



Intellectual
Property
Office



Music 2025

The Music Data Dilemma: issues facing the music industry in improving data management



Research commissioned by the Intellectual Property Office and carried out by Ulster University: Professor Frank Lyons, Dr Hyojung Sun, Dennis Collopy, Paul O'Hagan and Professor Kevin Curran.

Findings and opinions are those of the researchers, not necessarily the views of the IPO or the Government.

IPO | Making life better through IP

Intellectual Property Office is an operating name of the Patent Office

Music 2025 Core Research Team:

Professor Frank Lyons is Dean of Research and Impact in Arts, Humanities and Social Sciences at Ulster University. He has developed an international profile as a composer and researcher with over 150 performances and exhibitions of his works in China, Japan, Australia, South Africa, the US, Europe, the UK and Ireland and broadcast on BBC, RTE, NPR and ABCFM, performed by some of the world's leading soloists and ensembles. He has also developed an international network of research collaborations in the field of creative technologies and disability under the 'Inclusive Creativity' banner. Professor Lyons is currently Co-Director of Ulster's Creative Industries Institute and Co-Director (Partnerships) of Future Screens NI, a collaboration with QUB and a number of key industrial partners which secured £13million from AHRC and industry to drive growth in the creative economy in the region.

Dr Hyojung Sun is an interdisciplinary researcher whose work cuts across law, social science and cultural studies. She currently works as a Research Associate at Ulster University's Creative Industries Institute which is a key partner in the UK Government-funded, Nesta-led Policy & Evidence Centre. She holds a PhD in Science, Technology and Innovation Studies from the University of Edinburgh. She is the author of *Digital Revolution Tamed: The Case of the Recording Industry*, Palgrave MacMillan (<https://www.palgrave.com/us/book/9783319930213>) and her latest article is *Paradox of Celestial Jukebox: Resurgence of Market Control*, *Creative Industries Journal* (<http://dx.doi.org/10.1080/17510694.2018.1554944>).

Dennis Collopy is Senior Research Fellow at the University of Hertfordshire, specialising in Music and IP related research including various studies for UK Music and the IPO. He has spent over 4 decades in music working across artist management, record labels and music publishing having been MD of Riva Music (signing the Clash and John Mellencamp) BMG Music Publishing (where he signed Steve Earle and Maria McKee and worked with Eurythmics and Clannad) EG (working with KLF, the Orb and Robert Fripp) and most recently his own Menace Music Management working mainly in managing rights for song writers like Matt Aitken, Frankie Miller, Slowdive/Mojave 3's Neil Halstead, Gary Benson and Steve Edwards. Dennis is a former director of PRS and board member of the MPA.

Professor Kevin Curran is a Professor of Cyber Security, Executive Co-Director of the Legal innovation Centre and group leader of the Ambient Intelligence & Virtual Worlds Research Group at Ulster University. He is also a senior member of the IEEE. Prof Curran is perhaps most well-known for his work on cyber security, blockchain and location positioning within indoor environments evidenced by over 800 peer review papers. He is one of the most interviewed technology experts in the UK with over 1000+ interviews in recent years <https://kevincurran.org/interviews/>.

Paul O'Hagan is currently working with Ulster University and UKIPO researching music copyright, data registration systems and the impact of digital transformation on the creative economy. Having worked for over 25 years as a performer, songwriter/arranger, studio engineer, producer and music educator, he has consistently been an agitator, instigator and advocate for projects which empower and promote agency across the creative sector. Studying Cultural & Critical Theory at Salford University and Creative & Cultural Entrepreneurship at Goldsmiths College developed into an interest in research with strong socio-political/economic relevance, which is reflected in his current PhD project '(Non)Attribution & The Business Of Music'. Paul is also co-founder of Smidj Ltd and is strategic advisor to [JadeBlok Ltd](#), who are currently piloting projects concerned with innovation in cross-sector, cross-border and cross-platform data services.

Special thanks to Peter Jenner, Paul Jessop and Ritu Bhatt who were engaged as specialist consultants to support the core team's research activities.

ISBN: 978-1-910790-40-3

Music 2025: The Music Data Dilemma: issues facing the music industry in improving data management

Published by The Intellectual Property Office
June 2019

1 2 3 4 5 6 7 8 9 10

© Crown Copyright 2019

You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit <http://www.nationalarchives.gov.uk/doc/open-government-licence/>

or email: psi@nationalarchives.gsi.gov.uk
Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

Any enquiries regarding this publication should be sent to:

The Intellectual Property Office
Concept House
Cardiff Road
Newport
NP10 8QQ

Tel: 0300 300 2000 Fax: 01633 817 777

e-mail: information@ipo.gov.uk

This publication is available from our website at www.gov.uk/ipo

Contents

Ambiguous truth - A true story (as far as I can remember it).....	1
1. Executive summary	8
1.1 Context.....	8
1.2 Key findings	11
1.2.1 Urgency for change	11
1.2.2 Issues with International Standard Recording Code (ISRC) and International Standard Musical Work Code (ISWC) identifiers.....	11
1.2.3 Data infrastructure.....	12
1.2.4 The importance of data	13
1.2.5 Politics and asymmetrical power relations.....	13
1.2.6 Fragmentation and insufficient collaboration	14
1.2.7 Appropriateness of governance	14
1.2.8 Creators' earnings on streaming platforms.....	14
1.3 Key recommendations	15
1.3.1 Education	15
1.3.2 Interoperability	16
1.3.3 Governance	18
1.3.4 Collaboration.....	18
Acknowledgements.....	19
2. Research aims and design	20
2.1 Background.....	20
2.2 Aims and objectives	21

2.3 Theoretical approach	22
2.3.1 Social shaping of technology	22
2.3.2 Socio-technical constellation of music data management	23
2.4 Research design	25
2.4.1 Qualitative research: interviews and data analysis	25
Data analysis	26
3. Existing literature and key findings.....	26
3.1 Archaeology of music data - the industry context	26
3.1.1 Copyright law	27
3.1.2 The music publishing industry	28
3.1.3 The recording industry	29
3.1.4 Collective licensing and market analysis	29
3.1.5 Cultural economics	32
3.1.6 Data management initiatives	33
3.2 Architecture for music data management	34
3.2.1 Introduction	34
3.2.2 Topographical modelling	35
3.2.3 Industry identifiers	45
3.2.4 Interconnecting systems	53
Interoperability.....	53
Standardisation	54
Data privacy and confidentiality	55
3.2.5 Recent technological initiatives and developments.....	56
3.3 Research findings from the interviews	59

