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**MSc in Entrepreneurship**

**Commercial exploitation of intellectual property rights and the  
democratization of music industry**

by

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Τμήμα Οικονομικών Επιστημών, Τμήμα Διοίκησης Επιχειρήσεων  
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Διατμηματικό πρόγραμμα μεταπτυχιακών σπουδών στην «Επιχειρηματικότητα»

**Η εμπορική εκμετάλλευση των δικαιωμάτων πνευματικής  
ιδιοκτησίας και ο εκδημοκρατισμός της μουσικής βιομηχανίας**

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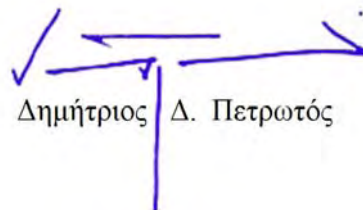
**2020**

*(Αυτή η σελίδα αφέθηκε κενή σκοπίμως)*

## Υπεύθυνη δήλωση

Ο κάτωθι υπογεγραμμένος, Δημήτριος Πετρωτός του Διονυσίου, βεβαιώνει ότι είναι ο συγγραφέας αυτής της διπλωματικής εργασίας υπό τον τίτλο: «Commercial exploitation of intellectual property rights and the democratization of music industry» / «Η εμπορική εκμετάλλευση των δικαιωμάτων πνευματικής ιδιοκτησίας και ο εκδημοκρατισμός της μουσικής βιομηχανίας» που παρουσιάζεται εν συνεχεία στην αγγλική γλώσσα. Δηλώνει επίσης, ότι κάθε βοήθεια, την οποία είχε για την προετοιμασία της, είναι πλήρως αναγνωρισμένη και αναφέρεται τόσο στα αντίστοιχα εδάφια της παρούσας εργασίας όσο και στον πίνακα αναφορών και έχει αναφέρει τις όποιες πηγές από τις οποίες έκανε χρήση δεδομένων, ιδεών ή λέξεων, είτε αυτές αναφέρονται ακριβώς, είτε παραφρασμένες. Τέλος, βεβαιώνει ότι αυτή η διπλωματική εργασία προετοιμάστηκε από εκείνον προσωπικά, ειδικά για τις απαιτήσεις του ΔΠΜΣ στην «Επιχειρηματικότητα» του Πανεπιστημίου Θεσσαλίας του έτους 2020.

Λάρισα, 16 Οκτωβρίου 2020.



Δημήτριος Δ. Πετρωτός

## Ευχαριστίες

Θα ήθελα να ευχαριστήσω όλους τις συμφοιτήτριες και τους συμφοιτητές μου για την υπέροχη συνεργασία που είχαμε τόσο δια ζώσης όσο και εξ' αποστάσεως και τηλεματικά, καθώς και τους καθηγητές μου, που παρόλα τα εμπόδια που αντιμετωπίσαμε κατά τη διάρκεια αυτού του μοναδικού στα παγκόσμια χρονικά έτους, καταφέραμε όλοι να φέρουμε εις πέρας κάτι που για πολλούς από εμάς αρχικά φάνταζε δύσκολο και περίπλοκο.

Ειδικότερα θα ήθελα να ευχαριστήσω τον επιβλέποντα της διπλωματικής μου εργασίας, καθηγητή Βασίλειο Χ. Γερογιάννη, Καθηγητή του Πανεπιστημίου Θεσσαλίας στο γνωστικό αντικείμενο «Ανάλυση και Σχεδίαση Συστημάτων και Έργων με έμφαση στην Υποστήριξη Λήψης Αποφάσεων», για την μεγάλη βοήθεια και επιστημονική καθοδήγηση που μου έδωσε κατά τη διάρκεια της συγγραφής αυτής εδώ της εργασίας.

Τέλος, θα ήθελα να εκφράσω τις ιδιαίτερες ευχαριστίες μου και στους άλλους δυο καθηγητές που απαρτίζουν την επιτροπή αξιολόγησης τούτης εδώ της εργασίας τον καθηγητή Γεώργιο Σταμπουλή, επίκουρο καθηγητή του Πανεπιστημίου Θεσσαλίας στο γνωστικό αντικείμενο «Διοίκηση Καινοτομίας και Επιχειρηματικότητα» και την καθηγήτρια Γλυκερία Καραγκούνη, επίκουρο καθηγήτρια του Πανεπιστημίου Θεσσαλίας στο γνωστικό αντικείμενο «Επιχειρηματικότητα, Καινοτομία και Τεχνολογίες Παραγωγής» των οποίων η συμβολή κατά τη διάρκεια των μαθημάτων του μεταπτυχιακού ήταν εκ των σημαντικότερων.

Σας ευχαριστώ όλους από καρδιάς.

Δημήτρης Πετρωτός

In loving memory of my friend Tim Bergling

1989 - †2008



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## Table of Contents

<b>Υπεύθυνη δήλωση.....</b>	<b>0</b>
<b>Ευχαριστίες.....</b>	<b>1</b>
<b>Table of Contents .....</b>	<b>4</b>
<b>Περίληψη .....</b>	<b>6</b>
<b>Abstract.....</b>	<b>8</b>
<b>CHAPTER ONE: INTRODUCTION.....</b>	<b>10</b>
1.1 Background .....	10
1.2 Thesis research topic .....	17
1.3 Research method and organization of the thesis .....	17
<b>CHAPTER TWO: LITERATURE REVIEW.....</b>	<b>19</b>
2.1 Innovative business .....	19
2.2 Commercialization process step by step .....	19
2.3 Differences between launching and commercializing .....	20
2.4 Global Corporations' way of operation.....	22
2.5 Open innovation .....	23
2.6 Intellectual property rights – The forms of protection and the objectives of protection of inventions .....	24
2.6.1 Industrial property rights .....	25
2.6.2 Copyright.....	25
2.6.3 Utility Patents .....	26
2.6.4 Trademarks .....	28
2.6.5 Design patents.....	29
2.6.6 Provisional patent applications.....	29
2.7 Objectives of the protection of the invention .....	29
2.8 Research design of intellectual property rights .....	30
2.9 Mapping of freedom to operate .....	31
2.10 Passive and active intellectual property strategy.....	31
2.11 Intellectual property strategy put into practice.....	32
2.12 Ideas to protect .....	32
2.13 Security objectives and functions.....	33
<b>CHAPTER THREE: CASE-STUDY: THE SOLOMON EARS.....</b>	<b>35</b>
3.1 The case of Solomon Ears.....	35
3.1.1 Monetization.....	39

3.1.2 Customers, competitors and usage .....	42
3.1.3 Technologies used by Solomon Ears.....	43
3.1.4 Alternative strategy.....	47
<b>CHAPTER FOUR: CONCLUSIONS.....</b>	<b>48</b>
<b>References.....</b>	<b>51</b>

## Περίληψη

Σκοπός αυτής της διπλωματικής εργασίας είναι να μελετήσει την εμπορική εκμετάλλευση των δικαιωμάτων πνευματικής ιδιοκτησίας, εξετάζοντας το ζήτημα της εμπορευματοποίησης της τεχνολογίας. Στη διπλωματική προτείνεται μια πρωτοποριακή λύση υψηλής τεχνολογίας που μπορεί να εφαρμοστεί για την εμπορική εκμετάλλευση των δικαιωμάτων πνευματικής ιδιοκτησίας προϊόντων της μουσικής βιομηχανίας, με στόχο τη δημιουργία αξίας και την προσφορά λύσεων σε πολλαπλά σύγχρονα προβλήματα. Στη διπλωματική παρουσιάζονται λύσεις που σχετίζονται με την κατανομημένη και δίκαιη διανομή δικαιωμάτων μουσικής στους νόμιμους δικαιούχους - δηλαδή στους καλλιτέχνες, στις δισκογραφικές εταιρείες, στους διανομείς και στους παραγωγούς - με διαφανή, δημοκρατικό, αποτελεσματικό και ασφαλή τρόπο, χρησιμοποιώντας τεχνολογίες αιχμής όπως το Διαδίκτυο των Πραγμάτων (Internet of Things), την τεχνολογία της Αλυσίδας των Συστοιχιών (Blockchain) και την Ανάλυση Δεδομένων (Data Analytics). Συγκεκριμένα, προτείνεται η χρήση μιας καινοτόμου υπηρεσίας που ονομάζεται Solomon Ears, η οποία έχει ως στόχο να χρησιμοποιηθεί στους τομείς της ανάλυσης των προτιμήσεων των καταναλωτών, του ελέγχου της απόδοσης, της διείσδυσης στην αγορά, και των τάσεων, για τη βέλτιστη απόδοση των δικαιωμάτων στους καλλιτέχνες, παραγωγούς, διανομείς και οποιοδήποτε άλλον έχει συγγενικά δικαιώματα σε έργα οπτικοακουστικής τέχνης όπως επίσης, μπορεί να βοηθήσει στον περιορισμό της παράνομης διακίνησης των έργων που προστατεύονται από πνευματικά δικαιώματα. Οι επιχειρήσεις αντιμετωπίζουν σήμερα υψηλή πίεση λόγω της παγκοσμιοποίησης, της εξειδίκευσης και της γρήγορης μεταφοράς γνώσης και τεχνογνωσίας, της μικρής διάρκειας ζωής των προϊόντων και των υπηρεσιών, καθώς επίσης εξ αιτίας του εντατικού ανταγωνισμού και του επιπέδου της καταναλωτικής συνείδησης που έχουν αναπτύξει με την πάροδο των ετών οι τελικοί χρήστες. Ο σκοπός αυτής της διπλωματικής εργασίας, είναι να μελετήσει τον τρόπο με τον οποίο οι εταιρείες μπορούν να εμπορευματοποιήσουν την πνευματική τους ιδιοκτησία, δηλαδή διπλώματα ευρεσιτεχνίας, εμπορικά σήματα, πνευματικά δικαιώματα, καταχωρημένα σχέδια και μοντέλα χρησιμότητας στην αγορά. Αυτή η διπλωματική εργασία επικεντρώνεται όχι μόνο στο δικαίωμα που έχει ο κάτοχος της εν λόγω πνευματικής ιδιοκτησίας να απαγορεύσει σε άλλους να κάνουν χρήση των δικαιωμάτων της ιδιοκτησίας του, αλλά κυρίως στο πώς ο κάτοχος της πνευματικής ιδιοκτησίας θα μπορούσε τελικά να εισάγει ένα επιτυχημένο προϊόν στην αγορά.

**Λέξεις κλειδιά: εμπορευματοποίηση, προστασία πνευματικής ιδιοκτησίας, εισαγωγή προϊόντων στην αγορά, αλυσίδες αξίας, μουσική βιομηχανία.**

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## **Abstract**

This thesis studies the commercial exploitation of intellectual property rights, considering the paradigm of commercialization of technology. The thesis suggests a breakthrough, high-end solution that can be applied to commercial exploitation of intellectual property rights concerning products of the music industry, with the aim to create value and offer solutions to multiple contemporary requirements. The thesis presents solutions with regard to the decentralization and the fair distribution of music royalty rights to the rightful owners, namely artists, labels, distributors and producers, in a transparent, democratic, efficient and secure way, making use of cutting edge technologies such as Internet of Things, Blockchain and Data Analytics. Specifically, the thesis suggests the usage of an innovative service, namely the Solomon Ears, which has the intention to be used in the fields of performance and customer preferences analysis, impact control, market penetration, patterns and trends examination, for the optimal bestowal of royalties to the authors, producers, distributors and any other party having neighboring rights on works of audiovisual art and also, it may assist in the confinement of the illicit trafficking of copyrighted works. Enterprises face nowadays high pressure because of the globalization, specialization and quick transfer of knowledge and know-how, the short life span of products and services as well as the intensified competition and the quality consciousness of the end users. The purpose of this research thesis is to study how companies can use intellectual property namely patents, trademarks, copyrights, registered designs and utility models on the market. This thesis concentrates not only on the right to prohibit others from making use of the intellectual property rights but mostly on how the holder of said intellectual property could eventually launch a successful product on the market.

