is becoming more and more confronted to challenges that were never experienced before. Entering the third decade of the 21st century, we are witnessing large lobbies taking control over a whole industry, giving independent and bedroom producers a small market to exploit (Zheng, Y., 2022). This leads to a need to be critical and lucid in choosing the right and adequate marketing approach. The integration, simplification, and development of new means of distribution and revenue generation independent artists is an active process and very crucial to its survival.

1.2. OBJECTIVE

In order to understand how any independent producer could use digital marketing tools and how it can help them improve their performance and their reach to their fans, this research is made to develop a framework that could be used by these artists. To achieve this goal, the following intermediate steps were defined:

1. Study the information requirements at the Marketing stage.
2. Identify the different technologies used by digital producers.
3. Build a framework for digital producers.
4. Validate the framework by digital producers

These objectives identified in this section intend to help answer the following research questions presented in the next section.

1.3. RESEARCH QUESTION

The central question of this dissertation is: Which is the most suitable range of tools for independent digital music producers to distribute their content?

To answer this main question, three sub-questions will be analyzed:

1. What are the different digital marketing tools and technologies used in the music marketing process?
2. How does independent digital music producers use tools to affect their performance and strategy?
3. How well does it integrate for independent digital music producers?

2. LITERATURE REVIEW

According to Diana Ridley (2012), the "Literature Review" chapter in a thesis or dissertation is where we ought to make extensive references to significant research and theories in the field; this is where connecting the sources and the study in question is made. It's an opportunity to direct a written dialogue with scholars, experts, professionals, and authors in the studied field, while also proving that you've learn, assimilated, and answered to the relevant literature that supports your study. Literature review is very helpful when one is trying to determine the theories, concepts, ideas, and past research that affects the study topic and approach selection.

This chapter of the dissertation seeks to provide the reader with essential understanding of the industry positions that will be explored in this study. It also offers the reader an overview of the dynamics of the music business in general. Essentially, this section will begin by analyzing a set of selected research and articles recently conducted by several authors and their produced concepts with insights into digitalization and innovation in the music industry. In addition, an overview of the application of these theoretical concepts with concrete examples and studies conducted will be presented in order to provide practical support to this thesis.

2.1. DIGITAL MUSIC INDUSTRY

The world of technology, as we know it, is moving at a breakneck pace. The stakes are high in a dynamic and complicated world, and the challenges and possibilities are legitimate. Since the release of the iTunes Music Store in the United States in late 2003, later on in Europe, the music market has slowly but surely shifted from physical products to digital products. This has led to an increase in the availability and diversity of music genres and artist's productions in many other countries' stores, instating a sense of commodification of the art. Today, streaming services like Spotify, Apple Music, TikTok, Amazon, Pandora, YouTube and Deezer have radically disrupted traditional music sales. Both the legal digital downloads and the sale of physical products including CDs, vinyl, and cassettes, are declining.

Omdia (www.omdia.com, 2020) is a technological advisory and research group that has an extensive understanding of the IT industry and the multimedia sector. The group was created in 2020 and has specialized its research practices focusing on multiple other sectors such as Internet of Things, Communications Service Providers, Cybersecurity, Media & Entertainment and Government & Manufacturing. Omdia provides unique and consistent insights within the technology, media, and communications network. As part of their Media & Entertainment Service Area, they deliver thorough and consistent annual reports on the present and future state of the many music industry segments. Such reports include "recorded music, publishing, rights and royalty collections, digital retailing, and live performances markets" insights. According to their latest reports (musicandcopyright, 2021), three big conglomerates hold more than two-third of the market share in the music industry on a global level. With a dominant market share of 68% in 2020, Universal Music Group (UMG), Warner Music Group (WMG), and Sony Music Entertainment (SME) seem to dictate the future of the industry, just as the future of other actors and companies outside of the major label circle. The independent sector, also referred to as Indie (Peter M. Thall, 2016), remains somehow strong in regard to their physical

distribution and compared to the general proportion. Combining an average of 43.3% between 2019 and 2020, the physical segment is still outperforming the digital market, with an average of 28% during the same period.

(%)	Physical		Digital		Physical/digital	
	2019	2020	2019	2020	2019	2020
UMG	25.8	25.8	33.8	34.1	31.8	32.1
SME	18.3	21.3	20.2	20.5	19.8	20.6
WMG	11.7	10.5	17.9	17.6	16.4	15.9
Independents	44.2	42.4	28.1	27.9	32.0	31.4
Note: totals may not add up to 100% due to rounding.						

Figure 1 Source: Music & Copyright (musicandcopyright.wordpress.com)

These numbers only reveal the fact that album, vinyl, and other physical artefacts have been replaced by paid online subscriptions for the past decade. In particular, music producers, production firms, and stores have all been impacted by the rise of digital music service providers or streaming service providers, which have deeply altered the paradigm from "possessing music" to "accessing music" over the Internet (Parc and Kawashima, 2018).

2.1.1. Independent Music Producers (Indies)

According to Tom Silverman, CEO of Tommy Boy Records, independent labels take nothing and turn it into something, while major labels will purchase something and try to generate more money out of it. In our context, Independent Music Producers, also known as Indies, are the producers that compose music that is not associated with a large label or a global firm. Although indie music can be highly popular and economically successful, the primary objective is usually not commercial sustainability (Brian M. Jackson, 2018).

To clarify the emphasis of this research paper, we consider the figure 2 (Brian Jackson, 2018) with the biggest circle representing music as an industry, and smaller circles indicating Electronic Music and Indie Music. Our interest falls within the junction of both these circles.
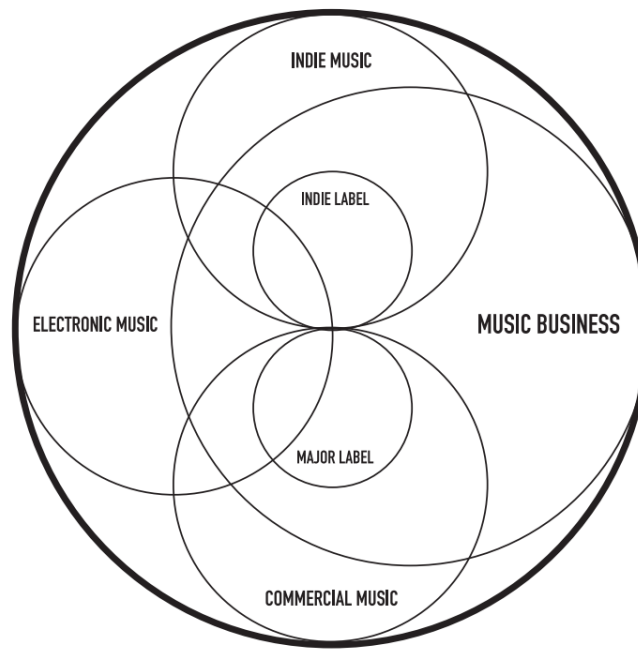
Figure 2 Electronic Music Distribution

By Electronic Music, we mean any music or sound generated by an electronic instrument or a machine such as drum machines, synths, sequencers, and samplers. The production of this kind of music is simple from a logistical point of view because it can literally just be anyone in front of a computer with the right tools (Brian M. Jackson, 2018). As such, it is perfect towards our study aim as the vast majority of electronic music producers live within the Indie music world.

2.1.2. Digital Marketing

The music business has seen its most significant transformation yet, moving from phonograph to vinyl and cassette to CD. However, music streaming is not only changing the way we listen to music, but it is also changing the structure of the whole music industry business. The rise of the adoption of digital means over physical products is game-changing for all parties as we can see in figure 3. Music streaming necessitates adaptation from all stakeholders and parties involved, from its production to its marketing, in order to realize all of the benefits it provides. And today's time requires innovative and advanced ways to market what is seemingly an easy-to-get product such as music (AJ Agrawal, 2016).
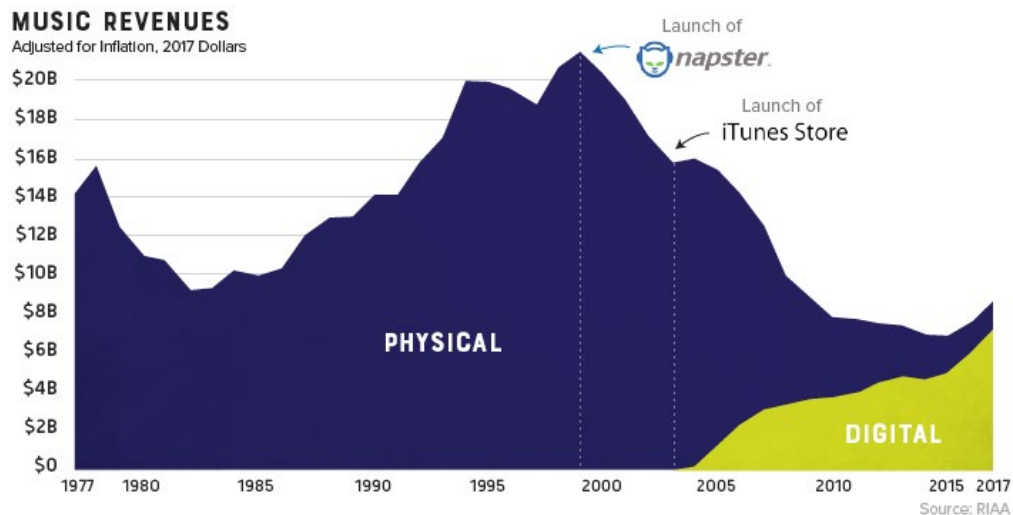
Figure 3 Digital vs Physical revenues

If we consider the current situation and the monopolistic status of the industry, we leave indies producers within a handful of choices regarding the marketing of their music. Online music services are a new digital form of marketing, and are comparable to music shops, where you can either own, rent, listen for free, or share with your social circle. Without a basic grasp of these new means of marketing, producers won't be able to create successful and adapted strategies. Plans can range from how to persuade your fans and followers to listen to your music on Spotify, to appearing on automatically generated playlists on YouTube. In today's market, there are roughly over 70 online music service available on the market, including Spotify, Apple Music, Bandcamp, Soundcloud, Pandora, etc.

However, since the start of 2021, NFTs (non-fungible tokens) have garnered a great traction among musicians. The tokens are supported by a blockchain technology and serves as a means of actually proving ownership for the buyer of the item (token) through the unique transaction that occurred on the blockchain (Freni, P., Ferro, E., & Moncada, R., 2022). NFTs can be used for special access to music collections, concerts, and other related events. It is the concept of exclusive ownership without the involvement of a third party. Purchasing vinyl from a retailer, for example, is different from purchasing an album directly from the artist. NFT is a win-win situation for artists and fans who need more time to realize their full potential. It is also the most innovative technology in this research, which will be discussed later (Freni, P., Ferro, E., & Moncada, R, 2022).

2.2. TECHNOLOGIES IN THE DIGITAL MUSIC INDUSTRY

2.2.1. DSPs: Digital Service Providers

In the early 21st century, music sales were plunging at an alarming rate, due primarily to the omnipresence of internet piracy and software using P2P (Peer to Peer) protocols, such as Napster or Soulseek. Although ground has been made up with the arrival of Digital Service Providers (DSPs), such as Spotify and Apple Music, the industry is still far from the level of money gained in the pre-Napster

era. Despite the fact that iTunes won a part of the battle against piracy, the music business has yet to recover from the Napster scandal.

The RIAA annual report uncovers that the industry income made during the 2021 year is in nowhere close to what it was in 1999. However, DSPs have been a major shifter in that, as streaming turned the issue around for the better.

U.S. Recorded Music Revenues by Format

1973 to 2020, Format(s): All
Source: RIAA
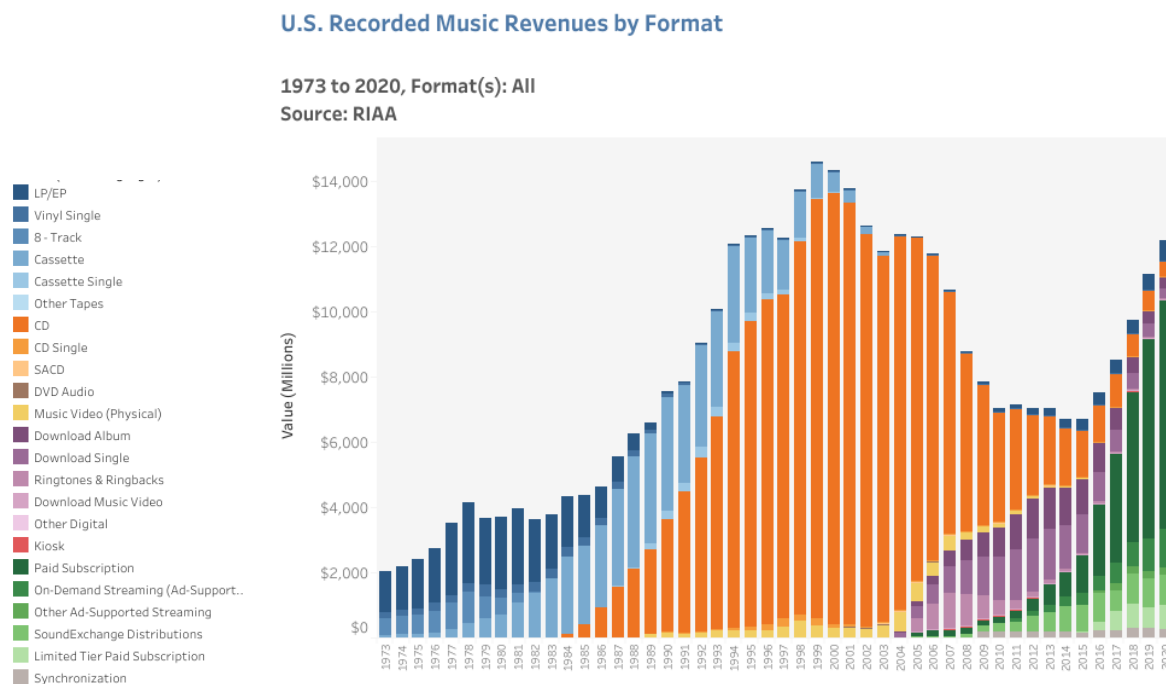
Figure 4 U.S Recorded Music Revenues by Format

As we can see from the figure 4, Paid Subscription systems are the most dominant form of music distribution, exponentially growing year after year. However, the puzzling fact is that while revenue streams are comparable to where they were before the digital revolution, artists, and particularly small, mid-level and independent artists, are not getting the level of income that many believe they deserve based on their numbers, views, swipes and clicks. This is due to the streaming compensation scheme that have been imposed upon the industry, which heavily favors major labels, artists, and commercial performers (Mejia, 2019).