3.3.1 Critical juncture for change	59
3.3.2 Issues with ISRC and ISWC	61
3.3.4 CMOs' roles and responsibilities	68
3.3.5 Recent industry initiatives	69
3.3.6 Further barriers to progress	71
3.3.7 Creators in music data value networks	74
3.4 Conclusions and recommendations.....	76
3.4.1 Conclusions	76
3.4.2 Summary of key findings.....	76
3.4.3 Recommendations	80
3.5 Final remarks and future research.....	85
APPENDICES	87
4.1 Archaeology of Music	88
4.1.1 Music industry and licensing overview	88
4.1.2 Copyright.....	90
4.1.3 Copyright and technology timeline	95
4.1.4 Streaming	102
4.1.5 Creator remuneration	104
4.1.6 Music data management – standards and codes	106
4.1.7 Legislative developments	108
2018 Music Modernization Act (USA)	111
4.2 Architecture of music data	113
4.2.1 Current Blockchain initiatives.....	113
4.2.2 Use case: Blockchain and the music industry	118

4.2.3 Artificial intelligence, deep learning, big data	121
Appendix 4.3.1 Key quotes from interviews.....	123
Appendix 4.3.2 List of interviewees	137
Appendix 4.4 NVivo analysis.....	139
Appendix 4.5 Bibliography	140
Glossary of acronyms:.....	152

Ambiguous truth - A true story (as far as I can remember it)

In the summer of 1966 I was 23 years old and had chucked a promising career teaching in economics to co-manage an experimental pop group with no record deal, only limited technical ability, but bags of ideas, most of them generated by the singer, guitarist and main songwriter, an even younger guy who everyone called Syd.¹ His band was transitioning from being The Pink Floyd Sound to just Pink Floyd,² though most of their fans informally carried on abbreviating to “the Floyd” or just “Floyd”.³ I was on my way to visit Syd at his room in Peter and Suzy’s flat in Earlham St⁴ when I heard a track from the American band Love.⁵ There was a section that stuck in my brain, it was an earworm and I could not get it out of my head. When I saw Syd; I asked him if he had heard the new Love album⁶ – he hadn’t. As I explained that I had heard this great riff, I was very charged up by this earworm, and mouthed it to him: “dah dah dah dah-dah dahdi-dah DAH”, or something like that.⁷ Now, I am definitely not personally musical, and I certainly cannot sing or hum in tune. Despite that, as I hummed the riff, Syd picked up his guitar and played it back to me. I recognised it as what I had been trying to hum and then; he continued to work on the riff, and then after a while I left, with Syd obsessively reproducing and reworking my somewhat, atonal humming on his guitar. Shortly afterwards Syd played the [re-worked] riff to the rest of the band who adapted it as an instrumental which became known as ‘Interstellar Overdrive’.⁸ It was the perfect title for a psychedelic tune from the leading ‘underground band’ of the time. As it developed, it became a long, improvised instrumental track for the whole band, and it helped define their ‘sound’. It became almost their signature song, and was filmed a couple of times, notably by Peter Whitehead.⁹ It was played live at the UFO¹⁰ Club and it became the closing song in the band’s live shows, and for all the other gigs in that early period. In many ways it defined the band’s unique character as a visual, multi-media substantially instrumental and improvisational group.

When signing, or dealing with initial contracts in early Floyd days, our ignorance was massive, both of the music business, copyright and contracts. Initially we talked with our agent, Bryan Morrison, who had some experience. Bryan advised us on a record deal and suggested we should go with the biggest company and get the largest cheque we could. This turned out to be EMI who offered us a large advance,¹¹ and access to Abbey

-
- 1 Syd’s real name was Roger Barrett. There was of course another Roger in the Floyd: Roger Waters. Identifying the contributions of the membership of the original Pink Floyd becomes more than a little ambiguous,.
 - 2 Pink Floyd went through a range of names in the early days.
 - 3 Today we call that fan input co-creation or “prosuming”.
 - 4 Peter and Susan Wynne-Wilson?
 - 5 Love were an American rock band from Los Angeles highly rated by 1960’s music fans in the UK
 - 6 The album was ‘Love’ by ‘Love’, the bands first studio album for Elektra Records released 1966. Source: Strong, Martin C. (2000). *The Great Rock Discography* (5th ed.). Edinburgh: Mojo Books. pp. 585–586
 - 7 The LOVE recording was a cover of a Burt Bacharach song which also had words and melodies, of which to this day I have no recollection, at all. What I had heard and remembered was merely a riff within that track.
 - 8 “Interstellar Overdrive” was one of the very first psychedelic instrumental improvisations recorded by a rock band. It was seen as Pink Floyd’s first foray into space rock Source: Manning, Toby (2006). *The Rough Guide to Pink Floyd* (1st ed.). London: Rough Guides. p. 180.
 - 9 Film Director Peter Whitehead used Interstellar Overdrive as the theme for the seminal 1960’s zeitgeist movie “Tonite lets make love in London” – A 16 min version of the song was recorded and filmed by Whitehead in 1967 at John Wood’s Sound Techniques in Chelsea.
 - 10 The UFO Club was founded by John Hopkins (usually known as “Hoppy”) and Joe Boyd in an Irish dancehall called the “Blarney Club” in the basement of 31 Tottenham Court Road, under the Gala Berkeley Cinema.
 - 11 EMI advance.

Road.¹² EMI were in great economic shape in full Beatles mode, at the time, and they provided Norman Smith¹³ as a producer, who had previously been an engineer on the Beatles sessions. When negotiating the contract, we were advised by a very nice lawyer who had no experience of the music industry. None of us had any idea about what really mattered in a record deal, and what might be the implications. When we asked those we negotiated with about something we didn't understand we were regularly told it was a 'standard industry' clause. The same advice applied to the publishing deal. We did not really understand the life of copyright, the implications of assignment or so many other things such as royalty rates, life of contract, assignment of rights, which we were told were 'standard industry practice' and we knew no better.

Later, in 1970 I produced a record¹⁴ with Roy Harper¹⁵, for EMI's Harvest records label.¹⁶ I was still very new to the game and we were recording his version of a traditional British folk song called 'The Girl from the North Country'.¹⁷ Roy just assumed it was 'a traditional folk song'. However, we were informed by the label that the song was being claimed by Bob Dylan's publisher as one of his. As an industry novice, I had no desire to take on Dylan and his people,¹⁸ so I just took EMI's word for it. It was only later that I realised that it was indeed a traditional British folk song, which was clearly Public Domain¹⁹, and that Dylan had previously been in England²⁰ where he had probably heard it in a British folk club. Dylan's publishers however, just claimed it via the standard industrial structures and as there was no dispute raised, the system sent the publishing money off to Dylan's people

12 EMI Recording Studios Abbey Road - 3 Abbey Road, St John's Wood, City of Westminster, London -

13 Producer Norman Smith was the engineer on all of the EMI studio recordings by the Beatles until the autumn of 1965, when EMI promoted him from engineer to producer. He began working with Pink Floyd in 1967.