**Keywords: commercialization, intellectual property protection, product launching, value chains, music industry.**

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## CHAPTER ONE: INTRODUCTION

This thesis studies the commercial exploitation of intellectual property rights, using the paradigm of commercialization of technology through a breakthrough, high-end solution in regards to the decentralization and the fair distribution of music royalty rights to the rightful owners, namely artists, labels, distributors and producers, in a transparent, democratic, efficient and secure way, making use of cutting edge technologies like Internet of Things, Blockchain and Data Analytics.

### *1.1 Background*

The focus of the current thesis is on the fair and timely rendering of recognition, material and moral, to intellectual creators, which is one of the main driving forces of production of civilization. Very important is also the control of the performance and the impact of an audiovisual work on a specific public for example on during a given timeframe. Of even greater importance, is the confinement of the illicit trafficking of intellectual property. These are the main problems to which the current thesis attempts to provide some solutions.

In the fields of music and singing, it is often extremely difficult to calculate accurately the royalty rights so that they are thereafter bestowed timely and correctly to the rightful beneficiaries. It is virtually impossible for every entertainment center, every concert venue and every cafeteria of each big city or small town to constantly fill out catalogues with the identity of music and songs, reproduced locally by private sources of sound, either by analogue or digital means, either legally acquired or not. Catalogues that should indicate how many times a song “A” was played and how many a melody “B” was heard in the same day, in which venues, at what time of the day, by which artist and so on. Tables constituting databases that could include information about how many more times a song “C” over a song “D”, that both are perhaps included in the same album, were presented. Likewise, in a movie theater, how accurate was the publicized start time of a certain film, how long did the commercials last, in which theater, older films are presented and so on. It is absolutely impossible. As it is totally impossible to distinguish the legally purchased copyrighted work from the illegal and pirated, just by listening to it alone.

Historically, the bestowal of royalty rights to the rightful beneficiaries was initially linked to the sales of the media themselves, namely phonograph and gramophone records, the

various magnetic media, vinyl records or optical discs. Then, with the rapid spread of the radio, the attribution of broadcasted music has been performed by matching radio stations and times at which songs were played, with playlists provided either by the radio stations or from third party sources; It is worth mentioning that the phonograph and therefor the broad spread of music, was invented by Thomas Edison in 1877 while the billboard magazine, founded in Cincinnati 1894, started covering “music in drama” as early as 1899 (Figure 1).



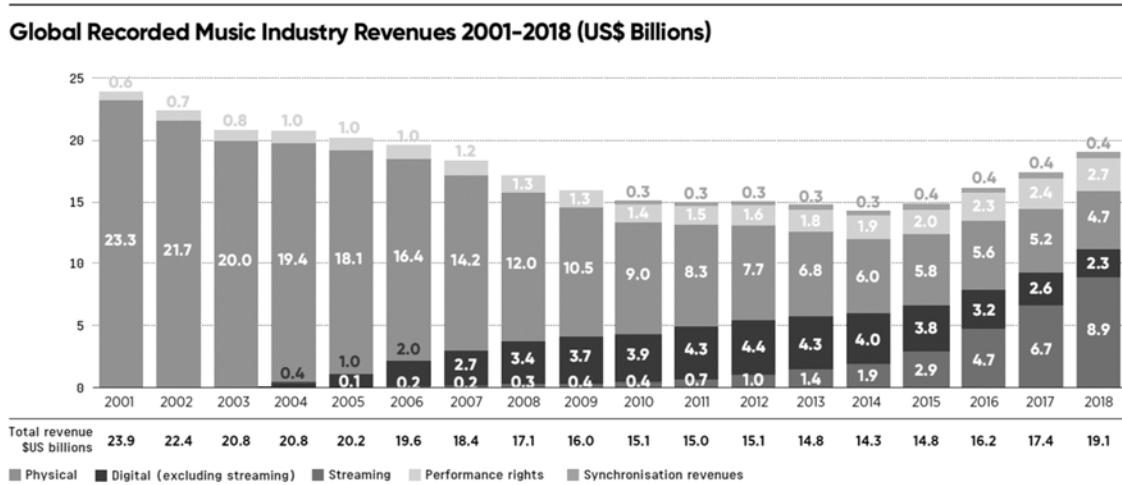
Figure 1: Billboard magazine anno 1989<sup>1</sup> (source: The Internet Archive, a 501(c) (3) non-profit)

The bestowal of royalty rights was also associated with the appearance of said copyrighted works of an entire disc or even its separate single tracks in the popularity playlists, namely the various “charts”, that a radio station was making available to the public; and lastly, with similar catalogs that content providers, like Apple, Spotify, Deezer or Amazon make public, as the digital portable players are increasingly replacing the radio as a way of listening to music, songs and audiovisual media, in general (Figure 2). Moreover, the subscription

<sup>1</sup> <https://archive.org/details/billboard1112-1899b/page/n65/mode/2up>



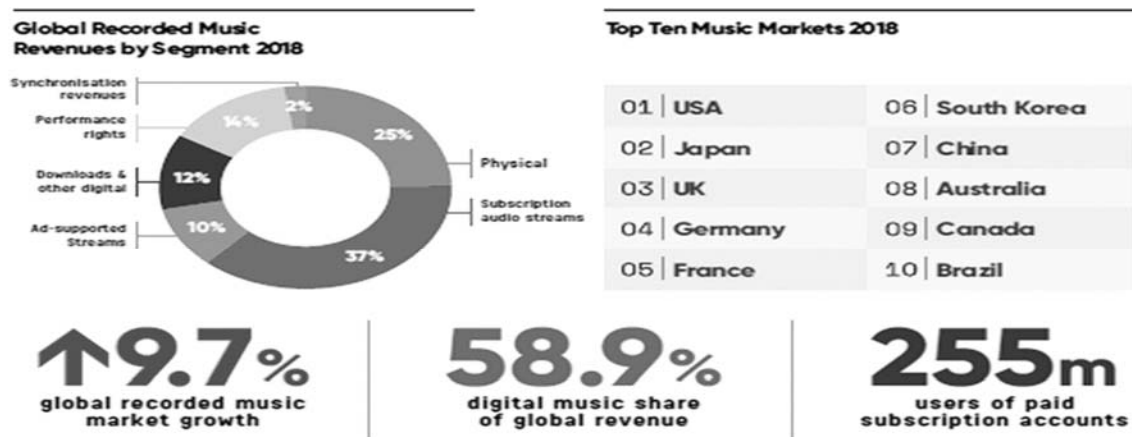
services to multimedia content, that almost monopolize the market today, are making obsolete and quite anachronistic the very essence of owning music.



**Figure 2: Global recorded music industry revenues (source: IFPI annual report 2019)**

The absolute incompetence of the abovementioned methods of monitoring the market is evident, both in terms of bestowal of royalties to the legitimate beneficiaries and in terms of control of the illicit trafficking of the copyrighted intellectual creations. A typical example of bestowal of royalties, which is not at all exhaustive and illustrates some dysfunctions follows: In a music club there are presented among others three different songs. The two are performed by well-known artists and the third one belongs to a non-so famous artist. The first one was illegally acquired and it is heard repeatedly multiple times again and again through the duration of the event, the second music work is legally acquired, it is only heard once during the program, but it is incidentally included twice as much in the various music charts compared to the first one. Finally, the third song, also legally acquired, is not included in any chart, but because it happens to be liked by the particular audience of the music club, it is played by popular demand over and over again. Among these three creators, it is the second one to receive the lion's share of royalty rights. The first creator will receive much less while at the same time, struggles with the repercussions of piracy, and the third one does not receive quite nothing in terms of royalty rights and remuneration. However, the owners of the entertainment centers or the venues, malls or airports, small cafés or enormous music clubs always pay in full the relative fees to the competent bodies for the management of the neighboring copyrights and

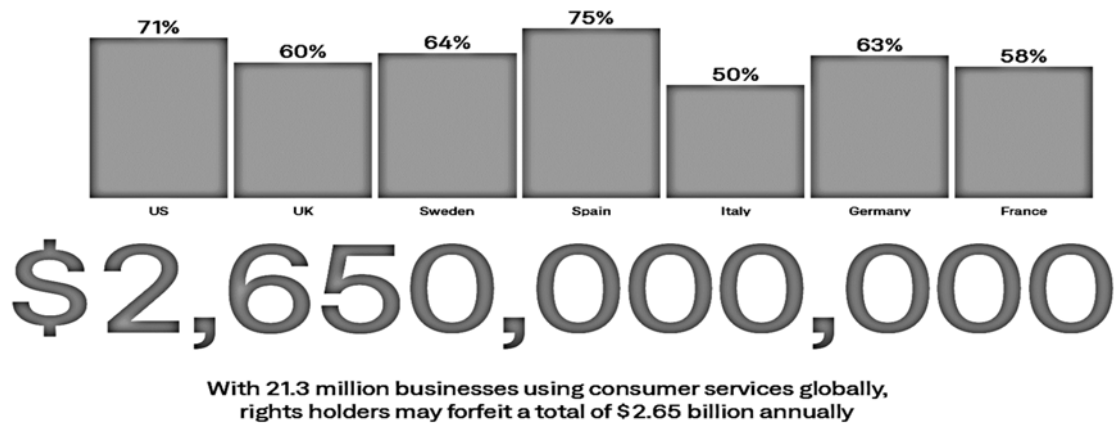
royalty rights. These rights though, are not attributed accurately and correctly to those who are entitled to (Figure 3).



**Figure 3: Global recorded music industry revenues by segment (source: IFPI annual report 2019)**

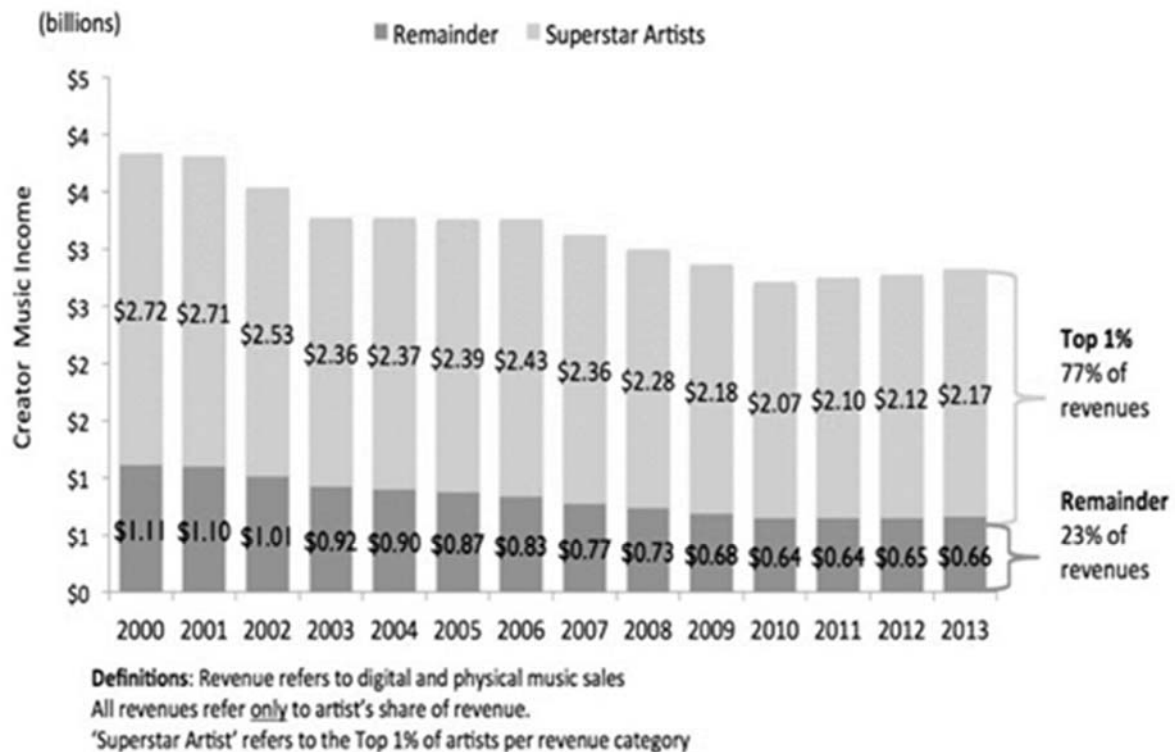
The dysfunction of the existing system is obvious. It does not take into account the way of the acquisition of copyrighted creations, be it legal or illegal, nor the frequency of their real presentation to the public. The existing system does not consider if it is rightful for said works to be presented publicly or if the relative obtained license is meant only for personal use. Some users do not even know that it is illegal. A recent study by Nielsen Music, commissioned by the commercial branch of Spotify, Soundtrack your brand, shows exactly that fact (Figure 4).