These DSPs work and make money by streaming music tracks, albums, podcasts, or videos in exchange for a subscription fee. In many recent cases, the providers are free of charge, however, they will use the data collected through the use of their platform to create value among actors of the music industry and sell it. They operate and survive on the assumption that the revenue generated by those subscription fees, or data sold, will eventually outweigh operating costs and royalties owed to rights holders. According to Fleischer (2018), Spotify's logic is based on combining easy access to a large music library that a listener already knows, merged with an algorithmic recommendation system of other music that the service predicted the user will like.

Although every provider is different in its offers, such as their exclusivity with artists or strategies, DSPs ultimately work toward the same goal. In an attempt to legalize access to a nearly unlimited music and artist catalog and prevent criminal file sharing, Digital Service Providers (DSP) created an opportunity;

rather than wasting time, energy and financial resources attempting to avoid the certain music sharing phenomena, businesses should concentrate on how to profit from it (E. Jordan Teague, 2012). The significant change in how we consume music has in fact altered the rules in regard to income structure and source for copyright holders.

However, the sense of ownership has been lost through DSPs. Users can listen to a virtually unlimited library of music whenever the urge takes them. No massive collections to build, no time limitations, in fact no actual ownership of anything (Luck, G.,2016). While none of this is beneficial to the user, it is extremely favorable to these DSPs platforms that utilize the free content to train AI, develop data sets, and track user interactions to offer value for their investors.

2.2.2. OADPs: Online Audio Distribution Platforms

Online Audio Distribution Platforms are digital spaces that help collect social data from an audio file uploaded to the platform. It lets artists upload, record, and distribute music they've made themselves, without any need for it to be contracted with a label or a distribution studio. This group of streaming services or audio distribution platforms serve a somewhat different function by making it free and simple to upload and tag digital music files. These platforms aim to give musicians a way to reach audiences without necessarily collaborating with major and publishing companies (Hesmondhalgh, 2019).

Therefore, as opposed to the "consumer-oriented" DSPs, they could be described as "producer-oriented" platforms (Hesmondhalgh, 2019). The use of the phrase "producer-oriented" refers to the fact that, unlike streaming services such as Amazon or Spotify, they are created in a way that encourages music creators to submit original content, even while being used by music fans who are not musicians and do not have any desire to function as producers (Hesmondhalgh, 2019). Debatably, these platforms represent a great opportunity to many digital independent producers. In fact, new relationships of "musical production and consumption" are being rooted in the rapidly emerging "platformized" cultural world (Hesmondhalgh, 2019). The aim of these platforms is to deliver "something that would enable artists to share and connect through music" (Ljung, 2017). OADPs increased its popularity quickly in the early 2010's to grow into the main way in which amateur and independent musicians and producers share music and connects directly with potential audiences, through platforms such as Bandcamp, Soundcloud and Mixcloud (Hesmondhalgh, 2019).

SoundCloud, as an example, is available worldwide, is highly shareable and highly social according to Mulligan (2017). Its user-friendly interface provides a direct and easy way to link its contents to all all-mainstream social media. It also combines many of the characteristic elements of a classic social media platform, such as the following of other users or favorite artist's page, the resharing of tracks posted by other users, and the posts interactions (commenting and liking). OADPs also allow to track every user interaction with the tracks being shared. Metrics are visibly displayed (e.g., number of followers, plays, likes, reposts), promoting user interaction, but also involving an honest contest and hierarchies for the users (Hesmondhalgh, 2019).

For professional musicians however, SoundCloud delivers a feel of an explicit link to the fans, unlike with DSPs (Mulligan, 2017). For any independent producer, ambitious for a greater success, it is perfect

for reaching fans with no intermediary (Mulligan, 2017). Like the video streaming service YouTube, SoundCloud involves millions of subscribers, either for free or for a monthly fee, who do not specifically seek professional success as content creators. However, success stories such as Billie Eilish or Lord, have put these OADPs in the front as a marketing tool for many an independent producer.

In the EDM sub genre, the identity hiding phenomena is very much spread among independent and amateur producers, as it is the music that will usually lead to the artist and not the opposite. In our case, it is very apparent in SoundCloud's design that the emphasis of their social space is made on the tracks itself, particularly with the graphic representation of the file as a waveform. It also provides amateur musicians technically equal tools, just like for already established and emerging professionals (Hesmondhalgh, 2019). Many musicians' profiles can coexist in the same digital space, enabling discovery of new talents of the same tastes. Since in the EDM genre world, DJs rely on multiple visual references, the Soundcloud waveform reflects perfectly the conventions adopted by all EDM communities. According to research by SimilarTech, almost 1 million different websites use SoundCloud's embeddable player. That is a huge number of outlets, and it illustrates how important and influential that one element has grown to be (Forbes, 2017).

Notably, SoundCloud's waveform acts as the key point of social engagement in the platform because the service give permission to any registered user to write their feelings and comments directly on it. These time-stamped remarks are frequently used to provide details on certain parts of an uploaded track or DJ set. By enabling users to leave comments on specific sections of recordings uploaded by amateur and professional artists, SoundCloud incorporates different types of genre-specific interactivity into its architecture. The comments left along the waveform allow listeners and users to communicate with one another. For amateurs and newcomers for example, this interaction is frequently a crucial source of direct feedback, while for established musicians and their fans, it can foster a stronger bond and community built (Hesmondhalgh, 2019).
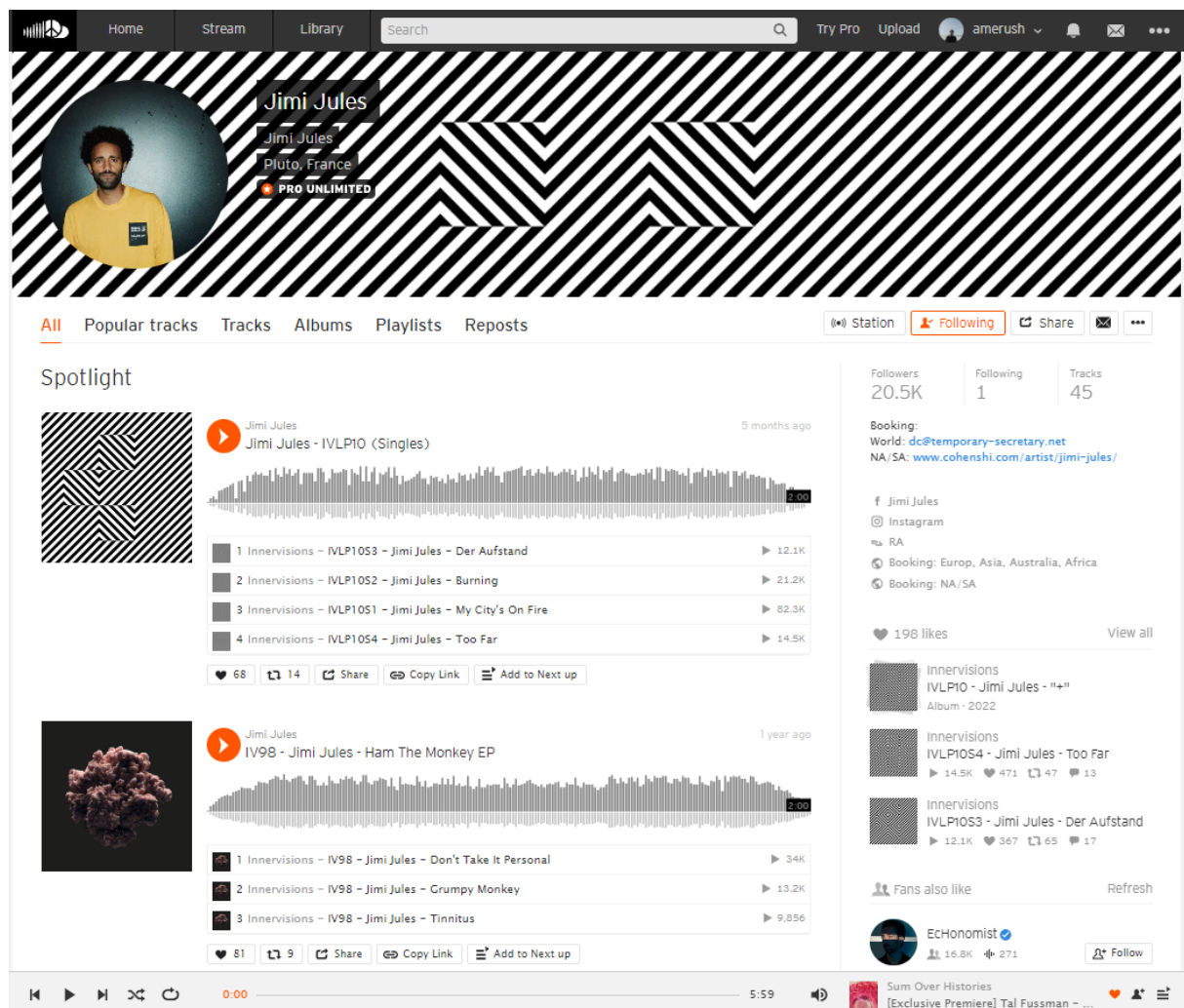
Figure 5 Detail from a profile page from SoundCloud profile page of an artist. (Screenshot of https://soundcloud.com/jimijules, accessed on July 15th, 2022)

While SoundCloud continues to have a reputation as a place where musicians can rise from anonymity to fame, defining itself as a "bottom up" challenge to the music industry, it has been struggling to get around the intellectual property systems that support the professional music industries. However, this constitutes the main reason for why it is very suitable for independent EDM artists, as it has successively limited its interest to independent musicians (Hesmondhalgh, 2019).

Figure 6 Soundcloud Homogeneous Design

In its various and own ways, SoundCloud and other OADPs involve a much greater sense of "rural" and direct interaction and reciprocity compared to the popular consumer-oriented platforms referred to as DSPs. Nevertheless, as digital music has been incorporated into these platforms, the chaotic and tumultuous peer-to-peer applications, and websites, which have long been popular among EDM audiences, have lost lots of their significance.
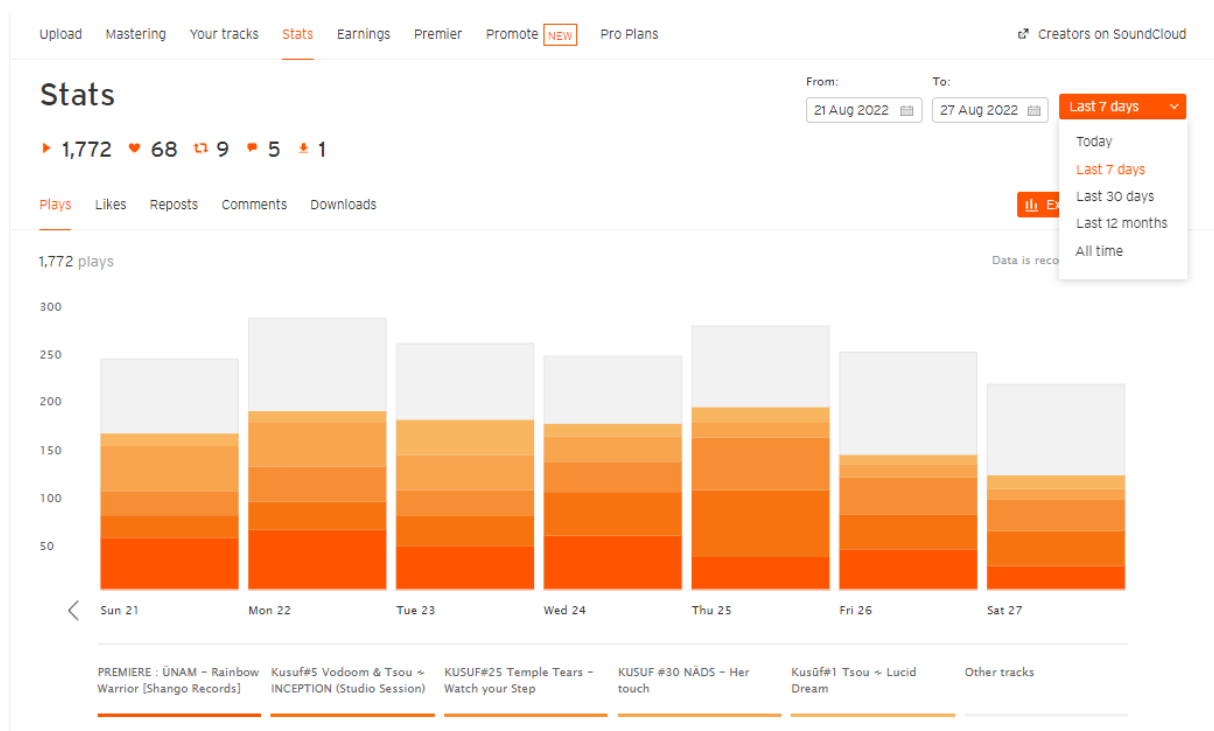
Figure 7 Soundcloud Premium Account Features

2.2.3. NFTs: Non-Fungible Tokens

According to Bradley Rauman (2021), the only part of the music industry that has remained constant since its inception in the 1950s is the dynamic of artists creating music for their audiences. Prior to the COVID-19 epidemic, artists depended largely on live concerts to make up for the loss of their quantifiable sales income. In a surprising way, the application of the blockchain technology brought one of the most important and exciting promises in the music business today, especially for indies (Rauman, 2021). Beginning to increasingly turn to outlets that allow fans to pay for unique content in the absence of live events, Blockchain technology might bring a creative solution to this problem, one that will endure far longer.