14 Flat Baroque and Berserk was the first of Roy Harper's recordings to enter the charts, reaching number 20 in the UK album chart in January 1970.

15 "One of Britain's most complex and eloquent lyricists and genuinely original songwriters... much admired by his peers" - McCormick, Neil (12 November 2013). "Roy Harper: 'I'm inspired to carry on'". The Daily Telegraph. London. Retrieved 15 November 2013.

16 Harvest Records is a British record label belonging to Capitol Music Group, originally created by EMI, active from 1969.

17 Girl from the North Country is a song written by Bob Dylan. It was recorded at Columbia Recording Studios in New York City in April 1963, and released the following month as the second track on Dylan's second studio album, *The Freewheelin' Bob Dylan*. Dylan re-recorded the song as a duet with Johnny Cash in February 1969. – Source: Bjorner, Olof (November 21, 2015). "5th Nashville Skyline session, 18 February 1969". *bjorner.com*. Retrieved October 31, 2016. Harpers version was released as 'North' on the album *Valentine* (1973).

18 Bob Dylan's manager Albert Grossman was known as a hard negotiator, he persuaded Dylan to transfer the publishing rights of his songs from Duchess Music, whom he had signed a contract with in January 1962, to Witmark Music, a division of Warner's music publishing operation. Dylan signed a contract with Witmark on July 13, 1962. Unknown to Dylan, Grossman had also negotiated a deal with Witmark. This gave Grossman fifty percent of Witmark's share of the publishing income generated by any songwriter Grossman had brought to the company. This "secret deal" resulted in a bitter legal battle between Dylan and Grossman in the 1980s. – Source: Sounes, Howard (2001). *Down The Highway: The Life Of Bob Dylan*. Grove Press, Heylin, Clinton (2009). *Revolution in the Air: The Songs of Bob Dylan, Volume One: 1957–73*

19 The public domain consists of all the creative works to which no exclusive intellectual property rights apply. Those rights may have expired, been forfeited, expressly waived, or may be inapplicable. – Source: Boyle, James (2008). *The Public Domain: Enclosing the Commons of the Mind*. CSPD. p. 38., Graber, Christoph B.; Nenova, Mira B. (2008). *Intellectual Property and Traditional Cultural Expressions in a Digital Environment*. Edward Elgar Publishing. p. 173.,

20 While in London in 1962, Dylan met several figures in the local folk scene, including English folksinger Martin Carthy. "I ran into some people in England who really knew those [traditional English] songs," Dylan recalled in 1984. "Martin Carthy, another guy named [Bob] Davenport. Martin Carthy's incredible. I learned a lot of stuff from Martin." Carthy exposed Dylan to a repertoire of traditional English ballads, including Carthy's own arrangement of "Scarborough Fair," which Dylan drew upon for aspects of the melody and lyrics of "Girl from the North Country," including the line from the refrain "Remember me to one who lives there, she once was a true love of mine."

establishing a precedent for payment of royalties. I doubt if anyone gave it a moment's thought, certainly no one asked me or Roy about it, and no-one queried the attribution.

Roy being signed to EMI, also meant we were given the free run of Abbey Road during a time when it was a ground-breaking environment. Assistant engineers who became engineers and then producers came up with technical innovations, techniques and inventions that shaped the sound of the recordings that were produced there, and which were widely imitated²¹. It was in this context that Roy somehow persuaded his friend Jimmy Page to come and collaborate with him on the making of *Stormcock*²². Along with Phil McDonald, Peter Bown and John Leckie²³ the album was produced with only four songs on it. The tracks recorded with Jimmy Page were extraordinary. They worked with the studio team to derive complicated repeat echo systems, which were set up all round the studio environment, yet all the music was played on acoustic guitars, and nearly all live. Jimmy was uncredited at the time as he had to work under an alias on the recording²⁴. *Stormcock*, never a big hit, raised important and interesting questions about attribution, such as: How is accurate information about the recording collected and categorised? Who should get credited for their creative contribution? What data should be listed, and for what reason?

These stories are intended as an invitation to consider how contractual obligation, employment conditions, the fear of litigation and concerns about relative market value and economic return, impact the gathering of data and subsequent attribution during the practice of creativity.

In short, I would argue that there are often essential elements of uncertainty and/or ambiguity in trying to assert authoritatively who is/are the writer(s) of a song, who was in the band and also, who had creative input. In this respect, deciding who should be paid and how much, becomes a very difficult question. This question becomes increasingly complicated with the passage of time, and also within the dynamic of a creative collective, encountering and engaging each other within a studio environment and/or other workspaces. When trying to think about information associated with a recording, one has to come to terms with the fact that data detests ambiguity, while on the other hand creativity is full of ambiguity. Tiredness, excessive use of drink or drugs, and the passage of all combine to make accuracy in recalling and identifying the accurate, 'true' information, of any event, and particularly a creative event, very challenging.

21 Abbey Road engineers such as Geoff Emerick and Peter Bown are legends in the industry and invented techniques which are now in standard use throughout the industry such as Direct Insertion for electric instruments, the choice and placement of microphones and the creative design and use of effects and signal processing.

22 *Stormcock* is the fifth album by English folk/rock singer-songwriter and guitarist Roy Harper. It was first released in 1971 by Harvest Records and is widely considered his best record. Savage, Jon (26 January 2011). "Jon Savage on song: Roy Harper serves up Hors D'Oeuvres". *Theguardian.com*. Retrieved 7 December 2018 - At the time, the album was not particularly well promoted by Harper's record label. Harper later stated: *They hated Stormcock. No singles. No way of promoting it on the radio. They said there wasn't any money to market it. Stormcock dribbled out.* Nonetheless, *Stormcock* would remain a favourite album of critics and Harper's fans. In October 2013 NME placed *Stormcock* at 377 in their list of "The 500 Greatest Albums Of All Time - Petridis, Alexis (13 October 2011). "Roy Harper: 'I fought like hell to stay alive'". *Theguardian.com*. Retrieved 7 December 2018, NME: The 500 Greatest Albums Of All Time : October 2013". *Rocklistmusic.co.uk*. Retrieved 7 December 2018.

23 John Leckie (born 23 October 1949) is a record producer and recording engineer. His production credits include Magazine's *Real Life* (1978), XTC's *White Music* (1978) and Dukes of Stratosphere's *25 O'Clock* (1985), the Stone Roses' *The Stone Roses* (1989), Radiohead's *The Bends* (1995), Muse's *Origin of Symmetry* (2001) and The Levellers' *We the Collective* (2018).