**A majority of business owners incorrectly believe a personal music account gives them the right to use it for background music at their place of business**



**Figure 4: Nielsen Music survey for “Soundtrack your brand” – 2019 (source: Nielsen)**

We are still using, an outdated system instead, to determine the amount of royalty rights measuring only the volume of sales of the real physical media, such as the number of compact discs sold just to give an example, and the various popularity charts made by radio stations and digital content providers. An outdated and flawed system that gives privileges to few and fails to support the less known or even independent creators, depriving them from revenues. In an era of overwhelming choice in terms of copyrighted works, an oxymoron seems to happen. In particular, a research survey (Mulligan, 2014) shows that the apparent too-much-alternative dubbed the “The Shazam effect” (Thomson, 2014), hinders the discovery for the new and the top 1% of the superstar artists are actually earning a staggering 77% of the total revenues of the music industry. The results of this survey are shown in Figure 5.



**Figure 5: 'The top 1%'** (source: Mulligan, 2014)

Of equal importance is the deprivation of moral reward. Worthy creators do not enjoy the fruits of their labor, their inspiration and their intellect, but instead, this literally perennial system keeps subsidizing very few with recognition and fame.

At the same time, the existing system, unwittingly, facilitates the piracy, since it is unable to control it, not having the proper instruments to confine infringements or even better, reverse the equation in order to turn “piracy” in favor of the rightful owners of the copyrighted works of art.

The music industry can be described as a mature industry and that is why it has to find new solutions especially in the field of the perennial problem of royalty rights distribution, along with the suppression of music piracy and the inevitable job losses. It is of paramount importance to rationalize the production of goods, or offering of services, as well as to increase the cost awareness in order to achieve a healthy market penetration and maintain competitiveness. It worth mentioning that all the large players in the music industry have done all various kinds of collaborations over the more of 150 years of their existence and they have always favorable ears when to adopt a robust solution for their pains. On the other hand, now is the time for all organizations in the music industry to create new inventions, intensify or even change their business models, re-engineer their products and services which might have worked well in the past but not anymore and create new business opportunities for the music industry as a whole.

Some of those changes include new ways of cooperation between the traditional players with external organizations, the licensing of technology, the purchase of intellectual property as a whole and investments of the big enterprises of the entertainment business in small but highly specialized external technology organizations and businesses. Also research work from the academia should end up with tangible solutions, in order for the artists, labels, distributors, producers, anyone involved in the music industry to be acknowledged for their work and rewarded for their intellect in a transparent, democratic, efficient and secure way; this will revive the interest of artists and creators, stimulating the production of more audiovisual art, promoting, as a consequence, culture in general. It is vital for everyone involved in the music industry to keep its freedom to operate on the market by protecting its copyrighted works of art while being able to make a living out of it and be incentivized to add more quality material in the value chain.

The entire value chain from the procurement of raw materials, the evaluation of the ideas, the technology developed, the necessary market research, to the launching of the end product and the eventual recycling after the end of its life cycle (Morcos and Khneisser, 2020). All co-operation projects must be the subject of written agreements defining responsibilities

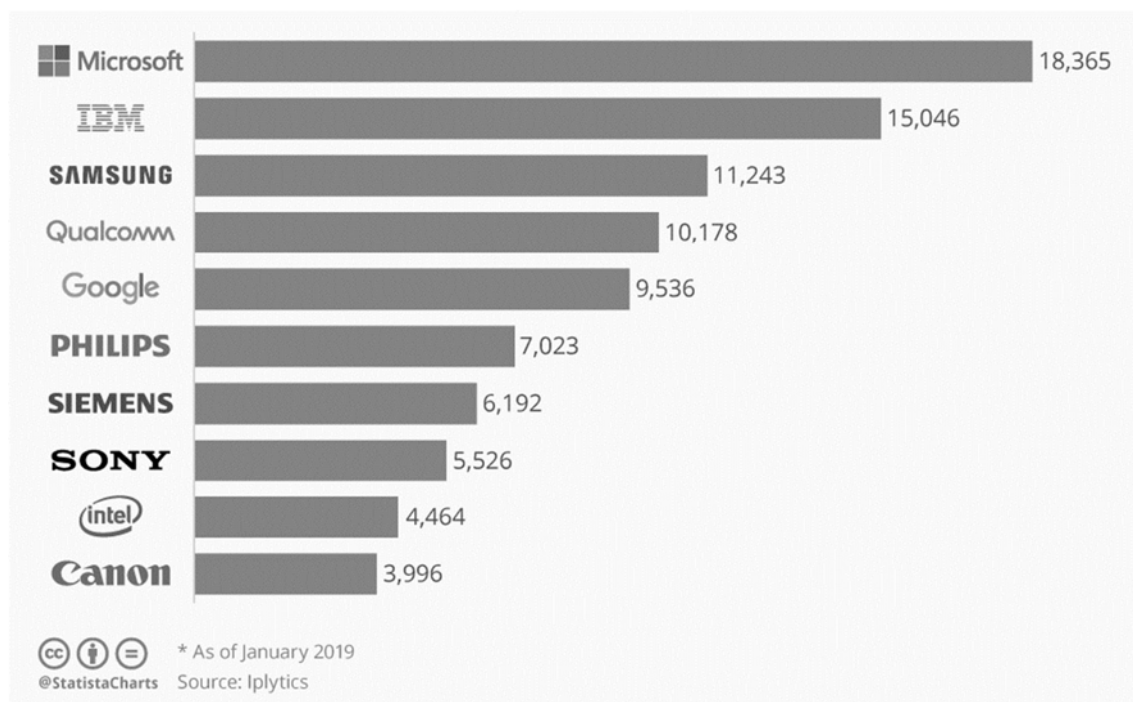
and rights. Cooperation agreements must also contain a condition that if the cooperation does not lead to the desired result, the agreement may be terminated or suspended. Contract law issues will be significant in future collaborative projects, and each participant must understand the legal content and significance of the agreements.

Today, music industry companies have to struggle for their existence in a tough international operating environment. Technology is evolving rapidly, requiring companies to streamline their operations and seek new innovative solutions to remain competitive in the marketplace and meet the growing needs of customers. Innovation has become part of everyday life, and so, both companies and their employees understand the value of new inventions and the rights associated with them (Gallagher, 2017). Innovation in research and development increases the efficiency of processes and improves product quality. Above all, the aim is to gain a competitive advantage over competitors and to maintain the desired freedom of action. Knowledge, competence and ability are the company's innovation reserve, its intangible assets capital. Special features are protected by patents to provide this competitive advantage. This intangible assets capital plays an important role in economic growth and labor productivity (Gallagher, 2017). It can be described as a way of protecting know-how as well as technical and competitor information sources.

The basic conditions for competitive advantage involve the evaluation and selection of profitable development projects, freedom of action, the protection of the assets and contractual matters. During the ongoing global economic restructuring and deep recession amidst the uncertainty that the corona virus pandemic has created, the importance of intangible capital is even more and further emphasized. Intellectual property rights form a significant part of a company's value and are an important factor in competition and added value. China is at the top of the list of the countries in the world when looking at patent statistics with the USA, Japan and Europe to follow (Einar Himma and Spinello, 2007). There are still problems with the commercialization of intellectual property assets, as their value is only realized in connection with the transaction. Good management of intellectual property matters requires active and solid expertise as well as a structured intellectual property portfolio management and robust strategic planning. In the licensing area, when successfully utilized, the technical market and competition information generated by the intangible system creates significant know-how for the company from the prevailing level of technology, technical solutions and competitors.

### 1.2 Thesis research topic

This thesis studies the commercial exploitation of intellectual property rights. The focus is on the entire value chain, from the raw material, the idea and the technology behind the first minimum valuable product to the final product launch along with the overview of some implementations of the service. The commercial exploitation of intellectual property rights has been extensively studied and the economic exploitation of intellectual property rights will be even more significant in the near future mostly because of the competitive factor the tech giants have introduced in the last five years due to the huge accumulation of intellectual property rights of any kind (Figure 6).



**Figure 6: Global patent holders (source: Statista – Iplytics 2019)**

### 1.3 Research method and organization of the thesis

The research method which adopted in this thesis was an extensive literature review in the area of USA and European legislation that is related with utility patents, copyrights and whitepapers. The review emphasized on discussing critically real-world examples, regarding innovation, commercialization and intellectual property rights exploitation. The thesis also analyzed, as a case study, an innovative service, namely the Solomon Ears, which has the intention to support the optimal bestowal of royalties to the authors, producers, distributors and

any other party having neighboring rights on works of audiovisual art and also, it may assist in the confinement of the illicit trafficking of copyrighted works.

The structure of the thesis is as follows. Chapter 2 presents an in-depth literature review aiming to describe in detail the general toolbox of today's entrepreneurship. The Chapter discusses what innovation is, how commercialization can be achieved, when to launch a product and how (with a step by step guide), what are the main differences between commercialization and launching and what open innovation is. In addition, Chapter 2 presents the main tools of protecting intellectual property that are available and what those tools regarding protection are used for. In addition, Chapter 2 concludes with the strategies that are available today regarding the protection of intellectual property. Chapter 3 presents the solution offered by Solomon Ears regarding the protection of intellectual property in the music and entertainment industry in general, the ways of monetization of the big data harvested and it is explained the strategic advantage of the decentralization in the royalty rights distribution along with some brief presentations of the cutting-edge technologies that are adopted by Solomon Ears. Finally, in Chapter 4 the conclusions of this thesis are presented.

## **CHAPTER TWO: LITERATURE REVIEW**

An in-depth literature review aiming to describe in detail the general toolbox of today's entrepreneurship.

### ***2.1 Innovative business***

It is important to focus on what we mean by the word innovation. A lot of people misunderstand it or misuse it. Innovate in the dictionaries, refers to introducing something new to the environment or the making of radical changes. Innovation is not just another word for inventing things and often people confuse inventing with being innovative. A proper definition it is the process of translating an idea or invention into a manufactured good or service that creates a value so innovation is the making money from concepts or ideas (Everard and Dupont, 2018). Innovation has nothing to do with bright ideas per se. Innovation always was and will always be actively linked with economic exploitation of that bright idea. To be called an innovation, an idea must be able to be manufactured or provided at an economical cost and satisfy an actual market need. Innovation takes many forms, it covers many different sectors, from low cost, commodity manufacturing, to advanced, high-end manufacturing and technology, even global supply chains.

### ***2.2 Commercialization process step by step***

Based on the relevant literature, the steps of the commercialization process are the following (Aggarwal, 2009; Casper, 2013; Zhang, 2009):

Step1: The very first think we need to do is to obtain a valid and doable plan, because it is unheard of trying to get from A to B, with a successful conclusion, without a very good plan. We need constancy of purpose so we don't be diverted and stick to the plan. We will also need the right skills in picking winners because it is not everything, we start off with, it is going to be a success right from the beginning. Another factor is timing. Timing is vital because we might have the very best idea in the world but if the market is in a bad shape it will be just an expensive mistake to try to launch our product at that time.

Step 2: It's very important to empower people to think creatively in order to generate the brightest ideas. We need to identify a problem, a need or a market opportunity. Many



companies that develop technology try market push. It doesn't always work. We have to listen to our employees and customers as they are important sources of information.

Step 3: You need to screen the ideas and select the one. It is not just a toss of a coin; this is a process where we need to evaluate the commercial opportunity, we need to have a realistic assessment of our organizational caper, we need to estimate the cost and time for the development and launch and put that against the market requirements, we need to assess the risks, political, geographical, economic, and technical risks and having taken all that into account we have to choose what we are going to do, based on whatever competitive advantage we have and on the best return on investment so we don't choose something brilliant that is not going to actually pay its way.

Step 4: We have to take this chosen idea, develop the concept and test it, taking it from pretty low down in the technology readiness levels across to the top ones. When it is fit for market this will be a serious undertaking and this is where we need the detailed plan from the beginning. This plan will say what we are going to do in what order are we going to address risks or what resources we need. Then we will need good communication and motivated teamwork so there is a big job for the leadership.