2.2.3.1. Blockchain Technology

The blockchain is a system of connected ledgers fully distributed between all its users, which makes use of some well-articulated software constructs of algorithms (Xiangyu Li, Xinyu Wang, 2021). Peers act all together to keep transaction's information and negotiate the informational content of arranged and linked blocks of transaction data, including cryptographic and security developments to achieve a full system reliability and integrity. A simpler blockchain definition states that it is a wide, digital, and decentralized ledger that records and executes transactions between two entities in a certifiable and unchangeable way. The blockchain technology makes it very hard to alter data from any registered transaction without it being exposed by the blockchain network's decentralized community of node operators, also referred to as miners (Taghdiri, 2019).

The blockchain was at first launched by the Bitcoin, back in 2009, and ever since that time, it only increased in its popularity. The financial, medical, supply chain, logistics, and many more industries have all been trying to adopt the technology and use it (Xiangyu Li, Xinyu Wang, 2021). In fact, on a business side, these distributed ledgers are flawless to use in order to enhance collaboration, provide origin and provenance, speed up transaction agreements, or offer clarity and transparency. The main aim of this technology, if used properly, is to give a lasting, tamper-proof record of business, commercial or personal transactions.

The Blockchain technology works by adding transactions to a series of blocks that are processed in a chain and connected to one another (Rauman, 2021). Nodes, which are standalone computers linked to the network and operated by miners, oversee exchanging and validating information in each block, as well as the chain's ordering. Blockchain-based networks can become decentralized if they reach a critical mass of independent miners and node operations, validating, and reporting transactions in a transparent and auditable way, free of any agent and remunerated in the cryptocurrency used for the blockchain (Rauman, 2021).

To understand in depth how these transactions are enabled, we need to understand one of Cryptography's most fundamental concepts: the Merkle Tree. Serving to encode blockchain data more efficiently and securely, Merkle Trees are also referred to as "binary hash trees." (Investopedia, 2022). It is a tree that represents a mathematical data structure, formed with hashes of numerous data blocks that encapsulate all historical transactions. The cryptographic hash of a given data block is used to identify each leaf node, and the labels of its child nodes are used to identify each non-leaf node.

Although most hash tree implementations are binary, with each node having two child nodes, they might sometime contain a superior number of child nodes.

For a better perspective on the importance of the Merkle Tree implementation in a Blockchain, let's imagine a network without a use case of the tree. The blockchain would need to see that every node on the network would have to retain a complete copy of every single transaction ever made. The size of data requested, and the energy consumption would be highly disadvantageous. One can imagine how much information that would be.

The primary portion of each block is organized using the Merkle Tree to record each transaction, and where each transaction is first independently hashed before having its hash value combined with another hash value.
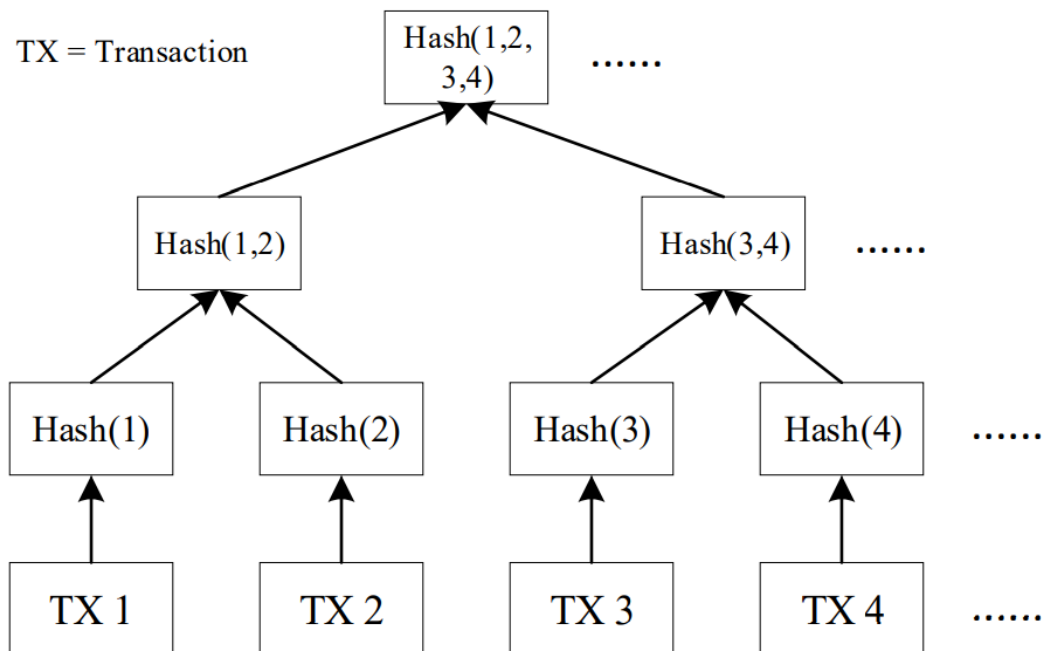

Figure 8 Merkle Tree example

In any given block, the block itself will also contain the prior block's hash value (Rauman, 2021). A connection between two blocks is made through the integration of the current and previous hash, as seen in the following figure 9.
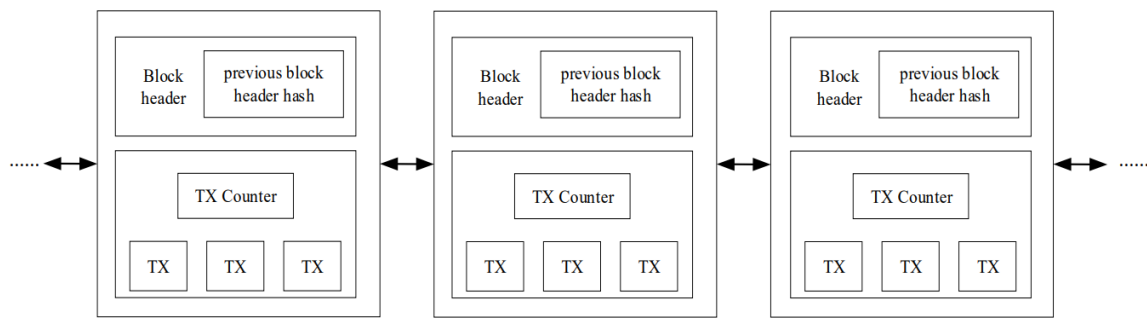
Figure 9 Block Connections

The term "smart contract," which was first used to describe the broad automation of legal contracts, has recently attracted a lot of attention as a result of the development of blockchain technology. The phrase is now frequently used to describe scripts written in low-level code that execute on a programmable blockchain network. Smart contracts were introduced with yet another blockchain technology, other than the Bitcoin, named Ethereum, and can be defined as "a secure and unstoppable computer program embodying an agreement that is automatically executable and enforceable on the Blockchain" (Yaga, D., Mell, P., Roby, N., Scarfone, K., 2019). To ensure that all nodes behave in accordance with the rules, definitions, and expectations, it materializes them as code and data.

All nodes in the network must carry out the smart contract for a specific outcome to be realized. For instance, a smart contract inside of the nodes will perform computations, store information, announce state, and execute transfers during the transaction process (Xiangyu Li, Xinyu Wang, 2021). A mediator or a third party is not required in such cases, and as a result, there is a significant reduction in the network's trust crisis. And what Ethereum aims to offer compared to its previous competitors, is a blockchain with an integrated full-featured programming language that can be used to create independent "contracts" that can be used to encode random state transition functions.

In order to have immutable recorded transactions and maintain consistent states, ensuring that all distributed unreliable nodes retain the same ledger, a consensus mechanism is needed. By neutrally validating and confirming transactions, each node will be compensated in accordance with their contributions to this process, and the two most fundamental proof-based algorithms are Proof of Work (PoW) and Proof of Stake (PoS) (Cao, B., Zhang, Z., Feng, D., 2020).

- Proof of Work: Proof of Work promotes nodes and their users in the system to allocate their computational power to process any transaction and paying them for their efforts in cryptocurrency (Zheng, Z., Xie, S., Dai, H. N., Chen, X., Wang, H, 2018). If a block of transactions is introduced by any node, it will need to be verified by every other node in the network with calculations using computational system power, commonly known as the mining process, and where miners are the nodes contributing to the network. *

- Proof of Stake: The basis of the Proof of Stake is the balance of every miner's wallet. With substantially greater computational power, those miners might easily uncover validated blocks, consequently compensating any miner with an interest determined by how much they already hold (Li, X., Jiang, P., Chen, T., Luo, X., Wen, Q., 2020). The holdings of their respective wallets act as "stakes", which exactly establishes the miner that will mine the subsequent block(s). The fact that there is no race amongst miners makes it that computational excess is decreased.

When we need to have a fast-moving network, working on processing transactions quicker, we need to be able to timestamp each transaction efficiently in tiny units (Solana, 2021). Programmable blockchains such as Ethereum however, only rely on separate programs to assign that timestamp, used later to validate the transactions in the received order. Considering the nature of the technology, having an outside program or source handling a part of the process defeats the purpose of a decentralized blockchain system. The Solana system answers to this dilemma by combining its already established PoS with a new innovation called Proof of History.

- Proof of History: Proof of History allows for "timestamps" to be built directly into the block itself. A verifiable delay function, or VDF, is needed for the process. "Every block producer has to crank through the VDF, this proof of history, to get to their assigned slot and produce a block," (Anatoly Yakovenko, co-founder of Solana Labs). Solana operates PoH by inserting data in the sequence and attaching the hash of the data of the previously generated states (Solana, 2021). The state, count and input data are then published, in a unique way that makes it impossible to recreate. Due to PoH's ability to use previous hashes as a reference, it will establish an upper- and lower-time limit. The VDF won't give the time but will instead tell exactly when a transaction happened in the past and future.

While many use cases might benefit from the attributes and virtues of the blockchain technology, they should also be closely analyzed to identify any prospective downsides. The following Figure 10 is extracted from a previous study on Blockchain (Barriers in the Pre-Decision Stage of Blockchain Adoption for Supply Chain, 2021) and is based on a handful of author's literature studies, highlighting four different and vital attributes while citing their benefits and drawbacks for a business adoption strategy.
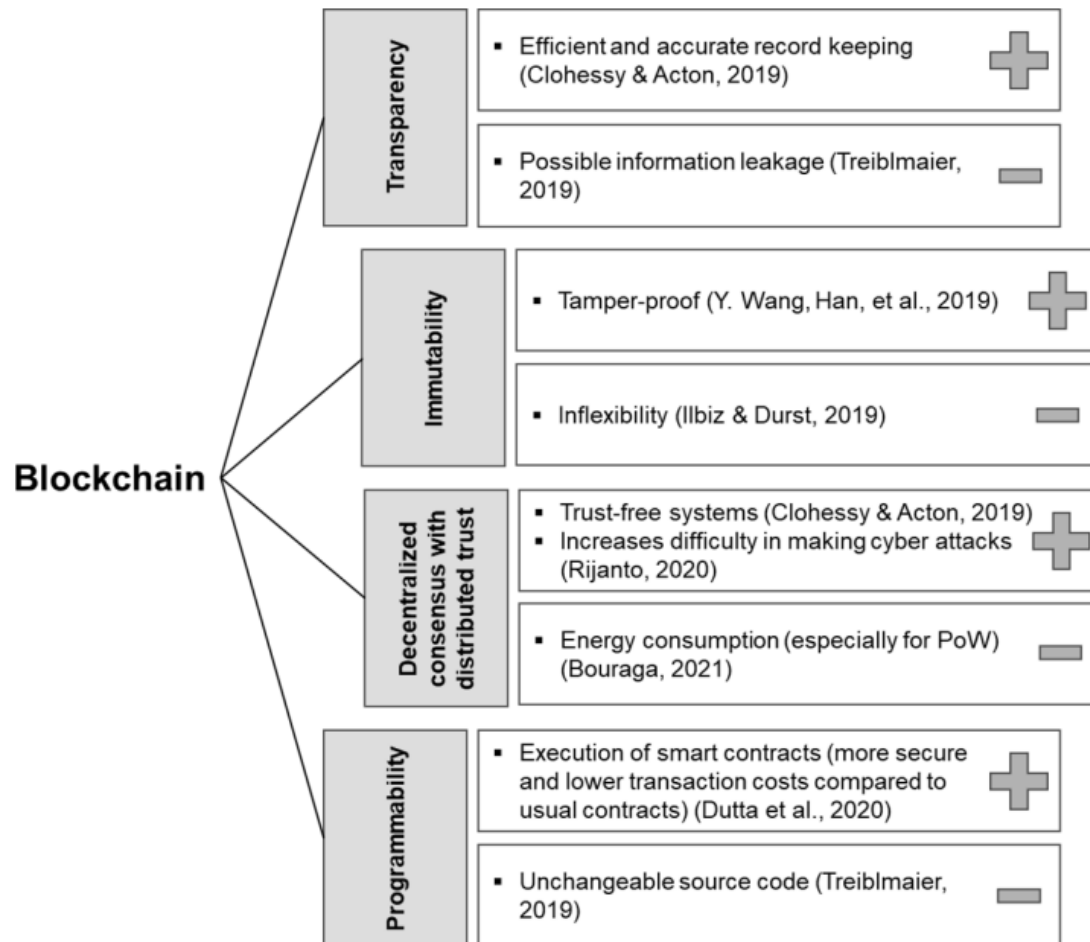
Figure 10 Blockchains Attributes and their Benefits and Drawbacks.