24 Jimmy Page was originally credited as S. Flavius Mercurius for contractual reasons.

There is a lot to be said for accepting that we cannot truly know the truth, but we must rely on the most probable and plausible suggestion. Not only is data on the creativity inherently uncertain, it is primarily dependent upon the memories of people after the event, (and in some cases long after the event). After a period of time, data disappears into the hands of people with little, if any, connection with the actual original event. If we consider a copyright life of 50 years from the first release of a record, or 70 years after the death of the last major writer (in the case of songwriters), the nature and possible extent of the problem starts to become appreciable. As time goes by creators and their estates too, lose touch with their instinctive understanding of the collective input of their collaborators. Consequently, I feel, that there is a case for setting aside a proportion of revenue from any recording to be withheld as a fund to compensate for the inevitable accidents and inadvertent mistakes that accompany and frustrate attempts to capture and categorise unambiguously creativity.

The implications of these sort of ‘accidents’ were brought home to me when I was managing Billy Bragg²⁵, and we went in to see his royalty collection society to look at his account, as a matter of curiosity. When we inquired into the system, we were surprised to find that Billy was under suspension. As we investigated, we found that what the system had identified as the same title, had two separate entries with different ISRC identifier codes. This had sent the system into automatic action, concluding that this must be Billy’s fault (somehow), and he was put on suspension, (i.e. they stopped paying him). The matter remained unresolved until we happened to decide to look up the database. In contrast, some years before, when I was looking after Billy’s early career, working with him on his first album ‘Life’s a Riot’,²⁶ we were talking through his repertoire, and there was a stand out song called ‘A New England’.²⁷ It came out that the first two lines of this song Billy had borrowed from Paul Simon.²⁸ By then I knew a bit more about publishing and I remembered the Bob Dylan experience with Roy Harper, so I talked to Billy about the problems of authorship. I suggested to Billy that he should write personally to Paul Simon and tell him about his use of those two lines, and how he was a fan, and he should ask permission to use them. Paul was very gracious and OK’d the use personally to Billy and these became the opening lines of Billy’s most successful song. What this story illustrates is not only the rather fortuitous nature of so much of the music industry, but also how human relationships can often underpin good business. Paul Simon’s publisher may not have given permission for the use of the two lines.

25 Billy Bragg’s music blends elements of folk music, punk rock and protest songs, with lyrics that mostly span political or romantic themes. His music is heavily centred on bringing about change and involving the younger generation in activist causes. Source: Jackiewicz, Edward; Craine, James (2012). “Scales of Resistance: Billy Bragg and the Creation of Activist Spaces”. In Johansson, Ola; Bell, Thomas L. Sound, Society and the Geography of Popular Music. Farnham, England: Ashgate, Kenny, Michael (2014). The Politics of English Nationhood. Oxford University Press.

26 Life’s a Riot with Spy vs Spy is Billy Bragg’s first album, released in 1983. All songs on the original album consisted of Bragg singing to his electric guitar accompaniment. The original album played at 45 rpm rather than the more usual 33.3 rpm, contained only seven songs and lasted for only 15 minutes and 57 seconds. However, rather than being classified as an EP, it qualified for the UK albums chart and reached number 30 in January 1984. Source: British Hit Singles & Albums (19th ed.). 2006

27 “A New England” was released in 1983. It became a hit single when covered by Kirsty MacColl the next year, and remains a signature song. The opening lines of the song (“I was 21 years when I wrote this song/I’m 22 now, but I won’t be for long”) are identical to the opening lines of Paul Simon’s song “Leaves that Are Green”, which appears on Simon and Garfunkel’s 1966 album Sounds of Silence.

28 Paul Simon’s musical career has spanned seven decades, with his fame and commercial success beginning as half of the duo Simon & Garfunkel - (originally known as Tom & Jerry), formed in 1956 with Art Garfunkel. Simon was responsible for writing nearly all of the pair’s songs, including three that reached number one on the U.S. singles charts: Source - Bronson, Fred (2003). The Billboard Book of Number 1 Hits. Billboard Books.

The fundamental problem, as I see it, is a conflict between the legislative rights and benefits that appear to be granted to the creator, and the market conditions that enable those rights to become alienated from the creators. Copyright legislation, with its historic ethical and religious/moral underpinning has an uneasy relationship with contract law which is built upon economic principles. Regulatory or legislative gaps (some of which are widened by technological innovation) are often explored and exploited to further these economic principles. In my view, contract law should be secondary to the normative legal structures that society has developed to balance competing interests in the interests of ‘fairness’ and to stimulate and encourage creativity.

It’s worth reflecting that one of the most re-used recordings in the history of popular music, is a 20 second drum solo, from a 1970s James Brown record called ‘Funky Drummer’. Clyde Stubblefield’s drum break was sampled and used on countless Hip-hop and Electronic Dance tracks, which have grossed millions of dollars in revenue. Although Stubblefield was credited as a drummer on the original record, as an employed session musician he did not benefit from any royalties in respect of his performance. Nevertheless, despite being the most sampled drummer in history, Stubblefield received nothing from any of the content which exploited his improvised performance or its capture on a phonographic recording.²⁹ He died aged 73 after years of protracted health problems and was eulogised throughout the music industry for his unique talent and massive contribution. A benefactor³⁰ paid his outstanding \$93,000 health bill.³¹

“All the drum patterns I played with Brown were my own; he never told me how to play or what to play, I just played my own patterns, and the hip-hoppers and whatever, the people that used the material probably paid him, maybe. But we got nothing. I got none of it. It was all my drum product... People use my drum patterns on a lot of these songs. They never gave me credit, never paid me. It didn’t bug me or disturb me, but I think it’s disrespectful not to pay people for what they use.” (clyde Stubblefield 2015).

My own personal experiences, combined with that of many experienced artist managers who have also spoken to even more experienced managers and lawyers, has led to my involvement in recent development and growth of ‘label services’ deals between artists and labels /distributors. The deal that Billy Bragg (with my advice as his manager) developed with Cooking Vinyl³² was particular in this regard. In this agreement, the recordings belonged to Billy, and Cooking Vinyl provided services, particularly marketing, promotional, financial and distribution, both nationally and internationally. Importantly, the deal required both parties to agree on strategy, tactics and expenditure. This type of deal demanded responsible and co-operative behaviour on both sides. In short it was a partnership where the artist had control of their business and career, but recognised that this happened in collaboration with the distributor/investor. Billy made a creative investment and cooking vinyl provided business development services.