Step 5: Is essentially the transition from technology readiness level 4 all the way up to 7. At the end of TRL 7 we will have a prototype that has been fully evaluated and tested in the market and in an operational situation. This is our MVP.

Step 6: We need to do some test marketing so we have got a product that is still fit for the purpose. We need to go to some strategic customers and ask their opinion. At this point we have to finalize our marketing strategy and our launch plan, agree on our priority markets and agree on our first manufacturing stage.

Step7: This is the actual commercialization; this is where we take the product into real manufacturing. This is TRL 8 and 9 with our production capability commissioned, our market launch done and already starting our production ramp up.

### ***2.3 Differences between launching and commercializing***

Every day, entrepreneurs around the world are working to launch an innovation into the marketplace, which they want to get out there and commercialize it. The difference in the terms of launch and commercialization is huge. A lot of people use these terms interchangeably and

throw them around as if they're the same thing. In reality, they are two very different and distinct notions. Launch and commercialization are indeed two distinct processes: one has to do with the timing of each process and second has to do with the goal of those processes.

Launching a product, is usually the last step in the innovation process. Innovators, startups and entrepreneurs have gone through the conceptualization of an idea, maybe a prototyping phase or even the pilot and now they are ready to launch. They are usually looking for a marketing partner and go to market. Partners in this phase always are very helpful in launching a product into the marketplace and the goal of that is usually to maximize awareness of the innovation or maximize interest about the invention whereas with the commercialization process, this is something that starts much earlier than launch. Commercialization happens way before product is ever developed so it's mostly starting during the ideation or conceptualization part of the process and most importantly commercialization process continues well beyond launch so the timing of that is very different and in distinction this is really important because there are a lot of decisions that are being made in the commercialization process that are either overlooked or not considered during the launch process.

The second piece of the differences between launching and commercializing is the goal. The goal for commercialization is to maximize return on investment from that innovation so when we say commercialization, we are thinking of what the strategy and plan is for maximizing the profit from that innovation. Something that sometimes coincides with launching only if the goal is to maximize awareness right away. A commercialization strategy, which is actually set out to maximize return on investment right to get actual real results and get people buying and investing in the product, getting customers, or potential customers, investing in the idea of what they have created. When an entrepreneur starts off, developing a commercialization strategy or plan in reality they often start off with looking at the product itself while it would be more appropriate to look at things like what's the minimal viable product and not just the minimum features and functionality that a product would need. They must look specifically through the lens of the early adopters what's the minimum value that this product or innovation needs to deliver, specifically to the early market, which will be very different than the mainstream market after a, sometimes, brief period of time. If someone is seeking to launch an innovation, he might be looking at more than the broader market. He might be seeking to understand the mainstream markets needs and the value that that specific innovation is delivering, which would be very different than just the early market.

Regarding the early adopters an entrepreneur have to create a different type of value but then there has to be a very clear path: the minimum value that it is created to those early adopters. If people are going to accept that idea, we need to start with an early adoption and a minimum value first. There has to be a path to their greater vision and that is the part of the process that the innovator must help walk early adopters through, not delivering a perfect product in every aspect. A big challenge for an entrepreneur is that majority of the time they have over developed the product, they are adding a lot of features and functionality that the early market doesn't want or they are investing too many resources in the product, making sure that it is not only just perfect but also has every bell and whistle in place. They sometimes have very limited resources remained to actually take the innovation to market because they have spent so much into the product. It is obvious the outcome of how successful that is going to be if a company is investing millions in the product and then they do not have enough funds to actually commercialize that product and launch it in the marketplace.

For example, during 2008, the general economic situation in the world deteriorated sharply and high wood costs hampered the paper industry. Net sales from business operations decreased and profitability weakened significantly from the previous year's level. An Italian company launched an alternative to paper notebooks using a stone byproduct from nearby quarries. It has been able to significantly reduce its fixed costs, however, the product was far from perfect. Although, by the time they had perfected their stone paper notebooks, the least competitive paper and pulp mills were already out of business (Candelin-Palmqvist, Sandberg and Mylly, 2012).

In Chapter 3 of the thesis a case-study start-up company will be presented that provides an innovative service, namely the Solomon Ears, which has the intention to support the optimal bestowal of music royalty rights. According to Solomon Ears' mission statement, the company wants to be a pioneer in the music industry of tomorrow, leading in an environment in which completely new ways of harvesting and utilizing data will be used, as well as creating added value and benefits for its customers. In the competitive environment of the music industry, readiness for change and new innovations create the best foundation for success.

#### ***2.4 Global Corporations' way of operation***

Global corporations like Google or Amazon are committed to acting responsibly in economic, human, social and environmental matters. Those companies strive to continuously

improve their operations in order not only to have a better return on their investment and thus a better profitability but also to create better workplaces and conditions for their employees, better practices, integrating holistic approaches to their organizational culture. They take care of the environmental impact of their products although this is debatable and they pay attention to good practices like renewable energy use and low carbon footprint. Amazon implements life cycle thinking in its business, which means that it recognizes and manages the potential social and environmental impacts of its products throughout the production chain. Globally, the company adheres to strict standards wherever it operates. The company also monitors the practices of its suppliers (Stiglitz, 2008) while Google's code of conduct provides the basis for all operations within the company.

### ***2.5 Open innovation***

In many countries around the world, open innovation is broadly utilized by large international companies, but blending proprietary technology with external open innovation is still quite rare. The technology market has not yet grown very large and therefore meeting the right buyer and seller is not that easy. Intangible capital, such as employees' skills, organizational structures, values and culture, as well as intellectual property rights, play a major role in companies' innovation activities. Competence in particular is an important factor in the emergence of innovations. Companies must develop their staff and its ability to constantly generate new ideas. The company's work atmosphere must be encouraging and forward-looking, and value the competence of the staff (Bell, 2008). An atmosphere must be created in which continuous improvement at all levels is a matter of course. There is a need for continuous development of work and working methods, as well as evaluation of all activities. New innovations require the modification and refinement of knowledge. The organization of the company should create policies in which information is shared, received, and further processed together. Open innovation aims to meet the new challenges of the business world, which are the specialization and rapid movement of knowledge and know-how, short product life cycles and intensifying competition (Sweet and Eterovic Maggio, 2015). To this end, it is important for innovation organizations to intensify cooperation with other organizations and companies, seek to license or purchase information and technology, and invest in transactions outside the strict borders of the company.

The music industry is a traditional industry in which there has been open innovation for a long time. Today, a wide variety of cooperation agreements are made between companies.

Cooperation must be intensified with artists, competitors, subcontractors, equipment manufacturers, labels, producers and even universities and research institutes. Licensing is not yet being implemented on a large scale. The exchanging of patents has not yet been done very much. But a more open way of working is recognized in the industry and it is also implemented in practice between different companies (Stiglitz, 2006). Acquisitions, alliances and licensing are the most appropriate means of obtaining existing information. Finding and exploiting external market channels is rather limited. Problems are caused by finding the right technology for one's own needs, finding a suitable and reliable marketing channel for surplus technology, lack of resources, and complex intellectual property issues.

According to the concept of new growth theory, the sources of economic growth are labor, capital, education, research and technology. The new model of economic growth emphasizes the importance of intangible capital. New growth is sought through the creation and assimilation of new knowledge, through innovation and know-how. This also allows production and productivity to improve without increasing tangible capital or labor input. Innovation is a productive investment for the future, which increases the level of competence, obtains new information and learns new ways of working (Andersen, 2012). Product development investments are used to develop new innovations that improve products and services, processes, organizations and operating methods. In addition, a good cooperation network is obtained. The aim is also to increase the contribution of skilled users to innovation and product development more widely. Product developers and users are very different people with different needs and through these new products, a wide market is constantly expanding. Users want customized products for their needs and so, the number of inventors and inventions increases, allowing even the users to be involved flexibly at different stages of the innovation process.

## ***2.6 Intellectual property rights – The forms of protection and the objectives of protection of inventions***

The current intellectual property system is based on international agreements dating back to the 19th century, namely the 1883 Paris treaty on industrial property and the 1886 Berne convention on copyright. The prerogatives of intellectual property rights have been privileges granted by rulers. The precursors of patents have been known since the 15th century. UK's first patent law was enacted in 1898. The notion of patents was so important in the US,

that right from the start, patents were specifically mentioned in the Constitution. Significant changes were made to the patent law in 1980, when the current concept of novelty and inventive step was introduced and in 1996 upon accession to the European patent convention (EUIPO-Legal Affairs Division, 2017). The emergence of the intellectual property system is closely linked to technological developments, which have required financial investment and safeguards have been put in place to safeguard them. Being able to control the use of others is one of those ways. Strong exclusivity implies that the subject matter of the exclusivity must be made available to all. Intellectual property rights are intended to protect the results of creative intellectual work and are always created for natural persons (Reitzig, 2004). The transfer of rights to a company always requires a measure defined by either law or contract. A transfer certificate is usually submitted to the patent and registration offices, which shows how the applicant has obtained his or her rights from the inventor.

Intellectual property rights are usually exclusive rights limited in time, designed to give the right holder control over the subject matter in order to encourage innovation and creative work. In practice, this means that the rightful owner can negotiate the use of the licensing rights with others or he can deny the use of the object of protection. The inventor can protect his inventions in several different ways. Forms of protection are usually divided into industrial property rights, trademarks, copyrights, registered designs and utility models.

### ***2.6.1 Industrial property rights***

Industrial property rights refer to the broader protection rules that include patent law, utility model law, design law, circuit design law, trademark design law, trade name law, protection against unfair practices in business. Industrial property rights protect the know-how, intellectual capital and competitive advantage acquired by a company. The holder of an industrial property right may prohibit others from professionally exploiting the subject matter of the right in the countries concerned while the right is in force. Industrial property rights do not arise by themselves, but must be applied for from an authority (Chaudhry, 2013).

### ***2.6.2 Copyright***

Copyright, in contrast to all other forms of protection, is very straightforward. A copyright protects a particular expression of an idea. According to section 1 of the copyright act (WIPO 8.7.1961/404), a copyright belongs to the person who has created a literary or artistic

work, whether it is literary or explanatory written or oral performance, a composition or stage work, a cinematographic work, a photographic work or other work of fine art, architecture, a product of an arts or craft. According to section 43 of the act, copyright is valid until 70 years have elapsed from the year of the last involved author's death or from the publication of any unpublished work after the death of the last involved original author. Copyright gives the rightful owner the exclusive right to own a work (Taubman *et al.*, 2012). Copyright gives the author both economic and moral rights. Economic rights mean that the author has the exclusive right to manage the ownership and making available to the public copies of the work, unaltered or altered, as a translation or variation. Copyrights include the actual copyright, neighboring rights, and the rights to photographs and audiovisual art in general. The copyright belongs to the author of the work and is always a natural person. Copyright is always free, exists automatically the moment you create a work of art, text, pictures, motion films, art, music or software and the most important: there is no need to register a copyright. In fact, there is even no absolute need to have that little C in a circle. Copyright arises automatically when a work is created. No registration, notification or other formalities are required to obtain a copyright whatsoever.

### **2.6.3 Utility Patents**

A utility patent application is the patent application for machines or software or ideas. A utility patent application covers machines, processes, systems, software, business methods, drugs that sort of things. A patent refers to the exclusive right granted to an inventor upon application to temporarily prohibit others from using the invention. The patent thus gives the inventor, for a limited period of twenty years, the exclusive right to exploit the invention or to order the invention. The inventor has to publish his invention in order for the relevant technical development to be possible. The invention must be new and substantially different from what is already known, the prior art, and it must be technically reproducible. A patent can be enforced by a person who has actually made the invention or to whom he has transferred his rights. Inventions arising out of an employment relationship are regulated by the employment inventions act, regulated by the act on the right to inventions made by an employee (WIPO-1967/656).