2.2.3.2.   Blockchain Market: Solana Technology

Although all technologies based on blockchain are powered by governing tokens and cryptocurrencies, the two (blockchain and cryptocurrency) are not identical and do not go the same way (Treleaven, Brown, and Yang, 2017). The number and quality of blockchain platforms with professional development tools and architectures have increased to the point where the majority of businesses can now find a suitable platform and a helpful developer and system integrator community tailored for them and that suits their activity (Xiangyu Li, Xinyu Wang, 2021). The following figure 11 illustrates the timeline of three blockchain technologies:
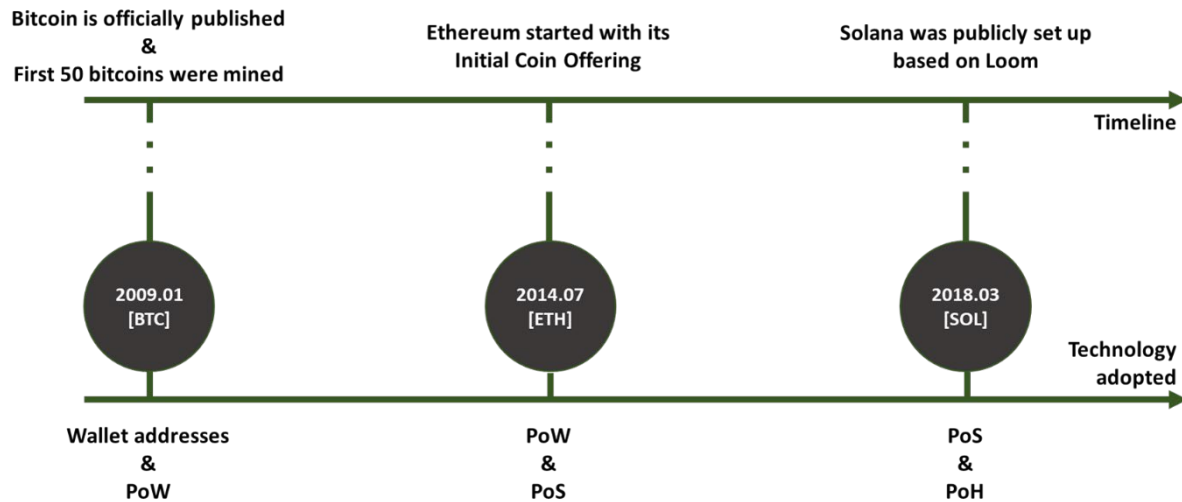
Figure 11 Timeline of some blockchain technologies

The two most well-known public blockchain platforms are Bitcoin and Ethereum. As the first blockchain implementation, Bitcoin integrates consensus techniques into a peer-to-peer network (Xiangyu Li, Xinyu Wang, 2021). Bitcoin coin, or BTC, introduced in 2009, was at some point the sole cryptocurrency people connected with and was supported by the Bitcoin blockchain technology. Transactions were made through BTC between wallet addresses and was strongly introduced as the most promising cryptocurrency, depending strongly on miners and its PoW structure. Ethereum on the other hand, introduces new features for users of the network to be able to build, publish, monetize, and use applications on the platform and make payments using "ETHER," the network's official token (Xiangyu Li, Xinyu Wang, 2021). The features introduced by Ethereum blockchain technology are smart contracts and account information, two cutting-edge ideas. With the use of accounts and smart contracts, Ethereum successfully modifies the fundamental design of bitcoin. However, these open blockchains do have performance and scalability issues.

The most recent news about some extremely innovative mechanisms introduced in Solana featured important improvement on TPS (Transaction per Minute) and Gas fees, and we think that it really is the ideal blockchain technology that not only promises transaction speed, but also transaction fees, usually lower than €0.001. Solana considerably exceled in terms of its high transaction performance with its improved consensuses, merged between PoS and PoH. More importantly, Solana programmable system confirms that basic blockchain structures and algorithms can still be significantly innovated to serve as the basis of many applications (Xiangyu Li, Xinyu Wang, 2021).

Our choice to study Solana more in depth is made because this technology makes it possible to create scalable and user-friendly applications for the entire world while also significantly enhancing the performance of standard blockchain. It has all the same features as conventional blockchain systems, but it performs effectively and efficiently by introducing both its Proof of History and Proof of Stake technology (Xiangyu Li, Xinyu Wang, 2021).

2.2.3.3. Web 3.0 & NFT

A rising consensus has been developed around Web 3.0 that describes it as a "decentralized web," in which users are accountable for their own personal data rights and take part in the execution and confirmation of transactions through smart contracts on a programmable blockchain (Chandra, 2022). As seen in the sections above, Blockchain is directly linked to cryptocurrency, as a first use case, and the metaverse worlds (such as SandBox and Decentraland). All three concepts play a part in NFTs and combine together in emerging the new Web 3.0. On the other hand, Web 2.0 is a "read and write" web in which users have little control over their data because it is being held by centralized systems and platforms. The original version of the Internet, known as Web 1.0, was a "write only" web (Chandra, 2022). In that sense, blockchain, cryptocurrency, the metaverse and decentralized applications are all part of Web 3.0 and NFTs are the newest addition to it, acquiring a lot of attention recently. With a value of more than US$40 billion in 2021, NFT is a new economic heavyweight (Chandra, 2022).

An NFT is a digital representation of an item that can be exchanged with cryptocurrencies (such as ETH or SOL) and is encrypted in a "smart contract" with a series of codes stored in a decentralized ledger. NFTs permits the ownership of unique artifacts, such as a picture, image, avatar, animation, video, and more precisely, music. Non-Fungible Tokens may be transferred to achieve both economic and non-economic purposes and are authenticated by the nodes in the ecosystem and traceable anytime on the blockchain (Chandra, 2022). NFTs offer a chance and unique opportunities for artists, painters, and other creative minds to be part of a technological revival and renaissance in the art world. In a rapid amount of time, NFTs has established itself beyond strictly artistic use, allowing more in real-life utilities such the provision of:

- Access: *such as passes, tickets, etc.…*
- Identification: *like certificates, diplomas, etc.…*
- Property: *by allowing actual ownership in a wallet*
- Loans: *by using valuable NFTs as a collateral*
- Donations: *by auctioning 1/1 NFTs and charity actions*
- Tradeable items: *specifically in games, with weapons and skins*

The size and aim of NFTs are currently amazingly diverse, and have a broad variety of affordances, stretching from virtual items in the metaverse to music, movies, sports, clothing, and books. Any valuable physical thing can have a "virtual twin" created through an NFT. In the following table 1, a thorough description of the characteristics of an NFT has been explored by Yanto Chandra, and can help us comprehend what makes this innovation so singular:

Characteristic	Meaning	Process	Example
Uniqueness	*In terms of its attributes, an NFT cannot be matched exactly (e.g., content, shape, name, number, and address)*	*On a blockchain-enabled marketplaces (Magic Eden, OpenSea, …), each NFT that is "minted" (recorded in a "smart contract") is recognized as a distinct object.*	- *An NFT of the very first SMS sent* - *"Cets On Creck" Club NFT is a Solana NFT collection of 6,969 unique virtual cats*
Non-interchangeability	*After being minted as an NFT, it is not and cannot be swapped for other artifacts directly.*	*An artifact that is listed as an NFT will have a "smart code" that enables identification and sets it apart from other artifacts.*	- *Each Cat in "Cets on Creck" is not interchangeable with other Cats or with any other NFT.*
Authenticity	*Once the NFT is minted in smart contract, its data cannot be changed or reversed.*	*When a creator creates an NFT in an NFT marketplace, the same NFT is will receive a token ID, wallet address, and smart contract code.*	*Example of valid Ethereum NFT:* - *token ID: 40,913* - *wallet address: 0xc6b0562605D35eE7101 38402B878ffe6F2E23807* - *smart contract address: 0x2a46f2ffd99e19 a89476e2f62270e0a35bbf0756*
Scarcity	*Each NFT is rare due to its singular nature and is the only one to exist in the blockchain.* *A higher market value results from scarcity.*	*The decision to produce and market a "1/1" NFT, or a collection of NFTs with a certain subject, is up to the artist.* *Unique NFTs can be produced in big quantities thanks to generative technologies.*	- *"The Glass Suit" is a 1/1 NFT made by Dolce Gabbana* - *"Bored Ape Yacht Club" NFT is a collection of ten thousand apes*
Resale ability	*Each NFT can be frequently sold and traded in the secondary market, providing its creator with passive and additional income in cryptocurrency of the chosen Blockchain.*	*The percentage of royalties for an NFT can be chosen at the time of minting.* *Blockchain will automate the payment and sends the money right to the wallet of the creator.*	- *OpenSea NFT marketplace allows up to 10% royalty.* - *Magic Eden secondary marketplace for Solana NFTs also takes part of the royalties with a fixed 2% on every NFT listed on their website*
Collectability	*An NFT allows its holder to collect objects in virtual space to increase their economic or non-economic value (e.g., fun, social status, religious reasons)*	*Anyone can purchase and accumulate NFTs and sell them whenever they want, provided there are interested buyers, after creating a wallet and account on an NFT marketplace (such as OpenSea and Magic Eden).*	- *Crypto Punks, a collection of 10,000 items, are collected by 3400 owners.* - *NFT-enabled conference event ticket called BlockDown Croatia 2022.*

Table 1 characteristics of an NFT

For NFTs to function, Web 3.0 infrastructure and environment is crucial. This infrastructure consists of:

- blockchain-enabled NFT marketplaces or platforms (such as Magic Eden or OpenSea) that allow NFTs to be "minted" or recorded in a smart contract and traded for cryptocurrency.
- complicated mathematical puzzles for validating NFT smart contracts (NFT miners).
- cryptocurrency wallets for NFT transaction settlement (such as MetaMask for Ethereum or Solflare and Phantom for Solana).
- P2P cloud storage for storing NFT files (e.g., Interplanetary File System)
- analytical platforms that follow the performance of NFTs (e.g., DappRadar.com)
- blockchain developer to write the smart contracts, the programming languages for NFTs can Solidity, Rust, and JavaScript

The sharing culture of the NFT community is what makes the spaces a suitable space to grow as an artist. Sharing culture includes information, reciprocity, support, and mutual learning (Dvoskin, 2022). Members aid one another to ensure the success of their NFT project, expanding the idea of stranger kindness in a decentralized environment. With time, a shared language was born, mixed with technical jargon, and used within the community everyday discussions. Examples include the terms "floor price," which refers to the lowest price of an NFT on the secondary market, an "air drop", referring to a received NFT in a wallet sent by another address, and "gas," referring to the transaction fee required to "mint", register or buy an NFT.

Furthermore, the usage of pseudonyms or anonymity is largely common within communities and on chat platforms like Discord or Twitter, where local to international NFT communities regularly gather. The conversations support social construction and reinforcement of the culture and bring together individuals across genres, fields, and platforms as part of a global community. Event planners, such as NFT. NYC, and the media are additional important members of the NFT community (Chandra, 2022).

NFTs have the potential to disrupt both Web 2.0 and conventional business structures because of their capacity to decentralize power. NFT acts as an external enabler of entrepreneurship and motivates artists to seek out new types of entrepreneurial action. NFTs are ambiguous by nature and are continuously being developed, just as other digital technologies. There is still emerging literature on the subject, which is mainly dominated by practitioners of the technology.

2.2.3.4. NFTs in the Music Industry

According to Treleaven (2017), one of the parties targeted to use decentralized ledgers are those who want to reduce any go-between situation. Decentralized ledgers can work with a third party but can also replace one. This is particularly crucial in our target industry, the music industry, because third parties have shareholders to satisfy with the ultimate purpose being to benefit from the work of artists rather than to contribute to the industry. Although many musicians give credit to third parties and actually need them, independent artists cannot rely on that luxury. They are opposed to handing up ownership of their work to go-betweens in exchange for their services. Now, artists might use blockchain to integrate a clear profit-sharing arrangement into a smart contract code. This way ensuring that all stakeholders are compensated truthfully their future royalties.