29 Sisario B. (2011), “Living Legend Tries to Make a Living”. The New York Times. Archived from the original on April 6, 2011.

30 According to Kreps (see below) Prince was the the benefactor who paid the health bill

31 Kreps D. (2017), Clyde Stubblefield, James Brown’s ‘Funky Drummer,’ Dead at 73 - Most sampled drummer in hip-hop history dies from kidney failure, Rolling Stone (Feb 18th 2017)

32 Cooking Vinyl is a UK independent record company, based in Acton, London. Founded in 1986 by former manager and booking agent Martin Goldschmidt and business partner Pete Lawrence. The company focusses on artist service based deals where the artist retains ownership of their copyrights - Label profiles: Four independents under the spotlight”. The Independent. 2006-05-23. Retrieved 2018-11-06, Hot Seat: Martin Goldschmidt – Founder, Cooking Vinyl”. The Music Network. 2013-12-06. Retrieved 2014-04-07

There is no doubt that this type of relationship depends on both parties taking administration, documentation and reporting processes seriously, and relies upon a practical data and communication framework that promotes, builds and underpins trust. This is expressed in the form of transparent reporting. However some difficult questions are raised with regards to structures which have to deal with an increasingly high volume of micro-transactions, such as, when is it no longer economically viable to administer payments? Can an avalanche of data and micro reporting really be called transparent?

In my experience, creators cannot find out how and under what terms their content has been used, or the terms and conditions under which others were working, in virtually identical situations. This is exacerbated by the use of Non Disclosure Agreements (NDAs) and Most Favoured Nation Clauses (MFNs) which can have exclusionary effects on rivals, new entrants and those pioneering 'different' business models.³³

Around 2010, I read about a proposal from the EU for some changes in copyright administration³⁴, which related to then current issues around digital content. Given, that changes in legal structures take at least ten years to work through the international legal forests³⁵, and a further five for implementation, it was better not to be constrained by current structures, but rather to think ahead in order to anticipate systems that may need to be in place to enable the creative content of 2025 to get through to the public and for the creators to have a chance of getting paid properly.

It became clear through discussions that data was the key to the digital future, but that this was also about a lot more than just allocating and distributing information and micro payments all around the world³⁶. (Attribution is a wide concept with a value that is not always directly linked to the payment process.) Technology can change not only the way that content is accessed and produced, but also the structure of the businesses, and the law, which inevitably needs to adjust to reflect the business changes and their societal impact. Music 2025 is probably not looking far enough ahead, but the pace of change across the industry is increasingly fast, so it is imperative that we start reflecting on these questions now.

33 Salop S., Scott Morton F., Developing an Administrable MFN Enforcement Policy, *Antitrust*, Vol. 27, No. 2, Spring 2013. © 2013 by the American Bar Association

34 The European Union's (EU) first attempt to unify copyrights in light of digital technologies was adopted in 2001 as the Copyright Directive 2001/29/EC – In 2010 The EU brought in the Audiovisual & Media Services Directive - In 2012, the European Commission (EC) announced that they would be reviewing the 2001 Directive and having stakeholder discussions in light of several issues raised with failed copyright proposals from those in the European Commissioner for Internal Market and Services position.

35 *Lenz Vs Universal Music Corp.* - is a decision by the United States Court of Appeals for the Ninth Circuit, affirming the ruling in 2008 of the US District Court for the Northern District of California, holding that copyright holders must consider fair use in good faith before issuing a takedown notice for content posted on the Internet. Stephanie Lenz posted on YouTube a home video of her child dancing to Prince's song "Let's Go Crazy". Universal Music Corporation (Universal) sent YouTube a takedown notice pursuant to the Digital Millennium Copyright Act (DMCA) claiming that Lenz's video violated their copyright in the "Let's Go Crazy" song. Lenz claimed fair use of the copyrighted material and sued Universal for misrepresentation of a DMCA claim. In a decision rejecting a motion to dismiss the misrepresentation claim, the district court held that Universal must consider fair use when filing a takedown notice, but noted that to prevail a plaintiff would need to show bad faith by a rights holder – [*Lenz v. Universal Music Corp.*, 801 F.3d 1126 (2015), (9th Cir. 2015), *Lenz v. Universal Music Corp.*, 572 F. Supp. 2d 1150 (N.D. Cal. 2008)]

36 Attribution versus payment.

Given the ambiguities attached to information concerning who actually performed on a recording, or wrote a song³⁷, attribution data needs to be able to be contested, queried and disputed. Data management, in my opinion, require that a trusted, regulated organisation oversee any policies, procedures and operations. System confidence, in my view, is inextricably linked to this exercise of governance. The future will be uncertain in many respects, and the socio-economic structures around creative content need to be flexible enough to be able to structure systems of investment that facilitate consumption/ use, as well as creator remuneration and reward. We should expect that accessing and stimulating creativity will be as important in 2025 as it is now, perhaps even more so.

I am immensely grateful for the opportunity to engage with my colleagues and peers across the music industry about these important topics, and I would like to thank everyone who has been involved in this project for their generous contributions. This research would not have happened without the ongoing help and support of David Humphries at UK IPO and the support of both John Mottram at PRS for Music and Matt Phipps Taylor at PPL who gave expert advice throughout the project, bringing a considerable wealth of experience and industry insight. Finally, I would especially like to praise the excellent work of the Music 2025 research team working out of Ulster University under Professor Frank Lyons, who diligently and bravely undertook the considerable and challenging task of investigating the issues of data and attribution across the music industry, and through tenacity, patience and hard work, have expertly and conscientiously produced this Music 2025 report. Many thanks to all. ...

Peter Jenner - January 2019

37 Soha M., MacDowell Z. (2016) Monetizing a Meme: YouTube, Content ID, and the Harlem Shake, *Social Media + Society* January-March 2016: 1 –12 © The Author(s) 2016 Reprints and permissions: sagepub.co.uk/journalsPermissions.nav DOI: 10.1177/2056305115623801 sms.sagepub.com – “This article analyses YouTube’s methods for monetizing UGC through their copyright Content ID system, explored through the colossal assemblage of creative energy that constituted the 2013 “Harlem Shake” meme. At its peak, the Harlem Shake meme was immensely popular and generative (with nearly 4,000 YouTube uploads per day). It only took about 40 days to reach 1 billion views on YouTube, half the time that it took for “Gangnam Style.” At the same time, the rights owners of the song that served as the musical accompaniment to all these amateur videos quickly realized the profit potential of the phenomenon and profited handsomely through the architectures of control provided by YouTube.” *Choreography -*

1. Executive summary

1.1 Context

The Intellectual Property framework is a crucial underpinning factor in the success of the UK's creative industries. It provides rights owners and holders with the tools to promote and distribute creative content to the public and to receive remuneration and attribution in return.