A patent is a legal document issued by the government that provides protection for an idea. Intellectual property rights are prohibition rights that allow only the rightful holder to exploit the intellectual property right, professionally or financially. In other words, a patent

does not give the right to do anything. A patent only gives the rightful owner the right to stop others from making, using or selling the patented invention so even the holder of a patent might not be able to manufacture the product that have patented because it may be covered by other people's patents. It would give though the right to stop all those others from making, using, selling even importing said invention from another country, where the said invention is not covered by any patents. The inventor's right to the invention and the patent is the original and the right of others to the invention, such as the employer's right, is always a derivative. A patent is valid only in the country where the patent has been granted (Fang, Lerner and Wu, 2017). The patent is based on registration by a national or supranational authority. In UK, registration is filed at the National Board of Patents and Registrations, in the US at the United States Patents and Trademark Office, in Greece at OBI (the Industrial Property Organization), every country has its own notified body for this task. They are the so-called investigating authority because they first examine if the conditions for patenting are met, they research for any prior art etc. A patent is therefore a right of prohibition that is territorially limited and valid in the countries where the patent has been applied for and obtained. Patent protection is for a maximum of 20 years from the first date of the filing of the patent. The patent does not remain valid unless the annual maintenance fees, have been paid in full and on time.

International patent protection is applied for with a PCT application. The so-called Patent Cooperation Treaty. The principle of priority allows the patent applicant not to lose the novelty on which the patent is granted when filing the first national phase for a patent application. The principle of priority means that a patent applicant can apply for a patent for his invention in other member states of the PCT network within 12 months of the first patent application, without the invention losing its novelty. In all these applications, the novelty will be assessed according to the application from the date of the first application. The patent cooperation treaty thus allows for an international patent application in which the application is first examined centrally. The patent applicant has up to 30 months (plus 2 extra months for amendments) from the priority date, in order to decide in which countries, he wants to protect his invention. However, on the basis of a pct application, the patent is granted nationally, and the granted patent is a national patent (Samaniego, 2013). However, the patent system is not global and is not a cross-border regional patent. Applying for a patent requires publication of the application. The application will become public 18 months after the application date. Through that public availability, anyone has the opportunity to learn from the development work done by others, and thus continue to develop ideas.



The public patent system forms a database of great technical knowledge that anyone can take advantage of. A patent is always granted by a government authority, which examines the conditions for the patentability of the invention presented in the application. A patent document is therefore both a legal document and a technical publication. The patent system is an information dissemination system designed to promote technological development and the well-being of the nation (Papageorgiadis and Sharma, 2016). The aim is to disseminate new technical information for the benefit of the society (Israel Innovation Authority, 2019). From a business perspective, a patent portfolio is a corporate asset that is well taken care of and this patent portfolio must be kept up to date and its value must be known to management in all details.

Patents are most useful when they are actively used in marketing and communications. By utilizing intellectual property, the company can ensure the return on the investment made. There are more than 50 million patent publications worldwide in all areas of technology. Patent databases contain 80-90% of new technical information. More than 90% of patents are for product development, product improvements or production methods. The purpose of a patent is to promote competition and innovation (Canals and Şener, 2014).

#### ***2.6.4 Trademarks***

A trademark is simply an identification of the source of goods or services. It is not the product itself; it is the source for a product. For example, in the case of UHU the liquid adhesive, UHU is the manufacturer of the adhesives, it's not the glue itself. More often than not, people come to identify trademarks so closely with the product that they may substitute the name of the trademark for the product. One can obtain trademark rights from actual use in commerce or by registering the trademark with the local notified body like the United States Patent and Trademark Office in the US or the ministry of Commerce in Greece or a trademark can be registered with what it is called an intent to use or ITU trademark application following the Madrid system for the international registration of marks. An ITU can be obtained even before having any sales, even just with an idea for a name of a company. Many times, entrepreneurs register their trademarks in advance, before their product is fully developed or before they're ready to do sales.

### ***2.6.5 Design patents***

A design patent application is a patent application that covers the ornamental aspect of a useful object. It can't be a piece of art you because that is not what is considered a useful object. Design patents are typically used for the look of things that we use every day such as smartphones, computers, automobiles, water faucets. They all have design patents on them.

### ***2.6.6 Provisional patent applications***

A provisional patent application is a relatively recent type of patent application in the USA. It is available for anyone and it is ruled by the latest modification of the US patent law, with a 1994 amendment of the Patent Act of 1952. It is a rather informal utility patent application that gives the applicant a chance to wait for one year before he files a formal utility patent application. It is a way of gaining time and evaluating about an idea if it is good enough to spend resources on the real utility patent application or not.

### ***2.7 Objectives of the protection of the invention***

By protecting an invention, the inventor wants to protect that others cannot commercially exploit his invention within the time limit. In this way, the inventor gains a competitive advantage over his future competitors. Security is an expensive and time-consuming operation, so a company needs to think carefully about what to protect and what could keep secret. In addition, the company must have the ability and willingness to control the rights it protects and any violations thereof. Product development and legal department, must work together to quickly achieve the best possible outcome in hedging while saving time and money (Papageorgiadis and Sharma, 2016). The company must have a hedging plan in support of its overall business strategy, on the basis of which it can apply for the most suitable forms of protection for registration.

The intangible assets provide the company with both a source of information and a protection system. One of the most important competitive tools is, for example, that hedging allows a company to take advantage of a huge amount of market and product development information in management decision-making (Lemley, 2002). The company is able to focus product development investments on the right target and thus find good technical solutions for products and methods. The product development process also speeds up and hedging provides protection for the product development input. It also supports the company's

internationalization and allows for licensing as well as partner search. The intellectual property system also avoids infringing the rights of others.

### ***2.8 Research design of intellectual property rights***

The definition of intellectual property rights is important in exploiting the results of research and development. In this question, it is necessary to define to whom the innovation and the economic benefits that may flow from it belong. The employer's right, for example, to the invention is justified by the fact that the employer has better resources to utilize the invention and bear the risks associated with the possible commercialization of the invention. Employers usually draw up guidelines according to which inventions arising in the employment relationship are reimbursed to the employee (Hagedoorn, Cloudt and Van Kranenburg, 2005). According to recent court of law rulings, the economic benefits of the invention are shared between the employer and the employee. In determining the employee's share, the value of the invention, the extent of the employer's right and any additional conditions agreed in the employment contract must be considered (Thatcher, 1984). The value of the invention should always correspond to the economic benefit arising from the implementation of the invention.

Today, research activities are increasingly focused on teamwork, where a large number of researchers from several different companies and even foreign partners may be involved in the research (Lee, Nystén-Haarala and Huhtilainen, 2012). Such co-operation projects raise a number of intellectual property issues that need to be resolved with the partners in advance through various agreements. Project parties may need to protect their own important know-how that they do not want to share freely with other project members. If such know-how is to be shared with other parties, it can be implemented, for example, in the form of license-type agreements.

Another difficult problem may arise if it is not agreed in advance regarding who has the right to exploit the research results or how the benefit will be shared. At the beginning of the research work, it may not be possible to map the commercial utilization of the research result sufficiently and extensively. Therefore, the question of who has ownership of the results of the study may remain unclear or incidental. Problems may arise at the end of the study when commercial exploitation begins. Solomon Ear's goal for example is to create a series of innovations in research and development of certain aspects of the music industry that allow the development of new products and services, the creation of trade in intangible assets, intellectual

property licensing, technology licensing and exclusive rights. When these assets are granted, revenue is generated that by its turn generates a return on the investment made.

### ***2.9 Mapping of freedom to operate***

Freedom to Operate (FtO) refers to whether it's commercially safe for an organization to make or sell a product in the country in which they wish to do so, without infringing existing third-party rights (Baker, 2019) identifying at the same time the intellectual property rights held by third parties that can be a barrier to an enterprise. Once the risks have been identified, the company can then devise different options to avoid or manage those risks. The perceived risk can be circumvented, for example, through licensing, cooperation or any other agreement. When looking at the overall picture of patents, account must be taken of their existence, where they are valid and how valid they are. Valuation of patents and patent applications is important in licensing and cooperation cases (Hudson and Minea, 2013). A patent is the property of the holder, the value of which is determined, among other things, by the meaning of the invention that is the subject of the patent, the scope of the patent, the general competitive situation in the market and the patent holder's ability to monetize his patent.

The value of a patent is also affected by the industry, the size of the market, the general patent situation in that market area, as well as the company's patent strategy and the company's own business objectives. Technology clearing can help reduce the costs of patenting. When a company needs protection, then it is worth analyzing the value of the company's industrial assets to its core business. The results provide strategically useful basic information on the value and market position of the patent portfolio as well as information on competitors. The results can be used by product development, company management and private equity investors. The results of the technology study are needed in cost cutting, strategy planning, financial negotiations and when seeking revenue from patent activities.

### ***2.10 Passive and active intellectual property strategy***

Two are the types of intellectual property strategies. A passive company only protects its core competencies and its most important assets. The company strives to act in a way that does not infringe on another's existing rights. The choice of strategy is influenced by the size and industry of the company, the paper production industry has traditionally this kind of calm strategy (Hudson and Minea, 2013). On the other hand, companies that actively monitor the

activities of competitors and choose their intellectual property strategy accordingly is the other type. The pharmaceutical industry for instance is such an example of active players in intellectual property matters. Companies develop a business strategy that incorporates intellectual property issues accordingly but either way an occasional patenting is not enough to support a company's business strategy in the global competition of today and on top of that, the right timing must be considered and the individual countries where national protection is sought after must be chosen ahead of time (Krikorian and Kapczynski, 2010).

### ***2.11 Intellectual property strategy put into practice***

Intangible assets are again the means of competition and marketing in product operations. They enable corporate and technological reorganizations as well as increasing the value of the company. Intellectual property risk management involves research into one's own freedom of action and not investing in a product that has already been developed and protected by another company. With constant competitor monitoring, an industry survey is made, in order to develop a valid strategy. Own position about the intellectual property rights must be actively monitored and defended as well. Claims against non-valid patents of competitors and actions for annulment must be made in a timely manner (Baldwin and Henkel, 2015). Threats must be clarified in time and react quickly. The company's contract policy must be up to date with partners, the limits of intellectual property responsibilities must be agreed in advance. Agreements with partners and staff regulations ensure that intellectual property issues are moving in the right direction and reaping the full benefits. Clear intellectual property goals and means will help achieve the goal.

### ***2.12 Ideas to protect***

The most important assets for an organization are the ideas and they should be protected if they have a clear technical and business benefit that provides a competitive advantage. The methods related to the company's important technologies should be well protected, as well and the same is true regarding the future plans that might prove suitable for the marketing strategy. When considering a hedging decision, a company should think about what a competitor would do in a similar situation if he came up with the same idea and possibly seek a cooperation or consider licensing from the competitor. Depending on the industry and the competitive situation, as well as the invention, it would make sense to proceed with protected in some or a few main countries

in the national phase, thus ensuring freedom of action and the right to ban in the most important market areas. If the invention supports the company's core technology, then the protection should be enforced in all major market areas. Depending on the industry, the competitive situation and the invention, it is not always advisable to publish the invention in the form of a patent application. Another option is to leave the invention as a trade secret that is not disclosed to outsiders. In the paper industry, all valuable inventions related to papermaking recipes are left as trade secrets. It is not only the Coca Cola Company with its recipe in the vault and it is not every company in the world of the caliber of Apple. Inc to enforce patents in every single country in the world. Of course, there will be compromises to consider.

### ***2.13 Security objectives and functions***

Hedging aims to improve the company's global competitiveness in the long run. The aim is to increase the company's sales. Hedging can be used in tenders, anti-counterfeiting, anti-piracy or licensing and other agreements. The most important and central goal, of course, is to secure the enterprise own operations. The company, of course, wants to prevent the imitation of its own products. There are several new dimensions to the operation of companies and the need for protection. The operating environment has moved online or in the cloud and brand-new business models are creating. The need for services has increased, traditional ways of working are combined in a new, different way. Of course, different industries have different needs. The distinction between right holders and users is no longer clear and unambiguous, the distinction between trader and consumer is blurred, and of course consumers can also create intellectual property with the use of proprietary methods and means of somebody else.

For the creation of a production and market network, the necessary resources must be allocated to provide sufficiently comprehensive patent protection in those areas where the holder of the invention can obtain the best benefit. The owner of the invention must analyze the competitors, rival companies and the market and only then take protective measures by means of either a patent or a utility model. On the other hand, the company can purchase or license the rights to an invention in full and this might prove more agile, having greater return on investment. Then all rights related to the invention are transferred from the owner of the invention to the company, as a result of this transaction.