In our specific context, small and independent artists, experiencing the evident handicap caused by a lack of means and expertise owned by many of their peers, will find NFTs particularly useful. Without the knowledge of the industry, the right leverage and a good legal counsel, indies may inadvertently end up signing an unfavorable agreement with a label or agency, which might be terrible for their careers (Rossow, 2018). NFTs are useful because they can be written in a clear legitimate language and executed instantly and constantly.

Technically speaking, non-fungible tokens (NFTs) can give music artists the ability to create a new market that is primarily intended for amateurs, fans, and a greater number of true followers, while also guaranteeing that with blockchain, it is possible to prove authorship, rights, authenticity, and related royalties (Folgieri, Arnold, Giuseppe Buda, 2022). For these artists, the simplest strategy involves keeping the royalties through transferring ownership of the composition or library via NFT between the fans or the interested parties. For instance, NFTs connected to a small library of music will provide music lovers the chance to support their favorite musicians' careers, help them build their reputations, and profit from them when selling their NFT, while distributing the royalties associated to the smart contract.

It is crucial to decide how to advertise NFTs given how they operate. As they are primarily associated with the Ethereum and Solana Blockchain, placing an NFT on any marketplace requires getting a Web 3.0 structure. Additionally, there may be an initial fee to pay in cryptocurrency, such as gas fees, which are high when linked with the Ethereum Blockchain, depending on demand at the time the transaction is made. Novice developers could face the danger of losing their money in the process of selling their art.

Any artist may track the sources of his income, ranging from the number of streams, marketing, events and touring, licensing, payments, etc… using NFTs, which are effortlessly organized in real time, so the artist is never in the dark about where they stand in terms of revenue creation (Hissong 2021). One other example of the use of an NFT is when a supposed fan or collector wants to get hold on a unique copy of a song, album, collection, or prize. The conditions around the sale and price may be directly embedded in the metadata of the NFT representing that single track or album, and the artist could then sell that contract as a valuable asset on the open market. The same NFT can then be sold if the holder decides it is not valuable for him anymore or found a good deal. It is a situation that is likely to happen because of the rarity of the item purchased.

A highly interesting independent blog, newsletter, and research DAO, WaterandMusic.com, aims to provide music-industry artists with the know-how, contacts, and abilities to engage in more progressive and collaborative engagement with technology. They recently provided a very useful market map for Web3 tools, which contains around eighty firms that place NFTs, social tokens, and DAOs in the context of music and producers. The majority of the proposed tools were developed during the 2021 year and available now for public use. In that sense, this market map is not intended to be complete, rather, it serves to illustrate a first conceptualization of how the Web3.0 and music landscape will look like overall. The map can be found in the following figure 12.

Figure 12 Web 3.0 Ecosystem for Music Producers (Source: waterandmusic.com, December 15th, 2021)

In a research paper around NFT projects in event ticketing applications, a number of interviews were conducted by speaking with CEOs of ticketing companies. They provided insightful professional knowledge of the current market. They noted that it would be preferable for event organizers to connect directly with event participants rather than having to rely on middlemen for trust and that an open protocol would be preferred over the usual methods for ticket distribution (Regner, Schweizer, Urbach, 2019). Some of the key issues that have been discovered are briefly summarized as follow:

- Lack of Trust
- No control over secondary market prices
- Dependence on intermediaries
- No immediate validation
- Lack of Transparency

All of these apparent issues can be solved through NFT integration in the event ticketing system. As seen in the section above, the characteristics that define Non-Fungible Tokens makes it a really suitable technology for independent artists to adopt and have a direct relationship with their fans.

When an artist decides to issue a limited number of unique tokens and sell the NFTs on the market for a fixed mint price, fans will try to buy back and create a secondary market with a price driven by supply

and demand. These unique, limited tokens can, for instance, grant access to events, secret venues, unique merchandise, track premiers, raffles and more.

Another revolutionary platform that mimics the Soundcloud concept on Web 3.0, have recently emerged in the market. On the new-generation music platform Sound.xyz, up-and-coming artists can earn money through NFTs. The platform wants to make it possible for less well-known and independent musicians to earn some streaming money through NFTs. Musicians can also connect with their followers and follow their releases using a certain number of digital assets. The names of the artists are stored instead of the corporate name of the platform, and the NFTs are stored on the Ethereum blockchain. This is significant because, in contrast to Sound.xyz, NFT mining carried out by numerous businesses does not leave distinctive branding for the protocol on the blockchain. Despite the fact that they are essentially "keepsakes", the comment option is provided for any holder at certain point in the music. The original token comment may be replaced by the new owner as soon as an NFT is traded, making it fun for users to "stake their claim on being there before everyone else".

3. METHODOLOGY

This thesis is based on Design Science Research – DSR. The researcher in DSR builds and assesses IT artifacts aimed at solving known organizational challenges (Cloutier, 2018). The goal of this technique is to create a toolbox architecture. DSR is the best approach since numerous strategies may be used to assess the recommendations provided. This toolbox will be shared with independent music producers through a private and exclusive group on social media, gathering small artists. As this research focuses on the NFTs technology, the target group is ideal to conduct the validation.

3.1. DESIGN SCIENCE RESEARCH

Since the last decade, Design science research (DSR) has become a recognized model for information systems research, and I will be using this framework to position my research contribution. It aims to enhance the technological and scientific knowledge base through the creation of innovative artifacts that solve problems and improve the environment in which they are implemented.

The DSR method consists of the next stages: in the beginning, awareness of the dilemma at hand, during which the issue or challenge that has to be resolved is determined. The goal of the proposed solution is then stated in the idea. Development of the IT artifact comes next. The artifact is assessed and tested afterwards in accordance with the specifications intended for validation. The artefact is updated, and the results are examined and debated, in the reflection phase, which comes last. If no resolution is found at the latest phase, the offered solution is regarded as insufficient to fix the issue, and a new cycle is restarted (Hevner, 2004).

Besides, presenting IS research framework and conducting a DSR process are two fundamental frameworks and concepts which I consider important to perform DSR according to the scientist's standards. In my paper, I will only mention the several Process models that we have to follow. This process involves six phases. A brief overview of each DSR phase activity is described as follow:

1. Detect problem: This step consists in defining the specific problem of the research and demonstrating the relevance of the solution.

2. Recommendations: They are derived from the definition of the problem. The objectives can be either quantitative, especially when it comes to determine if a desired solution would be better than the current solution, or qualitative, when describing how a new artefact should allow to find solutions to problems that are not yet addressed.

3. Strategy and development: This activity includes the determination of the artifact's intended functionality and architecture, and creation. It will start a questionnaire that will lead to a toolbox architecture for music producers.

4. Demo: This activity demonstrates the use of the artifact to solve one or more cases of the problem being asked. This may involve a simulation for testing it. To demonstrate its utility, a candidate needs to answer a problem by using the toolbox architecture.

5. Evaluation: The artifact is tested and evaluated according to the conditions foreseen for the validation. Interviewing independent producers to assess if the toolbox architecture will contribute to improve their performance is required. By the end of this activity, researchers can choose whether to

proceed with the design to improve the performance of the artifact, or to continue communication and leave the improvements for the future.

6. Communication: Understand producers needs and the technologies useful to them in Production and Marketing phases. The designed artifact is later shared with relevant stakeholders.

4. TOOLBOX ARCHITECTURE FOR MUSIC PRODUCERS

This chapter will be providing the toolbox architecture to assist electronic music producers in deciding which technologies and systems to use to improve their marketing strategy and distribute their creations in an effective and efficient way. As a result, the assumptions that served as the foundation for the construction of the artefact, as well as its appraisal and debate, were founded.

4.1. ASSUMPTIONS

From our literature review and the introduction around the music industry, the new technologies presented, and the actors related to this research, the following assumptions around today's electronic music scene can be stated as follow:

- *The influence of music on human life is significant. While not directly necessary for its existence, music is more like to a technical innovation that we kept near to us because it is beneficial and had so many positive impacts throughout generations (musicpsychology, 2013)*

- *The music market has gradually but steadily migrated away from physical to digital items since the end of 2003. Online platforms are becoming the dominant form of consumption on the market thanks to new technology advancements (Simon, J.P., 2019)*

- *Given the monopolistic nature of the industry, independent music producers have to rely on new options for how to advertise their work. The ongoing quest of success necessitates staying current with cutting-edge technology tools. Independent producers now have access to a few helpful platforms and tools (AJ Agrawal, 2016).*

- *Not only is the way we listen to music shifting because of music streaming, but the whole financial model of the music industry as well. To fully embrace the advantages that digital music platforms offer, all stakeholders and parties involved—from its creation to its marketing—must adapt. Today, it is necessary to find new and cutting-edge ways to advertise and market artistic work (AJ Agrawal, 2016).*

- *DSPs and OADPs are platform integrated in the Web 2.0. And while many artists and producers adopted Web 2.0 as the cornerstone of their career with these platforms, users still have less control over their data. Web 2.0 is a traditional structure that stores all data in centralized systems, making it a "read and write" web (Chandra, 2022).*

- *DSPs created an opportunity by legalizing access to a virtually limitless music catalog while also preventing criminal file sharing. The regulations governing the structure and source of income for copyright holders have changed as a result of the considerable change in the way we consume music, as fans can access these platforms for an incredibly low fee, making it very affordable (E. Jordan Teague, 2012).*

- *OADPs are designed to provide musicians a method to connect with fans without necessarily working with large labels or publishing houses, making them "producer-oriented" platforms as*

opposed to the "consumer-oriented" DSPs. Possibly a great chance for many digital independent creators that are starting their careers (Hesmondhalgh, 2019).

- *The Web 3.0 community's attitude of sharing is what makes it an ideal environment for an artist to develop and thrive. Information, reciprocity, support, and mutual learning are all components of a sharing culture. Members support one another to make sure that their NFT project and initiative towards the community is successful, expanding and pushing the concept of stranger kindness in a decentralized environment (Dvoskin, 2022).*

- *In terms of technology, non-fungible tokens (NFTs) are enabling musicians to establish a new era for any artistic work. Producers and musicians can create a whole new market that is primarily targeted at a larger number of true followers while also ensuring that blockchain can be used to demonstrate authorship, rights, authenticity, and associated royalties (Folgieri, Arnold, Giuseppe Buda, 2022).*

4.2. TOOLBOX PRESENTATION

As a result of the assumptions expressed in the preceding segment, a Toolbox architecture was created for music producers to help and guide them with processes. The goal of this toolkit is to strengthen the bond between new technologies, the producer, and their fans. It will allow the producers to orient their marketing strategies and adapt to the innovations of today, making their job more vibrant and rewarding than it is, with the goal of boosting their career to the next level. Below are defined the key components of the created artefact.
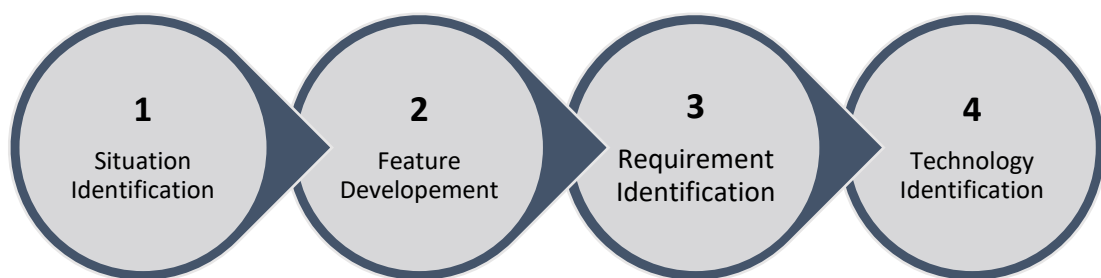

Figure 13 Toolbox Architecture

1. **Situation Identification**

   1.1. *Bedroom Music Producer*
   1.2. *Independent Music Producer*
   1.3. *Professional Music Producer*

2. Feature Development

2.1. Content Hub
2.2. Fanbase
2.3. *Network*

3. Requirement Identification

3.1. Web 2.0
3.2. Web 3.0

4. Technology Identification

4.1. DSPs
4.2. OADPs
4.3. *NFTs*

4.2.1. Identification of the Situation

Identifying the situation of the producer is the first stage in the Toolbox architecture. They must determine which is their context and for that, choose between three different options: Bedroom Music Producer, Independent Music Producer and Professional Music Producer.

- **Bedroom Music Producer**: An aspiring musician that writes, plays, and records music in their own home studio, and is frequently referred to as a hobbyist. No marketing is really needed in this situation, but a strive to learn and getting the right tools.
- **Independent Music Producer**: Needs production tools and a recording studio. They might create their own record label or generate music for others without acting as a label or management for them. Independent music producers and aspiring musicians usually hire space and time in studios. They need a fanbase and an advanced social hub to thrive.
- **Professional Music Producer**: The original and technical head of a recording project, owning a studio and teaching performers, he or she usually produces the song's sound and structure for them. Can be compared to the art director of a film. Uses his or her entrepreneurial skills to help fund the recording production.

Finally, once all the data has been collected and submitted, the producer may begin to identify his or her personal features and aspects in need for improvement.

4.2.2. Feature Improvement

The toolbox's second stage will be the examination of all current features that the digital music producer believes should be enhanced. These elements differ depending on what the producer considers his flaws or weaknesses. Producers can determine which platform interaction or technology adoption needs to be improved.

- **Content Hub**: Cloud where produced material is displayed. This content center should highlight abilities, previous music producing experience, and personality. It might be a webpage, a website, a blog, … Potential fans will recognize themselves in the content hub of an artist.