However, the advent of streaming and online distribution has posed a significant challenge for the management of repertoire and content attribution. This is due to unprecedented volumes of data being generated, divergent velocities across the data flow, exponential increases in the variety of data sources, a lack of confidence in the veracity of the information and difficulties with access. Additionally, inherited frameworks, which remain the backbone of the system, and which evolved to ensure that rights holders are effectively, efficiently and transparently remunerated, have increasingly been threatened by a range of competing, proprietary data protocols, introduced through disruptive innovation. Across the ecosystem as a whole, a divergence of standards has compounded problems. This multi-layered fragmentation of metadata and a preference for proprietary walled data silos, have inevitably undermined cross-system interoperability. These issues, and in particular their effects on the music industry, were pointed out in the Bazalgette Independent Review of the Creative Industries:

*'[W]hilst there has never been so much choice at all levels of the value chain, the growth in new streaming services and platforms, each with their own methods of managing data, means that there is a potential for error and conflict and a growing threat to an artist's ability to gain attribution and remuneration for their works. In order to develop the right environment for the market to create new and sustainable business models, we need data to be robust, reliable, transparent and accessible. In many parts of the Creative Industries, in particular the Music industry, this is not currently the case.'*³⁸

Data can be defined as a collection of facts such as numbers, words, measurements, observations that has been translated into a form that computers can process. It can also simply be information. In the music industry, this data, specifically clean data, is central to the function of any remuneration/reward system that is built upon content attribution.

The application of computers to solving complex business problems is well established however there is a move towards using mainstream artificial intelligence (AI)/machine learning (ML) techniques which is a big departure from previous practice as most business problems were solved by processing data with logic, not learning from the data itself via algorithms. Netflix recommendations are built on data, LinkedIn has 300 billion events in which data is used every 24 hours, Uber tracks data from rides and drivers to match them up and select the best journey. Machine Learning is the process of building a scientific model after discovering knowledge from a data set. It is the complex computation process

38 HM Government, 2018. Independent Review of the Creative Industries <https://www.gov.uk/government/publications/independent-review-of-the-creative-industries>

of automatic pattern recognition and intelligent decision making based on training sample data. Machine learning can therefore make use cases like this possible as it can make predictions based on patterns and the other factors it has been trained with, which can prove significant in the music industry for solving gaps in data when amalgamating various repositories of music data.

There are limitations however and these are for the most part due to computing power and the actual sophistication of the AI-driven algorithms. A computer can only solve problems it is programmed to solve and does not have any generalized analytical ability. For many that ultimately limits AI/ML. Specifically, the limitation which needs to be overcome is the degree to which data should be balanced such that ordinary machine-learning methods work well. The greatest advances at least in the near future will be due to Deep Learning (DL). Deep learning is already achieving excellent results in fields such as computer vision, automatic speech recognition, natural language processing and audio recognition where they have been shown to produce state-of-the-art results on various tasks. In the shorter term in the music industry, it could be applied in areas such as processing large volumes of merged music metadata and cleaning misappropriated data.

Despite industry practices that automatically match data and expose errors, inaccurate data from old catalogues, often resulting from a paper to digital transition, can require time-consuming manual reconciliation. The opacity and complexity of music data flow has created a perception in some parts of the creative community that unattributed income generated from digital music platforms is unfairly distributed to labels and publishers in proportion to their market share. This perception has created a lack of trust in some parts of the industry and could inadvertently dis-incentivise generating and maintaining accurate datasets. With the rise of digitisation and increasing demand for efficient and transparent music data transactions, music industry stakeholders have made efforts to resolve these problems, including attempts to develop a centralised registry (e.g. Global Repertoire Database), initiatives which promote the implementation of metadata standards and messaging protocols and legal interventions. As discussed in more detail in the main report, these efforts have had limited impact, creating a need for fresh approaches to address these continuing issues.

Music 2025 has sought to address these challenges by adopting a holistic view and aims to provide a comprehensive and in-depth exploration of the issues. Inspired by 'Social Shaping of Technology' [SST], which emphasises the contingency, complexity and intricacy of relationships involved in the innovation process, the team sought to explore relationships amongst heterogeneous forces and give voice to the blurred interaction between the many stakeholders in the music industry who have different interests and perspectives. Drawing upon the qualitative data analysis of interviews with over 50 music industry stakeholders, the Music 2025 team brought together a broad range of expertise from across the entire value chain, all of whom agreed that improvements in data capture, accessibility and management are key to future success.

Across the ecosystem, divergence of standards in existing datasets has led to matching problems and a multi-layered fragmentation of data which affects use by different entities. Despite various attempts to resolve the problems, there remain disparate levels

of information access across the industry that hinders efforts to resolve the fundamental problems of data integrity. Yet, the interviews evidenced a strong and growing consensus that a transparent and efficient data infrastructure is key to building a more sustainable music industry, with potential benefits more widely across the digital creative sector. The importance of resolving these issues was recognised in the UK Government's Creative Industries Sector Deal, 2018:

'(The Creative Sector Deal) seeks to safeguard copyright and address the transfer of value from the creative industries... We will continue to address the transfer of value from the creative industries and progress work on closing the value gap at the European and domestic levels'.³⁹

Commissioned by the UK Intellectual Property Office (IPO) and supported by a Project Board including the two national UK music collection societies, PRS for Music and PPL, the prime objective of this research is to highlight infrastructure issues that appear to hamper the fair and timely distribution of revenue from digital music platforms. This has been problematic for the music industry because of disconnections between the ways in which music can be created, disseminated and remunerated. A current paradox for digital music is how it ignores national borders, yet the existing licensing system is still built around disparate territory-specific national copyright norms leading to a multitude of divergent licensing schemes and regulations. Crucially, this research provided the opportunity for all stakeholders in the music industry to come together to look at how efficiencies can be made, how the data is managed, the veracity of that data and how it flows; these are all essential components of an effective IP framework.

39 Industry Strategy - Creative industries sector deal <http://www.thecreativeindustries.co.uk/media/462717/creative-industries-sector-deal-print.pdf>

1.2 Key findings

It is important to emphasise that the key findings presented here are those of the core research team, however they were informed by the various perspectives provided in interviews with industry stakeholders; we have outlined in this report what industry told us.

1.2.1 Urgency for change

The interviews evidenced a growing consensus that a transparent and efficient data management system is vital to realise the full potential of the digital music economy. They revealed that the industry is urgently seeking to unlock the full potential across the value chain and that this requires better data. The three main drivers for change discussed were:

1. exponential growth in data volume;
2. potential existential threats to incumbents and inherited systems;
3. economic imperatives which recognise that improved data quality benefits industry.