Patents have two important functions in society, on the one hand they constitute an important source of technical information and can be used to monitor technological developments in

technical fields as well as the trends towards innovation. The activity of competitors can be promptly monitored, and the appearance of new competitors on the market as well. In the product development phase, a competitor's patent applications can be examined and information obtained on whether the competitor has come up with a better solution to the problem. However, the information on today's standards is already a bit outdated, as patent applications are published 18 months after the application or their priority date. Information obtained from patent applications and granted patents can be used in product development and marketing. Patents are a good source of background information to find out what the state of the prior art is in a particular field or what solutions are used in a technical field to solve a particular problem

## CHAPTER THREE: CASE-STUDY: THE SOLOMON EARS

A case-study regarding a Greek start-up company that provides an innovative service, namely the Solomon Ears, which has the intention to support the optimal bestowal of music royalty rights to the rightful owners, will be presented in this chapter

### *3.1 The case of Solomon Ears*

A seemingly trivial outsiders' approach combined with deep knowledge of international patent law, led to a rich patent portfolio for the Greek start-up company Solomon Ears<sup>2</sup>. The problem Solomon Ears tried to solve, was that nevertheless music recording labels, distributors and streaming services would love to track their products when performed publicly, they were trying hard to approximate this monitoring but they were failing miserably. They commonly use volumes of sales, numbers of downloads or even numbers of plays and they fail to trace the actual use of their products, mostly when commercial usage is involved. They often confuse commercial usage with usage of music for personal recreation. Moreover, they are not capable to track down the actual potential of such products simply because those key players in the music industry don't have a secure and failproof system to monitor performance and market penetration. They are basing their assumptions on radio charts, billboards and sales, the most obsolete and questionable measuring tools of all times.

The main players in the music industry don't actually know where, geographically, their products are consumed or what time of the day or what day of the week or how many times again and again music is played, because nobody obligates DJs to play each CD, they buy equal times, if played at all, or even all the individual tracks contained inside those CDs. Considered of course that they actually buy the music they play and that they do not get their supplies directly from BitTorrent or exploit ridiculously low cost or even free streaming services, intended only for personal and recreational use.

Today, each time a song is played on the radio, it is added to a 'cue list' which is submitted to a royalty collection agency, the copyright collective of the respective country. The collection agency will 'sample' a number of days per year based on the "popularity" of the radio station. If the airplay of a song happens to fall on one of these sampling days, a royalty right fee will

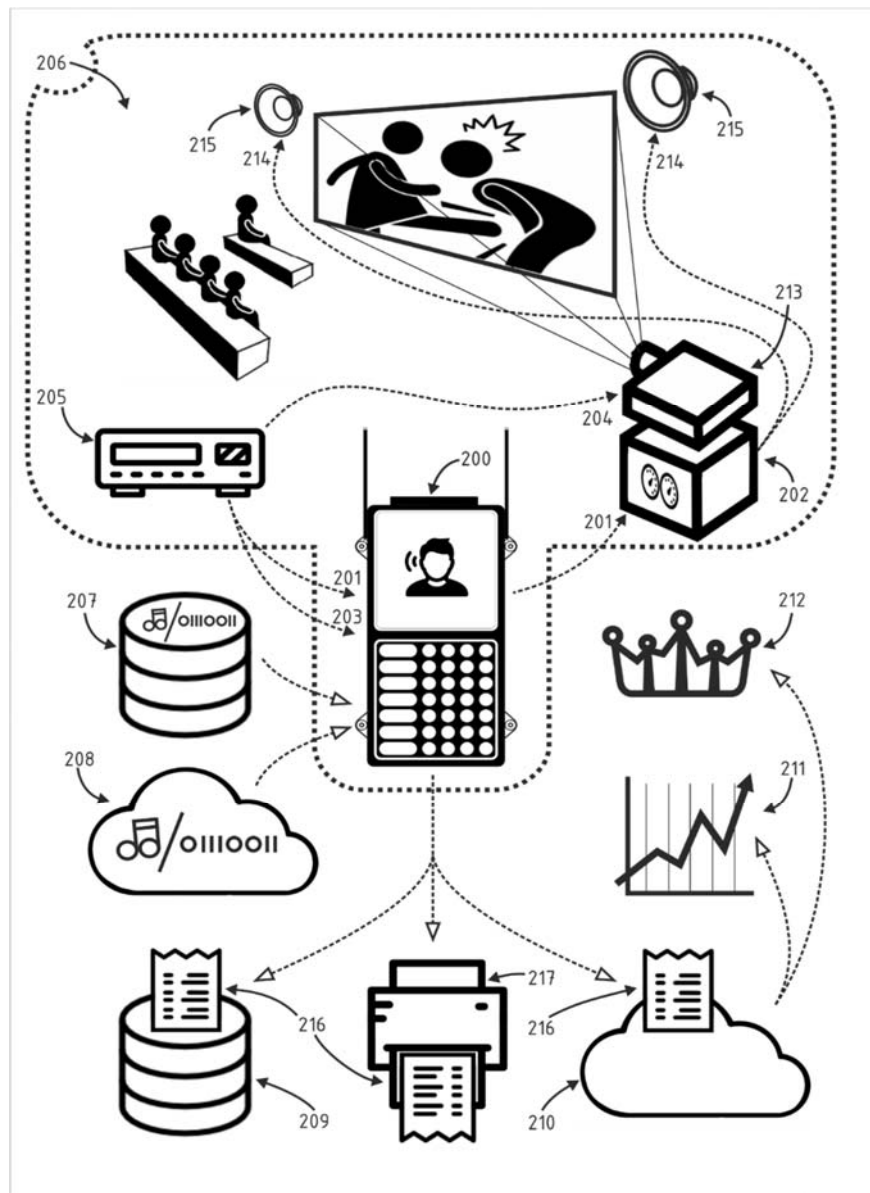
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<sup>2</sup> Solomon Ears foundation for music, Ltd: <https://www.solomonears.co.uk/>



be paid to the holder of the neighboring rights for that particular song by the collection agency. The amount will depend on the popularity of the station, the duration of the song, and of course luck! because sampling is not performed every given day.

Solomon Ears’ proprietary device and algorithms are in the vantage position to actually “listen” to every song and music playing anywhere in the world, in real time. And by listening is meant tracking the unique identification fingerprint; a hash, created by Solomon Ears’ powerful algorithms. In the following figure (Figure 7) it is depicted a simplified version of the System Architecture Diagram (Petrotos, 2018).



**Figure 7: System Architecture Diagram (source: Petrotos, 2018)**

The functionality of this system can be summarized as follows:

The apparatus for tracking and cataloging presentations of copyrighted audiovisual works, hereinafter referred as the Solomon Ears device (200) is installed and continuously operational within a venue (206), where audiovisual works of intellectual property are presented and is in a continuous standby mode. When the reproduction of an audiovisual work starts, the Solomon Ears device (200) is automatically fed with the audio signal (201) of said work and other relevant data (203) through the appropriate input interfaces, omitting the video signal (204). The electronic circuitry of the Solomon Ears device (200), decodes automatically the sound signal (201), reads any “markers” and/or “fingerprints” and/or “tags” and/or “metadata” contained therein with the identity and the various attributes of the work produced by the source (205) independently, or seeks assistance to external identification sources of information (207) and/or external automatic content recognition services (208) for said identification. The Solomon Ears device (200) creates automatically a line of catalogue (216) with the above information, which may be enriched with the identifiers of the particular apparatus (200), like for example the serial number and other information such as time stamps, geographical indication, repeatability of the presentation and other variables.

Thereafter, it is:

a) automatically, stored said catalogue (216) locally in the electronic circuitry of the apparatus (200), each time a new line is added.

b) automatically, stored said catalogue (216) to external (209) or remote (210) databases uploading it, in real time or periodically, for the scopes of future reference, royalties’ bestowal (212), processing and/or analysis (211).

c) On the basis of a pertinent instruction by an authorized user, the Solomon Ears device (200) may execute a printout through the interconnected printer (217) or store in an interconnected storage medium, the entirety of the lines or a fragment of said catalogue according a given filter value, such as for example: “all the song titles that appear more than 4 times in the same day” or “common song titles that appear between 9pm and 11pm from June 15 to July 10” and so on.

An example of a working setup includes:

A venue (206) where audiovisual works of art are presented to the public (for example, a small theatre), the source of reproduction (205) of an audiovisual work of art (for example a DVD

player), sound and video installation (for example projector (213), amplifier (202), sound installation conduits (214) and speakers (215)), the Solomon Ears device (200), an external identification sources of information database (207); an external automatic content recognition service (208), catalogues (216) of information produced by the Solomon Ears device (200); an external database (209) (for example, a hard disk drive in a local network), a remote database (210) (for example, a storing space in a cloud network)an optional interconnected printer (217). The audio signal (201) of the sound of the audiovisual work of art, beforehand been channeled towards the sound installation (202, 214, 215) and eventually other significant data (203), ignoring the video signal (204), reproduced by the DVD player (205) of the venue (206) are directed, through the appropriate input interfaces to the Solomon Ears device (200) which is permanently installed in the above venue (206) and is continuously operational. Automatically, the electronic circuitry of the Solomon Ears device (200) processes and decodes the audio signal (201), reads any markers, fingerprints, tags or metadata contained therein (203), produces a hash string of said audio file using the appropriate algorithm, recognizes the identity of the work and attributes it independently. In case the recognition can't be performed locally, the Solomon Ears device (200) seeks support in external identification sources of information (207) or external automatic content recognition services (208) in order to obtain said identification. The Solomon Ears device (200) automatically creates lines of catalogue (216) with the above gathered information, which can also be enriched with the identifiers of the particular Solomon Ears device (200) like it's serial number, the various time-stamps like for example the time of the moment of execution, the duration of play time, the geographic location of the installation of said apparatus, the repeatability of the presentation of above mentioned work presented as well as other variables and then, again, automatically stores said catalogue (216) locally in the electronic circuitry of the apparatus (200) , each time a new line is added and thereafter, and always automatically, the electronic circuitries of the apparatus (200) stores said catalogue (216) to external (209) or remote (210) databases uploading it, in real time or periodically, for the scopes of future reference, royalties' bestowal (212), processing and/or analysis (211).

This way all the players in the music and the entertainment industry in general, will have access to unique data about the performance of their own products but also the performance and market penetration of the products of their competitors as well. Taking into consideration in the meantime also the illegally downloaded or otherwise unaccounted music, in order to fine tune their strategies.

Labels and distributors will extract much better results and conclusions in real time without the involvement of expensive third parties with a time lag of months or even years.

Artists will know where their top music is spiking. This way, they will be better and more accurately involved with their fanbase, their marketing strategy or even their concert programming and live appearances.

### **3.1.1 Monetization**

The choice of the Solomon Ears foundation was to commercialize their invention by building privately the machines network and monetize every byte of data Solomon Ears harvests producing a variety of insights, tailored for every need based on subscriptions or by the piece in form of bespoke reports far better than the tools music industry have in its disposal today and in most cases, much more affordable compared to the mediocre tools of today.