- **Fanbase**: A fanbase is one of the most significant factors in determining producer's career's success. The fans cultivated will be paying customers who will pay for services for a sustainable livelihood. It's critical to develop not only a huge but also a devoted audience.

- **Network**: A group of individuals to turn to if support is needed or to generate new ideas for something that may take a project to the next level. A good music producer should have a network of people with whom he or she may collaborate (other producers, instrumentalists, vocalists, composers, sound engineers…). It takes time to build but makes all the difference.

After that, such features must be assessed. Following the evaluation, the needs must be identified. The features are graded as "A", "B", or "C". In the proposed questionnaire, the producer should use one of the letters to assess the status of his or her situation. Each aspect, his degree, and what the aspect consists of are shown in the tables below. We then categorize this feature into 3 levels.

- **"A"** - The feature is developed using technology, and its effects on the overall artist's strategy are obvious.
  "A" is to be selected when the feature does not need a significant upgrade, since technology has previously been used and applied, with visible results, meeting the required needs.

- **"B"** – The feature is developed using technology that helps the artist in some way but is not yet apparent on a larger scale.
  "B" is to be selected when the feature shows some improvements, but still has room for progress and improvements.

- **"C"** – The feature has not been developed with the technology, or if it has, technology has had very little to no impact on it.
  "C" is to be selected if the artist is not using the technology at all or if the technology that is used has very little to no impact on assisting the team.

Content Hub

Content Hub	A	B	C

- **"Content Hub - A"**: The artist's situation uses updated technology to the fullest for their content hub. The artist doesn't need to upgrade their marketing strategy.

- **"Content Hub - B"**: The artist's situation uses technology that has an impact sharing his/her content. There is still room for improvement regarding their marketing strategy.

- **"Content Hub - C"**: The artist's situation does not use suitable and developed technology, or if it is, it has little or no impact on the marketing strategy.

Fanbase

Fanbase	A	B	C

- **"Fanbase - A"**: The artist's situation uses updated technology to the fullest for their fans. The artist doesn't need to upgrade their marketing strategy.

- **"Fanbase - B"**: The artist's situation uses technology that has an impact on their followers. There is still room for improvement regarding their marketing strategy.

- **"Fanbase - C"**: The artist's situation does not use suitable and developed technology, or if it is, it has little or no impact on the marketing strategy.

Network

Network	A	B	C

- **"Network – A"**: The artist's situation uses updated technology to the fullest to have a valuable network. The artist doesn't need to upgrade their marketing strategy.

- **"Network – B"**: The artist's situation uses technology that has an impact on their network. There is still room for improvement regarding their marketing strategy.

- **"Network – C"**: The artist's situation does not use suitable and developed technology for a valuable network, or if it is, it has little or no impact on the marketing strategy.

4.2.3. Requirement Identification

The requirements for each feature must be stated after going through all the procedures of identifying the situation and identifying features to improve. Music producers must have access to certain resources to use the toolbox architecture. Some technologies may necessitate specialized conditions, such as access to a cryptocurrency wallet or signing with a record label. Some of these technologies may also be implemented through outsourcing, which entails hiring professionals to rent services and collect and analyze data.

This section will analyze and define a set of technologies and modern tools used in the music industry. An emphasis will be put on NFTs. Described in our Literature Review, the trends for NFTs since their appearance in 2021 around the artistic industry are exponentially increasing. Since it confirms ownership of an asset, investors can be represented as collectors.

The features to be developed must be presented considering the situation in order to establish the requirements for each one. The table 2 below is important for understanding the team's current state and position.

	Professional Producer	Independent Producer	Bedroom Producer
Content Hub	A	A	B
Fanbase	A	B	C
Network	A	B	C

Table 2 Requirement per feature for each situation

4.2.4. Identification of the Technology

In this part, the technologies already defined in the Literature Review to be used must be identified regarding the features. Following the assessment of requirements and considering our situations, the Toolbox will determine if the technology and artefact is suitable for the producer. At the end of this phase, the music producer will be aware of which technologies can meet the plausible needs and will be one step closer to attaining his objective. The tools and technologies highlighted in our toolbox for our context have several benefits. The table 3 below is a visual representation of our toolbox architecture:

	Content Hub	Fanbase	Network
DSPs	A	B	C
OADPs	D	E	F
NFTs	G	H	I

Table 3 Identification of Technology

In order to understand each technology and tool in the context of its features, we address every situation in detail:

DSPs:

a. **Content Hub x DSPs:**

The content or library of an artist appearing in a DSP is very well organized, detailed and updated. The metadata, artwork, and every information regarding an album, EP or single is highlighted and can be filtered easily for a precise search. With updated algorithms, DSPs can integrate the content of an artist in automatically generated playlists, based on their rhythm, melody, lyrics and more. Putting their talent on display goes farther, as artists can easily update their profiles data, like bio and images whenever the mood strikes thanks to profile tools.

b. **Fanbase x DSPs:**

Due to its low entry price, artists can reach a fair number of subscribers through DSPs. The artist's fanbase can easily access official releases and announcements of any kind, as DSPs are usually connected with social media. Any fan can become a follower of an artist by paying a monthly subscription fee. Many DSPs offer the possibility to download their liked music in an

offline mode. With Artist Pick, highlighted playlists, fundraising links, and sometimes looping graphics for specific songs, fans are immersed in the artist's world. The data provided by DSPs regarding fans interaction may be very useful for artists that need to plan for touring, releasing music, or promoting it. Artists can find out where the audience is and how songs are performing and getting found with the help of real-time movement and stats.

c. **Network x DSPs:**

Major labels frequently have a big influence on what is heard on streaming services platforms. They can use their financial clout to further the dominant side of their media. So, artists who have their support frequently get a lot of media attention and consequently, a lot of plays. While it is not evident to land collaborations and to network frequently on those platforms, independent artists with published music need to figure out how to work together more with the streaming industry's players. Because of their algorithmic power and collaborative tools, DSPs can relate different artists and integrate their music in the same playlists, making it easier to discover. Since the majority of the featured artists on Spotify for instance, are well-established, mainstream musicians, being noticed on their platform is just as challenging as getting discovered on any other music platform. And while DSPs usually offer specialized service to make it easier for you to find music, their search algorithms are still determined by how popular a song or artist is.

Let's consider the case of the Spotify platform. In order to maximize the chances for success for all different features, the producer can follow some of the presented guidance steps to allow publication, streaming opportunities, and visibility:

i. *Find a suitable music distributor, the middleman between the artist and the DSPs (Such as tunecore.com).*

ii. *Create the artwork of the track, EP or Album that follows the distributors and DSPs format.*

iii. *Get the item in the right format, defined by the chosen distributor.*

iv. *Upload the artwork and digital audio file(s) to the distributor's website, and fill in all the requested details, data, and metadata.*

v. *Choose the distribution date and the right platform for it (Spotify, Amazon, Apple Music, …)*

vi. *Use Spotify's artist page to request professional help from the platform inside curators, which might help in adjusting some parts before the item gets released.*

vii. *Once the music is published, share on social platforms to maximize visibility, streaming clicks, and playlist integrations.*

OADPs:

d. **Content Hub x OADPs:**

An OADP interface and UX are perfect to make it simple for an artist to create his or her own online home about their favorite music and audio and feature their content hub. These platforms allow any account to effectively follow new work from their favorite producers, liking their tracks and playlists, as well as creating their personnel playlists, uploading their unique works and distribute them among an ever-growing user base. In addition to obtaining thorough statistics and comments from the SoundCloud community, music and audio creators can distribute and make money from their work through easy-to-access links.

e. **Fanbase x OADPs:**

An OADP usually incorporates a handful of social networking functions, compared to most other platforms and music-oriented websites. As many independent artists will start from nothing and create a fanbase both online and offline, this can be advantageous to a novice, but an OADP presents the best opportunity to directly interact with the fans on specific tracks and compositions, gathering crucial information that would later help build a community. It is beneficial to encourage discussion among followers, and use likes and opinions to encourage conversation among them. The site offers a function that enables users to donate to and support musicians or buy albums with a "pay-what-you-want" price tag, or sometimes, listeners can download it for free. Users can find breakthrough tunes, unfinished demos, and podcasts as well as exchange music, promote songs, and interact directly with artists.

f. **Network x OADPs:**

Collaboration opportunities on OADPs are frequently found and happen a lot, specifically on Soundcloud, since it is primarily composed of electronic music producers. An OADP can help gain attention from labels, have music released on them, get played on local and national radio stations, and gain a respectable number of plays, followers, etc. OADPs can provide musicians the necessary tools to share pieces and early versions of their compositions to solicit reviews with internal professionals. This enables them to gather a thorough feedback and adjust the soundtracks as necessary before publicly uploading it. This chance to develop without affecting their fan base negatively is a huge benefit for any serious music artist. Since they do not enforce geographic restrictions on the use of their applications, OADPs support musicians by enabling global access to their music.

Let's consider the case of the Soundcloud platform. In order to maximize the chances for success for all different features, the producer can follow some of the presented guidance steps:

i. *Create an account on the Soundcloud platform and sign-in.*

ii. *Create a profile picture and a banner using the right dimensions and making sure to have a homogeneity in the visuals (such as in Fig. 6). The use of a predefined graphical design platform (such as canva.com) is recommended to get the desired output.*

iii. *Fill out all profile details, with a thorough description, the nickname, the artists contacts, all available social websites, links to gigs and events, booking agenda, etc.*

iv. *Upload the tracks already produced or a saved set with all the required details and metadata.*

v. *Find and follow the labels that are closer to the genre of the tracks produced through personal research on Soundcloud.*

vi. *Send a well-structured and artistic in-message within Soundcloud, with direct information, session invites, gig dates, exclusive content, Discord channels to artists and users that are following the labels.*

vii. *Identify potential users that could follow you back. This could be done by following back the users that interact in any way with your tracks or the tracks you like and the ones that follow.*

viii. *Get a Pro account (such as in Fig. 7) to have deep insights about the activity of the account, the reach, the number and evolution of followers and interactions, etc.*

ix. *Keeping a continuous contact with all close users of the platform is crucial and can help very much build a strong community.*

NFTs:

g. **Content Hub x NFTs:**
An NFT is by nature a digital key that will grant its holder access to a specified space or content on the Web 3.0. It allows any artist to upload their content for any of the key holder, ranging from one NFT to thousands, depending on the project's objective. The content hub of an artist using Web 3.0 could be a digital library unlocked only by holding the NFT, making it a rare piece of art.

h. **Fanbase x NFTs:**
Whether it is a produced song or album, free concert tickets, artist meetings, backstage passes, a trading token for gating, a group of collectibles made to grant exclusive content or merchandising, NFTs remain dependent on the artist's vision of his project but made for the fanbase. A loyal fanbase is required in order to sell out an NFT(s) but a very thought roadmap is as important. The road map is the overarching strategy for an NFT drop or project. The NFT Roadmap informs the fan base of the preparations being made for the artist's release. It is envisioned as a "promise" to grow the ecosystem surrounding token ownership and an explanation for why someone should purchase a token. An artist should commit to building a

community and rewarding that community for continuing to be active. Traditionally, NFT communities are created and nurtured through Twitter and in Discord. In order to establish a strong community and concentrate on developing distinctive rewards and experiences, artists should adopt Web 3.0.

i.   Network x NFTs:

Decentralized Autonomous Organizations, commonly known as DAOs, are one of the ideas that blockchain technology have reinforced and present a huge opportunity to enhance an artist's network. DAOs can be described as a board of directors where the capabilities and the treasury are expressed on the blockchain, and the voting members who rule it have to have some investment in its ownership through NFTs. The network of a DAO is diversified and the possibilities for collaborations are endless for an artist.

Let's consider the case of an NFT to be released by an artist. In order to maximize the chances for success for all different features, the producer can follow some of the presented guidance steps:

i.   Get a digital wallet (such as "Phantom" and "Solflare" for Solana or "Metamask" for Ethereum)
ii.   Fund the wallet with an initial investment through the cryptocurrency of choice (SOL or ETH)
iii. Choose an NFT launchpad, it could be particular to music (such as "Sound.xyz" and "Audius.co") or a general marketplace (such as "Opensea" and "Magic Eden")
iv.   Select the quantity and rarity, if it is a collection of NFTs, and then set the initial price for the item or an auction for the highest bidder.
v.   Add a very thought description to sell the digital collectibles
vi.   Promote the NFT project to the community and fanbase to increase its value.

Based on what is answered on the previous evaluation questionnaire, the status of the artists is classified, considering his or her situation and each feature, in three different colors, as followed in the list below:

- Green – improvements are not significant

- Yellow – improvements should be considered

- Red – improvements are very significant

In the following table 4, we assess the required technologies by merging the previous presented tables in accordance with the needs of the producer.

Feature	Professional Producer			Independent Producer			Bedroom Producer		
Grade	A	B	C	A	B	C	A	B	C
Content Hub		7	1,4,7		7	4,7			4,7
Fanbase		8	2,5,8		8	5,8			5,8
Network		9	3,6,9		9	6,9			6,9

Table 4 Assessment Table

In the next part of the toolbox, an identification of the proper technology, in regard to each feature, is needed. To allow an easy understanding of the toolbox towards the end user, an implementation of a simple color code system will be used in order to categorize the artist's position.