1.2.2 Issues with International Standard Recording Code (ISRC) and International Standard Musical Work Code (ISWC) identifiers

In music data management, two important standards were developed to identify digital music content: ISRC for sound recordings and ISWC for underlying works. Whilst these were developed to promote standardisation and interoperability, our findings conclude that there are significant issues in linking ISRC and ISWC identifier systems, including:

- insufficient understanding of the proper use of ISRC which is often compounded by inconsistent application of the guidelines of this standard, frequently leading to misuse and duplication;
- the inherent complex and dynamic nature of music publishing data, which is less readily available at the point of first release of a new recording. Several stakeholders, who find reconciling ISRC and ISWC a significant issue, have created their own internal linking solutions which have required substantial capital investment and manual processing.

Alternative solutions to these issues are emerging, including CMO-driven linking initiatives, a provisional ISWC initiative, International Standard Name Identifier (ISNI) adoption and recently announced changes in ISWC processes⁴⁰ which aim to speed up authors' societies' assignment of an ISWC code for use by digital service providers and publishers. CMOs' initiatives have in the past struggled with the lack of consistent application and technical disruption in the use of identifiers.⁴¹ The long-standing issue of ISRC/ISWC linking is still an important focus of activity and cause for complaint across the industry.

40 Paine, A., Feb 2019, CISAC to upgrade global music identifier system, Music Week <http://www.musicweek.com/publishing/read/cisac-to-upgrade-global-music-identifier-system/075189>

41 We understand from one interviewee however that in late 2018 the, US trade body, Recording Industry Association in America (RIAA) recommended its adoption

1.2.3 Data infrastructure

We heard evidence that data structures and practices developed for the analogue world are no longer appropriate to meet the demands of the digital streaming business environment. For example:

- some legacy datasets created in the analogue era with less emphasis on data integrity are incomplete;
- existing business practices including Non-Disclosure Agreements (NDAs) are obstacles to data transparency, and impair the ability to effectively and efficiently audit information across systems;
- some existing infrastructures still rely on paper-based transactions; reconciling the legacy data often requires significant financial and human resource involving time-consuming manual processes;
- opacity in the data flow together with inaccurate data creates a perception that a significant amount of income remains un-attributable;
- unattributed income distributed on a market share basis may reward poor reporting and inevitably impacts weaker or insufficiently informed stakeholders;
- many weaker, less informed stakeholders are often unregistered and remain unaware of their entitlement to potential remuneration.

Whilst acknowledging the UK CMOs' relative high standards of operation that are perceived as pillars of trust and confidence by a range of competing interests, there remain concerns about bureaucratic and archaic governance structures when looking at the CMO system as a whole. For example:

- on the publishing side, systemic complexity, increasing fragmentation of datasets and the relatively slow process of 'interested party' disambiguation are issues affecting the velocity of data;
- stringent processes, designed to ensure data privacy and security, have become part of the systemic friction involved in data processing;
- on the phonographic rights side, although CMOs collaborate to consolidate data processing (e.g. PPL back office services, SCAPR VRDB), they are not involved in monitoring data or collections on interactive streaming services, which makes it harder to implement a single collective solution to data issues;
- in the absence of a centralised ISRC reconciliation, frequent un-reconciled multiple versions increase complications when linking with other identifiers. A CMO's decision to lock down their data may, in time, make the CMO's role less relevant as they could be bypassed.

Duplication of work across the industry leads to:

- many organisations with their own systems operating in isolation;
- proliferation of databases across the licensing systems, most designed to meet internal and local needs and obligations;
- replication of effort, lack of efficiency and high cost.

1.2.4 The importance of data

The interviews indicated that a number of issues arise from a general lack of awareness of the importance of data. For example:

- historically, getting the (meta)data correct at a point close to content creation was rarely deemed a priority and there is a sense this can be significantly improved;
- the lack of a unified systematic infrastructure to embrace all of the different component parts of the value chain has compounded the data problem;
- the emergence of a DIY culture and increasingly diverse ways of creating, producing and distributing music have made it difficult to maintain rigorous data management standards;
- there is insufficient awareness and understanding of the incentives for good practice nor of the impact of bad practice;
- even with the education programs available across the industry, their limited remit and lack of homogeneity reduce their impact.

1.2.5 Politics and asymmetrical power relations

We heard from many stakeholders that:

- the failure of the GRD project showed that vested interests and asymmetrical negotiating power can impede efforts to improve data efficiency and integrity;
- what the entire recorded and music publishing industry needs is less to do with technological solutions and is more about improved industry-wide collaboration;
- politics driven by self-interest has hampered industry-wide collaboration and engendered a lack of trust.

1.2.6 Fragmentation and insufficient collaboration

We also heard from stakeholders that:

- the rapid growth in the volume and variety of data, discrepancies in the alignment and velocity of data flow and the increasing pace and sophistication of technological change have all exacerbated complexity in the management of data;
- the existing complex data management landscape depends on an interoperable and interconnected framework to function across the whole ecosystem;
- where there is a lack of collaboration, this has led to increasing fragmentation of datasets, along with increasing administration costs for data management and a duplication of data solutions built by individual organisations.

1.2.7 Appropriateness of governance

Many stakeholders argued that:

- the market-led approach has created hierarchy and friction, which are not suited to realise the full potential of the value in digital music;
- whilst continued support for the standardisation led by DDEX (Digital Data Exchange)⁴² is essential, this alone is not enough to solve the complex challenges of data management;
- there is a need for a mechanism to ensure all stakeholders work together better - without this many companies are looking for individual solutions to meet their own needs.

1.2.8 Creators' earnings on streaming platforms

We heard that a number of issues impact on creators' income from streaming platforms. For example:

- content creators themselves are not fully aware of the importance of (meta)data and data management;
- inaccurate data resulting from inefficiencies and opacity can lead to non-attribution with a common perception in parts of the creative community that a considerable part of the income generated from digital music platforms is unfairly distributed to labels and publishers in proportion to their market share;
- there are divergent views on the current application of the 'making available' and 'communication to the public' rights in respect of interactive streaming, with some organisations representing artists advocating change and others such as IFPI favouring the current interpretation;

⁴² a consortium of leading media companies, music licensing organisations, digital service providers and technical intermediaries, focused on the creation of digital supply chain standards

- reassessment of the legal definition of streaming seems desirable to ensure artists are reassured about the model. This is particularly relevant given the emergence of automated search and discovery systems and the impact that streaming is having on the next generation of music consumers who are increasingly turning away from traditional broadcast media.