Royalty rights collection agencies, copyright collectives and notified bodies across the world, like PRS<sup>3</sup> (Performing Rights Society) in the UK , ASCAP<sup>4</sup>, (American Society of Composers, Authors and Publishers) and SESAC<sup>5</sup> (Society of European Stage Authors and Composers) in the USA, ACUM<sup>6</sup> (Society of Authors, Composers and Music Publishers) in Israel, SACEM<sup>7</sup> (Société des auteurs, compositeurs et éditeurs de musique) and CISAC<sup>8</sup> (Confédération Internationale des Sociétés d'Auteurs et Compositeurs) in France, SIAE<sup>9</sup> (Società Italiana degli Autori ed Editori) in Italy, GEMA<sup>10</sup> (Gesellschaft für musikalische Aufführungs und mechanische Vervielfältigungsrechte) in Germany, IFPI<sup>11</sup> (the International Federation of the Phonographic Industry) headquartered in Zurich, Switzerland and also, some of the mega streaming services like YouTube<sup>12</sup>, the Chinese giant Tencent music<sup>13</sup>, Apple music<sup>14</sup>, Swedish Spotify<sup>15</sup>, French Deezer<sup>16</sup>, or the American SiriusXM<sup>17</sup> will greatly benefit from the powerful

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<sup>3</sup> <https://www.prsformusic.com/>

<sup>4</sup> <https://www.ascap.com/>

<sup>5</sup> <https://www.sesac.com/#!/>

<sup>6</sup> <https://acum.org.il/en/>

<sup>7</sup> <https://www.sacem.fr/en>

<sup>8</sup> <https://fr.cisac.org/>

<sup>9</sup> <https://www.siae.it/en>

<sup>10</sup> <https://www.gema.de/en/>

<sup>11</sup> <https://www.ifpi.org/sisalfr>

<sup>12</sup> <https://www.youtube.com/>

<sup>13</sup> <https://www.tencentmusic.com/en-us/>

<sup>14</sup> <https://www.apple.com/apple-music/>

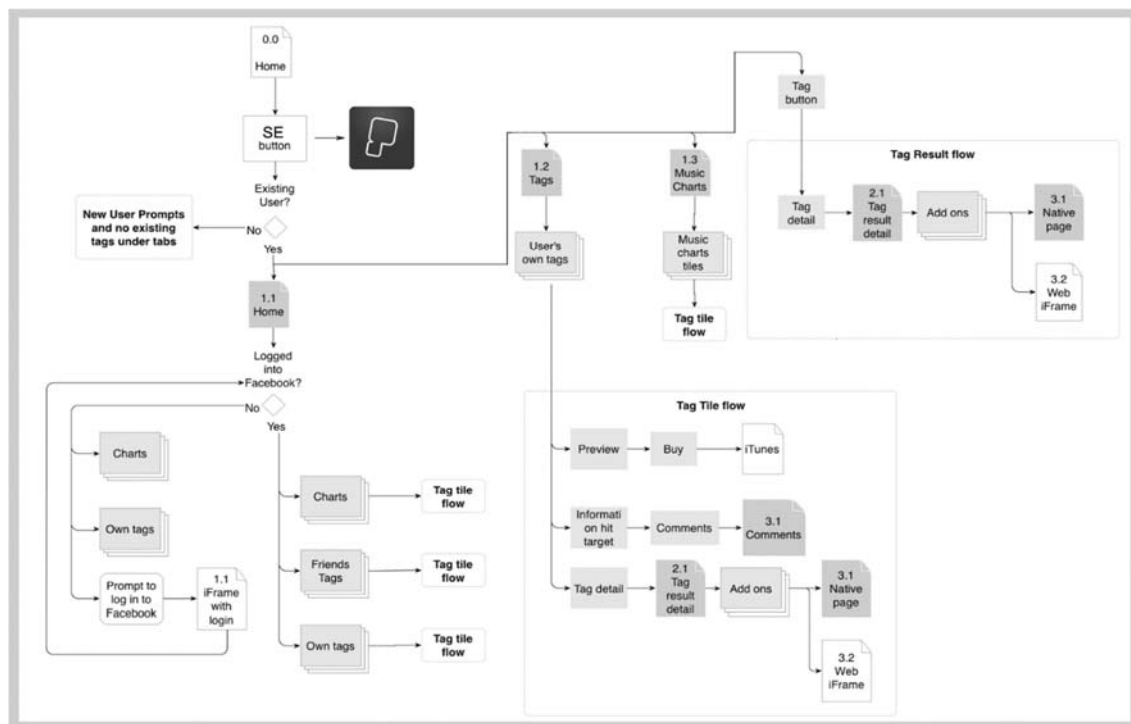
<sup>15</sup> <https://www.spotify.com/se/>

<sup>16</sup> <https://www.deezer.com/fr/>

<sup>17</sup> <https://www.siriusxm.com/>

database Solomon Ears will create because they will have access to secure and transparent analytics about royalty rights bestowal and artist remuneration.

Especially the copyright collectives, could cut substantial amounts of their costs on employees and agents policing all those public establishments. Solomon Ears will monitor the establishments in an automatic and much more productive way, decoupling along the way the need of antipiracy measures and policies simply because every piece of music performed will generate revenue, irrespective of whether it has been legally acquired or not. BitTorrent, Pirate Bay even Napster will have their revenge, because Solomon Ears will put music piracy out of business. Solomon Ears will offer transparency and efficiency to the work copyright collectives do, in order to create from scratch, the democratic environment we all need in the royalty rights distribution industry. The music industry though isn't only about the artists, the labels and the distributors or the money collectors. The music industry is also about the people who listen to that music and the owners of the places where the DJs present in the best of the ways that music to the public. For this reason, Solomon Ears consists also of a family of mobile apps tailored for the pub owners, the DJs, the artists and the pub goers. In the following figure (Figure 8) is depicted a simplified Flow Case Diagram regarding the functionality of the user oriented, free basic Solomon Ears App.



**Figure 8: User companion app, flow chart (source: Solomon Ears foundation for music)**

Using this companion app, users can integrate into their social platforms the actual music they listen in the course of a day either manually either automatically and share their whereabouts in a dynamic manner focused not only on the geographical physical presence but also interrelated with the music played in the background of their day to day life. Moreover, the app can be programmed to build playlists of places or establishments in an automatic manner and most importantly; even without the need of physical presence of the bearer of the mobile device inside the actual place of the premises they wish to monitor:

The free, basic versions of those apps that will give fundamental functionality such as information about the genre of music, a specific place is playing and its location on a map along with other info and directions to get there. Paid subscription plans or one-time payments for limited time usage will cover playlists of given places, where specific songs are playing in real time or where specific DJs are performing. In the following figure (Figure 9) is depicted the user companion app showcasing the user experience interface for iOS devices:



***Figure: 9 User companion app, UX – iOS and Apple watch interface (source: Solomon Ears foundation for music)***

The most important ingredient though of that family of mobile apps, will be the option to rate individual DJs and places based on the actual music they play along with the possibility for the customers, the pub goers, to be involved in the playlist of participating places.

This way Solomon Ears will build a solid and healthy base of music consumers and producers exploiting real world data provided by the implementation of Solomon Ears extended network.

### ***3.1.2 Customers, competitors and usage***

The main target-customers are the music recording labels, artists and distributors, the major players in the music industry, that need real and up to date numbers about performance and market penetration of their products. Namely those are the music recording labels, artists and distributors.

The second group of clients or better: collaborators, are the copyright collective societies. They will be greatly benefited when it comes to royalties' distribution.

And last but certainly not least, the third and broader pool of customers are the actual users: bar owners, djs, artists and pub goers that will use the rich functionalities of the mobile apps and solid social ecosystem that the physical installation of the dedicated hardware will create in a way nobody else have ever thought about before, establishing democracy for the first time in history on the music industry.

Nielsen Global Media<sup>18</sup> and its subsidiary AGB metrics, the Billboard magazine<sup>19</sup>, branch of MRC/Eldridge Industries and MIDia Research<sup>20</sup>, the leader in media and technology specialized analysis companies are the main competitors of Solomon Ears. After all, Solomon Ears is a service that will effectively disrupt their platforms and own way of doing business for decades, making space for new and innovative means of establishing the Top Ten in the entertainment industry. Solomon Ears is also a game changer in the music industry that will put an end to music piracy, making BitTorrent<sup>21</sup>, illegal downloading and the like; obsolete once and for all like more or less did the widespread availability of streaming services in the recent years .

Bmat music innovators<sup>22</sup>, ACRCLOUD<sup>23</sup>, Orfium<sup>24</sup> or even AudD<sup>25</sup>, are secondary players and should be acknowledged more as service providers and possible future collaborators, rather than competitors.

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<sup>18</sup> <https://www.nielsen.com/sa/en/solutions/nielsen-global-media>

<sup>19</sup> <https://www.billboard.com/charts/search>

<sup>20</sup> <https://www.midiaresearch.com/reports>

<sup>21</sup> <https://www.bittorrent.com/>

<sup>22</sup> <https://www.bmat.com/>

<sup>23</sup> <https://www.acrccloud.com/identify-songs-music-recognition-online/>

<sup>24</sup> <https://www.orfium.com/>

<sup>25</sup> <https://audd.io/>

With Music Modernization Act in the USA<sup>26</sup>, passed as a law just some months ago, and articles 15 and 17 in Europe<sup>27</sup>, set for implementation by the members countries, the stars are aligning for a better and simpler tomorrow for the music industry. The music industry will be, at last, democratized! Artists, labels, distributors, producers, anyone in the music industry, should be acknowledged for their work and rewarded for their intellect in a transparent, democratic, efficient and secure way. Systematic use of the Solomon Ears platform will revive the interest of artists and creators, stimulating the production of more audiovisual art promoting, as a consequence culture in general.

### ***3.1.3 Technologies used by Solomon Ears***

The main technologies implemented in the Solomon Ears system are presented in the following sub-chapters:

#### ***3.1.3.1 Internet of Things***

The Internet of Things, a term coined by Kevin Ashton in 1999, can be described as a web of smart devices, interconnected with each other through network connections. However, connected devices will only deliver their full potential if they can exchange data with each other and are able to trust the data provided by other nodes (Gantait et al., 2017; Tapscott & Tapscott 2016, pp.152-155). Sophisticated sensors and chips are embedded in the physical things that surround us, each transmitting valuable data that lets us better understand how these things work and interact with each other. These devices share large quantities of data and all that information can be put to work whether we're improving the production of a factory, giving city residents real-time updates on where to park, monitoring our personal health or harvesting the exact music each and every café plays, in quasi real time. "Open standards based distributed IoT networks can solve many of the problems associated with today's centralized, cloud-based IoT solutions, including security, scalability, and cost" (Gantait et al., 2017). Internet of Things platforms bring us diverse information together and provide the common language for the devices and apps to communicate with each other. The process starts with the devices themselves which securely communicate with a dedicated platform. This platform integrates the data from many devices and applies analytics, to share the most valuable data with applications that address industry specific needs.

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<sup>26</sup> <https://www.congress.gov/bill/115th-congress/house-bill/5447/text>

<sup>27</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1602604554484&uri=CELEX:32019L0790>



### **3.1.3.2 Hashing**

Hashing is the result of a computation using a dedicated algorithm called hash function. It takes in values of arbitrary size, no matter if it is a number, a single word, a whole page of text, or an mp3 file and the algorithm, the hash function, computes an output of a fixed size so that all outputs are equally long, no matter the size of the inputs. Hashes need to be deterministic meaning that the same input needs to generate always the same output, Hashing functions need to be quick in order to cope with demand, they must only work in one way and most importantly small changes to the input, must yield completely different outputs. The input can generate the output, but given the output, one must not be able to generate the input. This is a special feature of the cryptographic hash functions. The most well-known cryptographic hash function is SHA-256. Reverse engineering regarding hashing is infeasibly hard and can guarantee very rare collisions. Blockchain technology applies hash functions extensively. A hash function is a mathematical function that transforms an arbitrary input into output, a so-called digest or hash, of fixed length (Preneel, 1993, p.162; Rimoldi, 2011). For Bitcoin, the digest is a 256-bit number. A cryptographic hash function is a one-way hash function; thus, it is technically infeasible to revert the digest (Dwyer, 2016, p.3; Pilkington, 2015, pp.7-8). Put differently, the digest of a cryptographic hash hides the information of the input: It is almost impossible to restore the input from the output. In addition, a cryptographic hash function is collision resistant: It is very unlikely to find two inputs that hash to the same digest (Ramzan, 2013). As an example, a song of any length could be hashed into a specific digest, e.g., a 256-bit number. If this same song would be hashed again at any later point in time it will always result in exactly the same digest. However, by being in possession of the hash, one cannot trace back the input song.