- Green: The feature does not need improvements

- Yellow: The feature needs a few improvements

- Red: The feature needs strong improvements

The results of the toolbox are displayed in the following final table 5:

Feature	Professional Producer	Independent Producer	Bedroom Producer
DSPs			
OADPs			
NFTs			

Table 5 Toolbox results

4.3. APPLICATION OF THE TOOLBOX

To understand how the toolbox can be applied on a specific context, a simulation around an artist's situation is considered. We will be using a template and a User Interface prepared with Microsoft Excel tool that will guide the user through the questionnaire he or she needs to answer. We consider a bedroom electronic dance music – EDM – producer with a goal to expand their reach and popularity through the adoption of innovative marketing means and become an independent producer. The artist is locally known, playing some of her compositions around town during private but small events, but

has already built a fanbase close by. The objective is to publish at least two tracks with an independent label and have an increase in visibility, number of followers and streams. The artist feels that her time investments on platforms and her reach are not yet convincing and needs to acquire more information about the available market and her statistics. The toolbox application will be used in this case in order to understand what the different strategies are to adopt and reach her objectives. The artist uses a stage name and will be referred to as "Markosa".

First, Markosa will need to identify the situation and context she would like to adopt, in this case, an Independent Producer:

Application Toolbox
Please select the situation that fits your profile below:

☐	1	**Bedroom Music Producer**
☑	2	**Independent Music Producer**
☐	3	**Professional Music Producer**

Note: Only one option can be selected

Figure 14 Situation Selection screen

Markosa will next need to begin analyzing the factors by responding to the survey with a suitable alphabet letter (A, B or C).

- "A" - The feature is developed using technology, and its effects on the overall artist's strategy are obvious.
- "B" – The feature is developed using technology that helps the artist in some way but is not yet apparent on a larger scale.
- "C" – The feature has not been developed with the technology, or if it has, technology has had very little to no impact on it.

The replies from Markosa were as follows:

Figure 15 Feature Evaluation Screen

Markosa chooses her evaluation from the Application Toolbox based on her personal judgment. In our instance, Markosa chose for:

- Content Hub ➜ **C**
- Fanbase ➜ **C**
- Network ➜ **C**

Based on what was programmed in the Toolbox earlier, we have a standard basis to follow for Independent Producers:

- Content Hub ➜ **A**
- Fanbase ➜ **B**
- Network ➜ **B**

The disparities between the standards established earlier and what was evaluated by Markosa are summarized by the toolkit. Following the identification of the areas that require improvement, the Application Toolbox will combine the data with the technologies already selected. Therefore, "Independent Producer", "Content Hub", "Fanbase" and "Network" are picked to enter the system, and a list of technologies that can be used to address this issue is developed.

Feature	Independent Producer				Content Hub	Fanbase	Network
Grade	A	B	C	DSPs	1	2	3
Content Hub		7	4,7	OADPs	4	5	6
Fanbase		8	5,8	NFTs	7	8	9
Network		9	6,9				

Figure 16 Choice of Technology

The Toolbox specifies the following technologies to enhance "Content Hub", "Fanbase" and "Network":

- DSPs
- OADPs
- NFTs

These technologies are then subjected to a process to determine how they relate to the context being provided. The link between context and technology is depicted in the figure 17 below. In the specified context, green denotes frequent usage, yellow indicates irregular usage, and red indicates rare usage.

Feature	Independent Producer
DSPs	
OADPs	
NFTs	

Figure 17 Situation and Technology Relation

The Application Toolbox determines that the appropriate technology to use by Markosa is OADPs and NFTs, as a primary option, then to use DSPs as the second option.
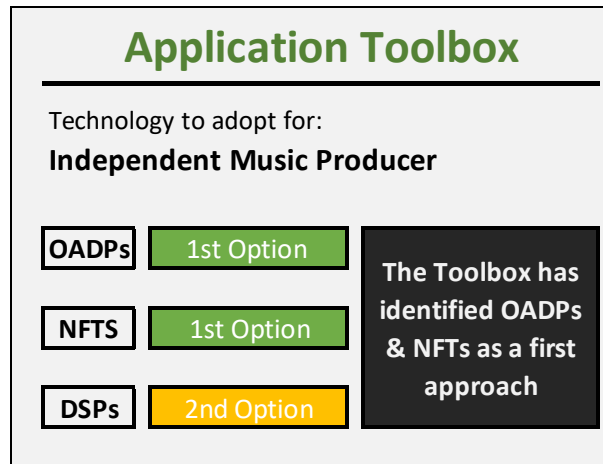
Figure 18 Toolbox Technology Identification screen

Presented then within the application, every primary option is detailed and reported for Markosa to understand how she can help reach her objectives. With a dropdown list of the available technologies and feature to improve, the screen shows the following:

Figure 19 Toolbox First Results screen for OADPs

Application Toolbox

Situation: Independent Music Producer

Technology: NFT ∨

Feature: Content Hub ∨

An NFT is by nature a digital key that will grant its holder access to a specified space or content on the Web 3.0. It allows any artist to upload their content for any of the key holder, ranging from one NFT to thousands, depending on the project's objective. The content hub of an artist using Web 3.0 could be a digital library unlocked only by holding the NFT, making it a rare piece of art.

Application Toolbox

Situation: Independent Music Producer

Technology: NFT ∨

Feature: Network ∨

Whether it is a produced song or album, free concert tickets, artist meetings, backstage passes, a trading token for gating, a group of collectibles made to grant exclusive content or merchandising, NFTs remain dependent on the artist's vision of his project but made for the fanbase. A loyal fanbase is required in order to sell out an NFT(s) but a very thought roadmap is important. The road map is the overarching strategy for an NFT drop or project. The NFT Roadmap informs the fan base of the preparations being made for the artist's release. It is envisioned as a "promise" to grow the ecosystem surrounding token ownership and an explanation for why someone should purchase a token. An artist should commit to building a community and rewarding that community for continuing to be active. Traditionally, NFT communities are created and nurtured through Twitter and in Discord. In order to establish a strong community and concentrate on developing distinctive rewards and experiences, artists should adopt Web 3.0.

Application Toolbox

Situation: Independent Music Producer

Technology: NFT ∨

Feature: Fanbase ∨

Decentralized Autonomous Organizations, commonly known as DAOs, are one of the ideas that blockchain technology have reinforced and present a huge opportunity to enhance an artist's network. DAOs can be described as a board of directors where the capabilities and the treasury are expressed on the blockchain, and the voting members who rule it have to have some investment in its ownership through NFTs. The network of a DAO is diversified and the possibilities for collaborations are endless for an artist.

Figure 20 Toolbox Second Results screen for NFTs

The toolbox will conclude by referring the appropriate technologies to implement for Markosa. The final report for the Toolbox is shown in Fig 18. A summary of the situation is presented at the end, with every possible combination to improve the feature.

Application Toolbox

Technology OADP

Guide for First Steps: Soundcloud

i. Create an account on the Soundcloud platform and sign-in.
ii. Create a profile picture and a banner using the right dimensions and making sure to have a homogeneity in the visuals (such as in Fig. 6). The use of a predefined graphical design platform (such as canva.com) is recommended to get the desired output.
iii. Fill out all profile details, with a thorough description, the nickname, the artists contacts, all available social websites, links to gigs and events, booking agenda, etc.
iv. Upload the tracks already produced or a saved set with all the required details and metadata.
v. Find and follow the labels that are closer to the genre of the tracks produced through personal research on Soundcloud.
vi. Send a well-structured and artistic in-message within Soundcloud, with direct information, session invites, gig dates, exclusive content, Discord channels to artists and users that are following the labels.
vii. Identify potential users that could follow you back. This could be done by following back the users that interact in any way with your tracks or the tracks you like and the ones that follow.
viii. Get a Pro account (such as in Fig. 7) to have deep insights about the activity of the account, the reach, the number and evolution of followers and interactions, etc.

Figure 21 First Steps for OADPs screen

A guide for the preferred technology is then presented to orient the artist. Markosa might need to use a Soundcloud page as a first step for greater fan interactions and an easy content hub for her content.

Once the visibility of the artist is beginning to rise, and a solid fanbase is found, then Markosa can start building on Web 3.0 an create an NFT or a collection of NFTs. Another guide will be provided then for the very first steps needed to start.

Application Toolbox

Technology | NFTs

Guide for First Steps: NFT marketplace

i. Get a digital wallet (such as "Phantom" and "Solflare" for Solana or "Metamask" for Ethereum)
ii. Fund the wallet with an initial investment through the cryptocurrency of choice (SOL or ETH)
iii. Choose an NFT launchpad, it could be particular to music (such as "Sound.xyz" and "Audius.co") or a general marketplace (such as "Opensea" and "Magic Eden")
iv. Select the quantity and rarity, if it is a collection of NFTs, and then set the initial price for the item or an auction for the highest bidder.
v. Add a very thought description to sell the digital collectibles
vi. Promote the NFT project to the community and fanbase to increase its value.

Figure 22 First Steps for NFTs screen

The artist can then grant his most dedicated and loyal fans exclusivity products, event access, private parties, merchandise, etc. through the key hold in the NFT.

4.4. VALIDATION

Two EDM producers were selected and chosen for personal interviews, each of them having his own experience, rising from a different background, and is now at a different stage of their career. As follows:

- **Interviewee 1 –** Producer Hamza HT:
  "Humblejack" is the founder and designer of "KUSUF", a Tunisian underground music label. Hamza is known for his numerous cultural knowledge as many enjoy his international presence and reputation on social platforms. He has been making a lot of echoes in Tunisia where he reached the `Top 10 revelations of the year` by the diversity and vivacity of the melodies used in his sets that led to a trendsetting atmosphere. His Podcasts have been released on international labels in Russia, France, Switzerland, Berlin, in which he gained an impressive network of artists. "HumbleJack" has performed at over fifty different gigs and events all over Tunisia. "KUSUF" (https://soundcloud.com/kusuf) is an independent label that helps a group of passionate Tunisian artists dedicated to their art and music, and introduce independent Tunisian artists to the global scene while inviting international names to perform sessions and podcasts on its platform and solidifying its community.

- **Interviewee 2 –** Producer Ramy Ounis:
  "formiq" is a Tunisian Producer & DJ treading with steady steps in the music scene.
  He defines himself as bedroom music with big ambitions, as formiq co-founded of "The Unspoken Sessions" (https://soundcloud.com/unspokenseries), a series of podcasts streaming intimate mixes made by emerging artists to reflect their unvoiced tastes. He seeks creativity and exploration especially in uncharted territories with different genres and ideas. Seeking to go beyond the usual techniques used on traditional platforms, "formiq" is considering a continuity of his journey on the Web 3.0. A social blog named Meoko, made to promote forward thinking underground music, industry culture, and events around the world and with around fifty thousand followers, recently published one of his articles around NFTs. We can read his opinion "The rush of artists to mint and sell their work as NFTs is legitimately backed-up by an important aspect of the story, and that is ownership of their work."

Before the interviews began, a brief presentation of the proposed work, research questions of the thesis, its key objectives, and a summary of the suggested toolbox has been presented to our interviewees. The interviews were conducted in the same sequence as the one for listing the producers.

To get the necessary data and comments about the proposed plan, the producers responded to four questions. The following table 6 depicts those questions before we address them in the next section:

Q1 Usefulness	Are you in favor of the suggested Toolbox? If so, why? If not, why not?
Q2 Criticism	Is there any constructive complains about the proposed toolbox? If yes, please explain.
Q3 Implementation	Do you think putting the suggested Toolbox Architecture into practice would be helpful? Please elaborate your answer.
Q4 Recommendation	Do you have any advice or ideas for further enhancing the suggested Toolbox?

Table 6 Question for the Interview

Each producer selected has been interviewed separately and the four questions presented above would be answered in the Discussion section. All the interviews were held during the month of August 2022.

4.5. DISCUSSION

Transcripts of each and all producer responses to the author's previously posed questions are to be found in the present section. Nothing that is transcribed is fabricated and everything that is written was previously documented or recorded. The interviews were open to imagination and out of the box thinking and the responses were encouraging and very thorough.

Q1: Usefulness	Are you in favor of the suggested Toolbox? If so, why? If not, why not?
Interviewee 1	The toolbox can be a milestone for amateur and independent artists because they can improve their reach, as long as they develop themselves and make the sufficient efforts. A music producer in the EDM scene would need this kind of toolbox, it would improve his profile visibility, share his music with everyone, especially with platforms such as Soundcloud, because of very useful and important features that artists need to be aware of for insights. I personally use Soundcloud very much but needed a guide at the beginning that would tell me that using in-message feature can make me more reachable through sharing content and music, then redirect my followers to a community-based platform such as Discord or other links. Having the direct insights about the content hub, the network and the fanbase is also very important. Starting from the bottom, this kind of toolbox can be an ideal start, there is no such application that helped me when I started, and I can relate that many artists would need such guidance to make their life easier. The kind of platforms proposed in the toolbox also enable artists to have direct contact for a funding initiative or direct payments, which is the goal, I guess.
Interviewee 2	I am in favor of this toolbox because it can really help new artists, specifically bedroom producers such as myself. Of course, it can be for many other reasons, such as educating a young aspiring artist or an inexperienced person trying to find new ways with marketing tools and new technologies. I think that this kind of initiatives are a real time saver for many of us, sparing many efforts and research in something they sometimes cannot yet understand.