### **3.1.3.3 Blockchain and timestamping**

"The next big thing" (The Economist, 2015), "[...] a Ledger of Everything" (Tapscott & Tapscott, 2016, p.7), "We may be at the dawn of a new revolution" (Swan, 2015, p.vii) "There has been much hype around blockchain and its potential economic impact over the past years. Despite its popularity, blockchain is far from being a clearly defined technology" (Draper, 2017). The technology has evolved over time given rapid advancements and progress since it was disclosed by Satoshi Nakamoto in the form of Bitcoin in 2008 (Mattila 2016, p.4; Nakamoto, S., 2008). In its purest form, blockchain, is a cryptographically secured, distributed ledger (or database) of recorded transactions which are verified across a network of participants and which can be traced back entirely (Buehler et al., 2015, pp.4-7; Schneider et al., 2016, p.3). The fact that blockchains allow for transactions without the need of a trusted intermediary is

considered the most important and disruptive feature of the technology (Buehler et al., 2015, p.5; Tapscott & Tapscott, 2016, p.4). Thus, the disintermediating character of the technology removes friction in the form of costs, delays, as well as credit and liquidity risk in transactions over the internet (Bogart and Rice, 2015, p.3; Buehler et al., 2015, p.5). Underlining the importance of the technology in a digital world, several authors have classified blockchain as a 'general purpose technology' with enormous potential impact on productivity (Andreessen, 2014; Swan, 2015, p.vii)

### ***3.1.3.4 The timestamp.***

A timestamp proves that a block of information has existed, prior to some point in time. It is paramount for the functioning of the society and can take various forms. One excellent example is the time stamp, a literal stamp, of the post office (Figure 10)

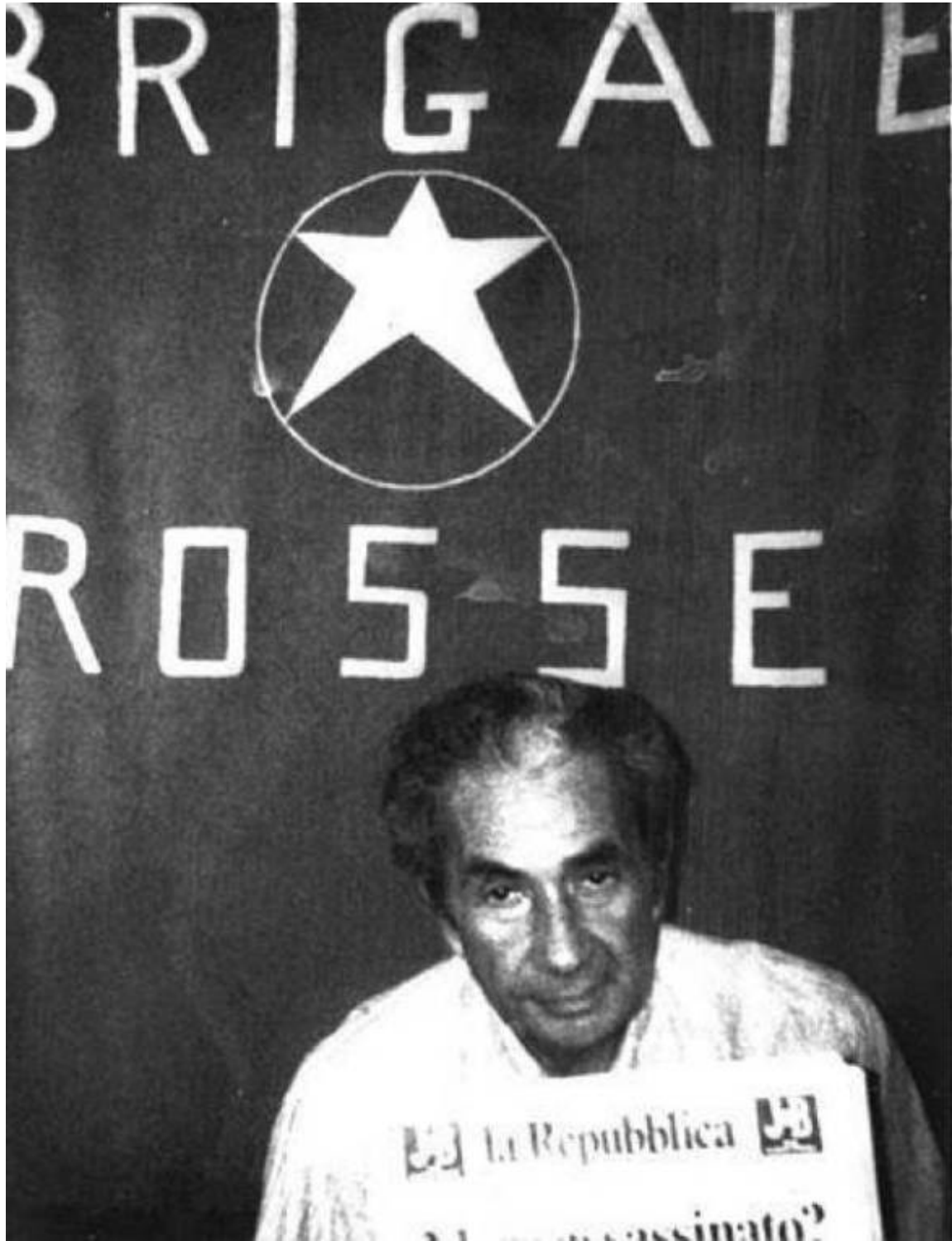


***Figure 10: Timestamp of United States Post in 1932, “Merry Xmas” (source: USPS)***

The first prerequisite of a timestamp as mentioned above is to prove that some information has existed, prior to some point in time.

The second, and most important has to do with the demonstration of the integrity of said of information along with the immutability of that information. Of course, any superfluous

information other than the absolutely necessary, like “Merry Christmas” in figure 10 or advertisements (Figure 11), has nothing to do with the actual timestamp and should be avoided.



*Figure 11: “Comunicato n° 7, Aldo Moro with newspaper in hand, proving he’s alive along with some J&B (Justerini & Brooks) whisky advertisement (source: La Repubblica)*

Blockchain is the groundbreaking technology, that natively bears all these features. Blockchain technology is based on a decentralized database structure. It does not depend on one single server to guarantee the availability and up-to-dateness of the database (Bogart and Rice 2015, p.3). A block, the key element of a blockchain can store any value representative of any set of data and once it is ready it's validated by the network who deems it as appropriate. Every time the network validates a block which involves resolving a difficult cryptographic puzzle it is added to the blockchain and cannot be removed. Any single file, after being reduced to its hash value, the unique string obtained using a strong hash function, gets a digital fingerprint. The hash value is then inserted together with the other hash values into the block. This block with its content is validated and appended to the blockchain. Every time this happens the block is provided with the date and time values which will benefit the immutability feature of the blockchain and this extends to the content of the block, including the original files hash values that can be verified by anyone who possesses the Blockchain and the hash function. This way not only a blockchain can provide a secure way to time stamp any individual piece of information but also recognize data breaches or data tampering by comparing the hash values of the original file with the one previously added into a block.

#### ***3.1.4 Alternative strategy***

The exploitation of Solomon Ears' patent portfolio could be also a matter of assigning the rights related to an invention in relation to another entity in some legally significant way. The right to the invention may be granted either in whole or in part. The transfer may take place entirely by trade, inheritance or any other legal act specifically intended for the transfer. The patent holder may also keep the patent for himself or not take advantage of it at all. If a patent is considered passive in its own possession, it is essentially a deterrent or a mere deterrent on the market in favor of its holder, a "blocking patent". A patent can also be pledged, in which case it increases the value of the company's assets. An invention for which a patent has not yet been granted (patent application) may be assigned to another. The patented invention is the result of long-term research and development work, which causes a lot of costs for the company. At the latest at the stage of commercialization of the invention, a precise transfer agreement must be drawn up between the parties.

## CHAPTER FOUR: CONCLUSIONS

This thesis studies the commercial exploitation of intellectual property rights, more specifically utility patents, in the marketplace and the subsequent fair distribution of copyrights to the legitimate owners. The entire value chain from the procurement of raw materials, the evaluation of the ideas, the technology developed, the necessary market research, to the launching of the end product and the eventual recycling of the hardware, after the end of its life cycle. These various stages involve a large number of partners, whose intellectual property rights and protections must be clarified in advance. In the highly competitive world of today, a world of global reach and instant availability even whole parts of the entire value chain might be patented, so that competitors cannot take advantage of it.

The industry has long protected industrial inventions with patents. Today, the use of intellectual property as a tool with exchange value has become common place. The economic value of an intangible asset such as a utility patent, granted or just pending, arises only from the exercise of the right in an economic activity. Success in intellectual property operations therefore requires expertise in legal terms, management as well as contractual and negotiation skills. Intellectual property issues are always central when a business creates or seeks to create significant economic value. From a company's perspective, the value of a right depends on how the company is able to leverage intellectual property rights in its business.

The intellectual property operating environment is a global operating environment, where operations in national markets alone are extremely rare. The effective exercise of rights is based on a functioning commercial market, clarity of rights, effective competition and of course the efficiency of the enforcement system. Intellectual property rights are managed on a contractual basis and the agreements define the rights, obligations and responsibilities of the various parties and for this reason is paramount that the quality of patents is central to the effectiveness of the rights. By researching all prior art regarding a patent application in progress, gathering all available information right at the beginning of a product development project, better quality solutions are obtained and at the same time the intellectual property protection is strengthened. This is even more important especially when it comes to marketing, product development, and launching a product in the market, aspects that should also be considered since the very beginning. Determining the value of patents is not a simple matter and there is no single right way to assess the economic value of them. Because of the

prohibition character of the patent, giving the rightful owner the right to stop others from making, using or selling the patented invention a value of any patent could be calculated by the economic damage a competitor is subjected, just by not allowing him to use the intellectual property. Intellectual property management has to consider tons of questions regarding both the competitive advantage and the value of the technologies around a patent in the making. Against whom and what are the things that are patented. What is the value of the patent in question and if, the patented product will ever go on sale. If the return on invested money is been used wisely. In addition, the invention itself and its content must also be considered well into the future because technology may (and will) become obsolete, perhaps very quickly. Several different parties are involved in these reflections, and in particular sales, marketing and procurement staff need to be involved in every decision-making phase. Competition between companies is moving towards competition between entire value chains. The competitiveness of a product in the market is finally determined by it. Depending on how efficient and economical the value chain as a whole is, companies strive to work closely with each other so that everyone can benefit from the entire value chain. This way, an individual company receives more benefits as part of the value chain than when operating alone. The change in the operating environment causes different problems for different industries, so companies need to take these changes into account and assess their impact on strategy. Creative work requires special expertise and know-how, but commercializing products requires mastery of many other different areas.

In the case of Solomon Ears we can see the perfect blend of top of the line Internet of Things hardware, proprietary artificial intelligence algorithms and big data harvesting and analytics on a social platform that will bring democracy in the music industry, with the security provided by blockchain and distributed ledger technologies. A unique and solid self-sustainable ecosystem for all the pains in the music industry, including piracy. A social platform built around an array of mobile apps that will bring together artists, labels, djs, pub owners and their clients but most of all, the copyright collective authorities. Solomon Ears will work relentlessly for the music industry, continuously in the background. Night and day monetizing the data that the music industry is producing setting piracy free along the way and bringing democracy, efficiency and transparency for the very first time in the history of the music industry. Solomon Ears will provide the means to establish one common and universal royalty rights catalogue to rely on, because the very same data will be used by the copyright collective authorities in order to distribute efficiently and correctly all the money they collect for the artists and labels. While

at the same time, Solomon Ears will be used in the containment of piracy. Thanks to the systematic use of these IoT devices all over the world, even the pirated pieces of audiovisual works will generate revenue, reversing the equation and thus, turning piracy in favor of the rightful owners. It will make sense for the very first time in history for a DJ to download music in the afternoon in order to play it later that night in the club in which he works. Solomon Ears will hear it and acknowledge it generating a new block with that entry in the long chain. The rightful owners will not be harmed because their creation would be included in the royalty rights catalog.

Artists, labels and anyone in the music industry should be acknowledged for their work and re-warded for their intellect in a transparent, democratic, efficient and secure way. Systematic use of Solomon Ears devices will revive the interest of artists and creators stimulating the production of more audio-visual art promoting as a consequence culture in general leading to better products, better practices, better pricing, a better world for a better future.

i) All product names, logos, brands and trademarks, used in this document are property of their respective owners. Companies, products and service names mentioned in this dissertation are for identification purposes only. Use of these names, logos, and brands does not imply endorsement in any way. Solomon Ears is a registered trademark of the Solomon Ears foundation for music Limited.

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