Table 7 Question 1

Q2: Criticism	Is there any constructive complains about the proposed toolbox? If yes, please explain.
Interviewee 1	I would suggest having an all-in-one application with useful links to redirect the user, profile building for personal growth with technologies and more axes to focus on. In web 2.0, I think this can be something really helpful, but I don't think it could be helpful for the Web 3.0, as it can only be integrated with some platforms for the moment such as Sound.xyz. The infrastructure and education needed to adopt Web 3.0 needs to be pushed in the toolbox, in such a way that it becomes the reference for emerging artists. As I see it now, it is the milestone in the EDM scenery, but needs more information integration and educational content around Web 3.0. From my personal experience, I would love to get into a new field and to have the best advice, links, guide to help me get on the right track in one place, such as this toolbox. I believe it is a very good start and can be very helpful once more information is integrated.
Interviewee 2	At the level of a theoretical toolbox, and based on what already exists as information, I would have chosen to add more axes of from the artist's perspective and try to talk about them more in depth. The mapping seems to be too easy and too general for an EDM actor, as this genre is a vast ocean, but maybe for now, the toolbox holds what is needed to start building. Maybe it would have been better to specify sub-genres of the EDM music, what are the public or niche of fanbase to reach, the location of the artists or the kind of fans per region, etc... more axes to make it more accurate and precise.

Table 8 Question 2

Q3: Implementation	Do you think putting the suggested Toolbox Architecture into practice would be helpful? Please elaborate your answer.
Interviewee 1	Of course, it would be helpful putting this toolbox into practice. And of course, everything depends on the artistic side, you need to be a good artist to be successful, but as I said, this toolbox is a very helpful guide and can surely help in building a fanbase, have a good network, selling products, gaining money from it, which means improving your setup and life as an artist. It is that after all, the dream of all EDM artists, to be successful DJs and producers. I would suggest this toolbox to anybody starting in the EDM genre, or I would have used this toolbox myself if I go back to the beginning of my career. Starting from that point, even though I believe it is very updatable and can move beyond the informative part, this toolbox can be put into practice for a Bedroom Producer. Even in the websites and platforms mentioned in the toolbox, much information for beginners is missing, and this is the part that makes the potential of this toolbox amazing, as it covers the beginning, but should also cover a larger part in upcoming versions.

Interviewee 2	Yes, I could use a practical version of this toolbox, an actual application of course. I can ask you why stop at the exploratory part while it can be way more, but to start with something from scratch, I believe it is a perfect beginning. I myself have never seen or used an item like this toolbox, I always relied on personal research which it really time consuming. This kind of initiatives can really help people who have no idea about the business, who need the ABCs to market their production and name, especially when they are alone, with no one to help understand or guide. I don't see why it can't be proposed to bedroom artists for now.

Table 9 Question 2

Q4: Recommendation	Do you have any advice or ideas for further enhancing the suggested Toolbox?
Interviewee 1	Centralize every bit of useful information for each technology, with descriptions of different platforms, their how-to-use advice, etc. one example is to try to combine sending messages to followers on Soundcloud and how to use Discord to your advantage or Twitter, all under on click. The toolbox should also be able to identify more specific situations. It could guide the artist with ways of communications, useful links, blog, etc... and of course a way better design - sorry I am a designer myself.
Interviewee 2	I would highly recommend introducing more axes, sub-genres, take into account the location of the artist, and where does he want to go from his situation, such as production, DJing, touring, etc.… I also think that when successful artist start talking about their personal experience, it could be very helpful and mind opening for others who pursue the same dream. Maybe by holding a blog or a podcast session fitting the toolbox application spirit, and inviting people to tell their success story, may really help.

Table 10 Question 3

5. CONCLUSION

The fifth and final chapter of the thesis attempts to reconnect with the questions and objectives of our study from the first chapter. If the goals and research questions outlined in the Introduction have been satisfactorily addressed, our conclusion can be very straightforward. It is safe to say that this thesis will be valuable for many artists from the music industry seeking more reach., and more especially, to independent and bedroom producers. Although the Application Toolbox received positive feedback during the validation process, there are still some shades and parts that could have been done better. The Conclusion summarizes the work done during the thesis' production, and the thesis' limitations are then discussed.

5.1. SYNTHESIS OF THE THESIS

This dissertation's approach was developed using a typical DSR technique. The goal of the project was to develop an application toolbox for independent EDM producers to support them in choosing the right technology and increase their market reach. A thorough literature study was conducted using the most recent studies, scientific papers, research, and articles, making this thesis an updated guide. Based on the prior knowledge of the industry and having used the technologies mentioned in the research, the thesis and the toolbox are adapted, coherent and understandable to the public. The concept of the toolbox was subsequently validated by an artist, owner of an independent label, and working today on the emerging Web 3.0. An interview was made with the artist to conclude the validation procedure and obtained a valuable feedback and opinion towards the end of the conversation. It is reasonable to claim that the originally intended objectives of this thesis were met, the study questions were addressed, and this research's purpose was served.

5.2. LIMITATIONS & FUTURE WORK

Running into some constraints in a study is very much common, and this dissertation was no exception. Since this topic was chosen as a requirement for a master's degree, the time commitment was clear from the start. However, getting to tackle a specific subject to conduct the study was not easy, as the music industry value chain is huge. The first evident restriction encountered was actually time, as the author spent the majority of it on the Web 3.0 to understand practically how an artist can thrive. The second restriction was to get a contact of the ideal person that was later questioned. Of course, interviewing more than one person would have been better, but time was a constraint. This study, based on the DSR model, did not include the Communication phase. The completion of this final step takes a lot of time. Additionally, the Communication phase is reliant on community participation and feedback. The financial restrictions were not taken into account as well, as adopting these technologies need initial financial input, depending on the situation of the artist. Not every technology requires the same amount of investment. Finally, the framework used for our study is a theoretical one, meaning that real life application may differ from one artist to the other. Depending on their status, talent, community, and many other factors, using this toolbox does not guaranty the same output. Still, an effort to imitate reality as closely as possible was made but will never contain the options and variables of a real-world use case.

The restrictions that have been reached in this work can be overcome by future effort that might offer more value to the producer toolbox. It is vital to note that the author's presence is not required for subsequent works as the basis have been already discussed. Since obtaining a master's degree was the primary goal of the created approach, this paper will be made available to any researcher interested in these subjects. In order to make it feasible to apply the latest technologies and the right tools in all artistic work, it is crucial to promote awareness of the issue and to concentrate attention not only on EDM independent producers but also on other parts of the value chain from the music industry. Lastly, the integration and inclusion of a budgetary variable into our equation is a must in order to adapt to the variation of today's technology pace.

6. BIBLIOGRAPHY

Agrawal, A., 2016. How digital marketing is changing the music industry, Inc., [online] Available at: https://www.inc.com/aj-agrawal/how-digital-marketing-is-changing-the-music-industry.html

Cao, B., Zhang, Z., Feng, D., Zhang, S., Zhang, L., Peng, M., & Li, Y. (2020). Performance analysis and comparison of PoW, PoS and DAG based blockchains. *Digital Communications and Networks*, *6*(4), 480-485.

Chandra, Y. (2022). Non-fungible token-enabled entrepreneurship: A conceptual framework. *Journal of Business Venturing Insights*, *18*, e00323.

Cloutier, M., & Renard, L. (2018). Design science research: issues, debates, and contributions. Projectics/Proyéctica/Projectique, 20(2), 11-16.

Endres, C. (1995). What Hath Rock Wrought? Blues, Country Music, Rock'n'Roll and Istanbul. journal of American Studies of Turkey, (1), 33-39.

Fleischer, R., & Kullenberg, C. (2018). The political significance of Spotify in Sweden–Analysing the# backaspotify campaign using twitter data. *Culture Unbound. Journal of Current Cultural Research*, *18*(2), 301-321.

Folgieri, R., Arnold, P., & Buda, A. G. (2022). NFTs In Music Industry: Potentiality and Challenge. *Proceedings of EVA London 2022*, 63-64.

Freni, P., Ferro, E., & Moncada, R. (2022). Tokenomics and blockchain tokens: A design-oriented morphological framework. *Blockchain: Research and Applications*, *3*(1), 100069.

Grey, A. 2021. How NFTs are set to disrupt the music industry. Entrepreneur Europe. Retrieved on 14 November 2021. Available at https://www.entrepreneur.com/article/379893

Hesmondhalgh, D., Jones, E., & Rauh, A. (2019). SoundCloud and Bandcamp as alternative music platforms. *Social Media+ Society*, *5*(4), 2056305119883429.

Hevner, A. R., March, S. T., Park, J., & Ram, S. (2004). Design science in information systems research. *MIS quarterly*, 75-105.

Hissong, S. (2021). A Field Guide to Music's Potential Crypto Boom. *Rolling Stone Magazine*.

Hunt, K. A., & Mellicker, A. (2008). A Case Study of the Music Industry. Journal of Business Case Studies (JBCS), 4(3), 79-86.

Jackson, B. M. (2018). The Music Producer's Survival Guide: Chaos, Creativity, and Career in Independent and Electronic Music. Routledge.

Klug, L. (2021). Barriers in the Pre-Decision Stage of Blockchain Adoption for Supply Chain: A Single Case Study in a Swedish Small Enterprise.

Kushner, S. (2019). Collecting and media change, or: Listening to Phish via app. Convergence: The International Journal of Research into New Media Technologies, 26(4), 969–989. https://doi.org/10.1177/1354856519838741

L. Dvoskin (2022). Why Community Is the Secret to NFT Success. Rolling Stone Blog. Retrieved from https://www.rollingstone.com/culture-council/articles/community-secret-nft-success-1283244/?sub_action=logged_in

Li, X., Jiang, P., Chen, T., Luo, X., & Wen, Q. (2020). A survey on the security of blockchain systems. *Future Generation Computer Systems*, *107*, 841-853.

Li, X., Wang, X., Kong, T., Zheng, J., & Luo, M. (2021, December). From Bitcoin to Solana–Innovating Blockchain Towards Enterprise Applications. In *International Conference on Blockchain* (pp. 74-100). Springer, Cham.

Li, X., Wang, X., Kong, T., Zheng, J., Luo, M. (2022). From Bitcoin to Solana – Innovating Blockchain Towards Enterprise Applications. In: Lee, K., Zhang, LJ. (eds) Blockchain – ICBC 2021. ICBC 2021. Lecture Notes in Computer Science (), vol 12991. Springer, Cham. https://doi.org/10.1007/978-3-030-96527-3_6

Ljung, A. (2017). A note from Alex Ljung [The Soundcloud blog]. Retrieved from https://blog.soundcloud.com/2017/07/06/note-alex-ljung/

Luck, G. (2016). The psychology of streaming: exploring music listeners' motivations to favor access over ownership. International Journal of Music Business Research, 5(2), 46-61. https://musicbusinessresearch.files.wordpress.com/2012/04/volume-5-no-2-october-2016-luck2.pdf

Mejiha, P. (2019). The Success of Streaming Has Been Great for Some, But Is There a Better Way? NPR. Retrieved from https://www.npr.org/2019/07/22/743775196/the-success-of-streaming-has-been-great-for-some-but-is-there-a-better-way?t=16198905636

Mulligan, M. (2017, July 4). How Soundcloud could transform Deezer's market narrative [Music industry blog]. Retrieved from https://musicindustryblog.wordpress.com/2017/07/04/how-soundcloud-could-transform-deezers-market-narrative/

Parc, J., & Kawashima, N. (2018). WRESTLING WITH OR EMBRACING DIGITIZATION IN THE MUSIC INDUSTRY: The Contrasting Business Strategies of J-pop and K-pop. Kritika Kultura.

Rauman, B. (2021). The Budding Disruption of Blockchain Technology Upon the Current Structure of the Music Industry.

Regner, F., Urbach, N., & Schweizer, A. (2019). NFTs in practice–non-fungible tokens as core component of a blockchain-based event ticketing application.

Ridley, D. (2012). The literature review: A step-by-step guide for students.

Rossow, A. (2018). Blockchain Aims to be the Biggest Stage for Empowering Music Artists.Forbes. Retrieved from https://www.forbes.com/sites/andrewrossow/2018/05/27/blockchain-aims-to-be-the-biggest-stage-for-empowering-music-artists/?sh=1967e2153e0b

Simon, J. P. (2019). New players in the music industry: lifeboats or killer whales? The role of streaming platforms. Digital Policy, Regulation and Governance.

Simon, J.P. (2019), "New players in the music industry: lifeboats or killer whales? the role of streaming platforms", Digital Policy, Regulation and Governance, Vol. 21 No. 6, pp. 525-549. https://doi.org/10.1108/DPRG-06-2019-0041

Taghdiri, A. (2019). How blockchain technology can revolutionize the music industry. *Harv. J. Sports & Ent. L.*, *10*, 173.

Teague, E. J. (2012). Saving the Spotify revolution: Recalibrating the power imbalance in digital copyright. *Case W. Res. JL Tech. & Internet*, *4*, 207.

Thall, P. M. (2016). What They'll Never Tell You about the Music Business: The Complete Guide for Musicians, Songwriters, Producers, Managers, Industry Executives, Attorneys and Accountants. Watson-Guptill.

Treleaven, P., Brown, R. G., & Yang, D. (2017). Blockchain technology in finance. *Computer*, *50*(9), 14-17.

Yaga, D., Mell, P., Roby, N., & Scarfone, K. (2019). Blockchain technology overview. *arXiv preprint arXiv:1906.11078*.

Zheng, Z., Xie, S., Dai, H. N., Chen, X., & Wang, H. (2018). Blockchain challenges and opportunities: A survey. *International journal of web and grid services*, *14*(4), 352-375.

Zheng, Y. (2022, April). Influence of Digital Era on the Music Industry from the Consumer Behavior Perspective. In 2022 7th International Conference on Social Sciences and Economic Development (ICSSED 2022) (pp. 1872-1876). Atlantis Press.