1.3 Key recommendations

Following empirical analysis of the semi-structured interviews with stakeholders, a number of key recommendations for the industry to consider for future management of music data were developed, focusing on education, interoperability, governance and collaboration. These recommendations are detailed below:

1.3.1 Education

The lack of understanding about the importance of data is widespread across the industry from data entry specialists to creators.

Here we recommend that industry, academia and education providers should collaborate to develop, promote and deliver educational opportunities with accredited levels of proficiency around data management and that there should be:

(1) Accredited education programmes for data entry specialists

To ensure those who deal with industry identifiers have sufficient knowledge, we propose the development and delivery of education programmes with accredited levels of proficiency around data management for data entry specialists.

(2) Enhanced education programmes for creators

Specifically, to address the skills gap in the creative sector in respect of practical data management and digital rights, we propose the development of an industry-wide education programme specially designed for creators to increase their awareness of the importance of data.

1.3.2 Interoperability

Increased interoperability has been identified as a potential solution for improving data management and is inextricably linked to the standardisation of processes and to the will and ability of organisations to adhere to agreed practice while accommodating innovation.

Although standardisation promoted by DDEX is having a positive impact across a range of industry stakeholders, for increased interoperability a number of important issues still need to be addressed.

To this end we have a series of related recommendations:

1) Identifier use for uploaded content - no entity without identity

Upon upload to a digital platform, the content and contributor need to be represented by an authority regulated identifier. This is fundamental to the technical operation of an interoperable system and underpins automated processes of disambiguation empowering efficiency, reducing cost and enabling enriched experience through search and discovery. This unavoidably places a responsibility upon DSPs to become 'active' conduits of content, ensuring that legislative/regulatory frameworks and agreed systems of governance are adhered to.

It is recommended that all content uploaded to a commercial digital platform be identified and attributed using internationally recognised, publicly accessible, linked identifiers.

2) Links between identifiers

Although it is generally acknowledged that identifier linkage is critical to interoperability, commonly used identifiers, such as ISRC and ISWC have been constituted, developed and deployed as distinct, unrelated systems.

Proper linking of ISRC and ISWC is essential to ensure all parties involved in the value networks are properly remunerated. When matched with the associated metadata, the linked ISRC and ISWC becomes a valuable resource for rights compensation. Whilst diverse initiatives have attempted to tackle this problem, no comprehensive solution is readily available.

From this, it is recommended that mandatory procedures of ISRC assignment upon upload to a DSP should also include an ISWC assignment; i.e. no ISRC should be allocated without a linked ISWC.

3) Inter-connecting databases

Data silos are a pragmatic reality of the landscape when it comes to digital content.⁴³ The construction of a global database with defined rules of operation, to which all participants adhere, involves considerable commitment and resources and raises questions about ownership, access, cost and security which have failed to produce consensus. On a practical level, storage, access, ownership and structuring of a system which accommodates multiple data sources, needs a clear designation of responsibilities and obligations.

It is recommended that research into standardised processes and interoperable data gateway systems be prioritised for support and investment. The development of a registry focused upon the wider attribution of content contributors is also recommended as a subject of further research.

4) Standardisation

In building interoperability, stakeholders have been urged previously to consider four key infrastructure requirements to implement control mechanisms for the management of digital content:

- unique persistent identification;
- global resolution for identifiers;
- information management standards;
- Trusted Certification Authority services.⁴⁴

It is acknowledged that DDEX have already established a forum for technical discussions on standardisation and the implementation of these requirements. The practical implementation of small-scale targeted standardisation structures across the ecosystem using an accepted 'lingua-franca' and an agreed terminology around messaging could form the foundation of a flexible system that takes into account diverse operations. DDEX's role in setting data definitions, data exchange formats and choreographies (i.e. 'protocols'), and profiles for mandatory data sets for various types of transactions is important in this regard.

It is therefore recommended that funding for research be directed towards academic, governmental and industry partnerships appropriate for the management of data as a proprietary asset, acknowledging the status of data as a public good.

43 Ohlhorst, F.J., 2012. Big Data Analytics: Turning Big Data into Big Money., Hoboken: Wiley.

44 Hill, K., 1999. A perspective: the role of identifiers in managing and protecting intellectual property in the digital age. Proceedings of the IEEE, 87(7), pp.1228–1238.

1.3.3 Governance

Many stakeholders stressed that serious inefficiencies have resulted from a lack of system-wide data governance.

It is therefore recommended that a networked system of data governance, which takes into account requirements across the ecosystem, be the subject of adequately funded research and development; this should promote harmonisation of process, set infrastructure standards and implement rules of practice that facilitate collaboration amongst all parties in the value chain. It is further recommended that a working group be established as a priority to look at the issue of data governance across the industry as a priority.

Further research is required in this area, to determine the sort of system which may be appropriate in various territories. This should include perspectives from other industries, such as banking, telecommunications and internet domain names, who have encountered similar challenges dealing with digitisation and transformation as a result of technological change.

1.3.4 Collaboration

Many interviewees recognised that collaboration and improved communication are keys to efficient data management which could reduce administration costs and increase productivity across an interconnected system.

To inform any potential or future governance framework, it is recommended that bespoke fora are established to facilitate multi-layered collaboration and communication which engage a greater number and a wider range of stakeholders on a more frequent and regular basis than at present.

Acknowledgements

The study was instigated by Peter Jenner, (the original manager of Pink Floyd), whose passion and future thinking about the music industry persuaded the IPO, and in particular David Humphries, Head of Research, at the UK IPO, to develop this innovative research.

The team are deeply grateful for the support of the Project Board: Pippa Hall, IPO Director of Innovation and Chief Economist, John Mottram of PRS for Music and Matt Phipps-Taylor of PPL for their patience, support and constructive criticism.

Special thanks to Paul Jessop and those who peer reviewed for their generous contributions and insights. We would like to also acknowledge the support of Bendik Hofseth and Daniel Nordgård, along with the Kristiansand Summit, where many foundational concepts were debated and discussed under Chatham House Rules - this was an invaluable experience and is an example of the kind of open frank discussion which needs to be supported throughout the industry. Lastly, we would like to thank the Vienna Music Business Research Days conference, where the original Music 2025 manifesto was first presented in 2014.

Most importantly, this report would not have been possible without the support of the industry. The openness, willingness and insights the team gained from over 50 stakeholders from across the music and technology sectors have been the most critical part of this research. The research findings reflect what the industry told the team. We are deeply indebted to their generosity.

2. Research aims and design

2.1 Background

Digital technology has opened up unprecedented opportunities to manage data. In an ideal world, the automated process of registering and allowing access to worldwide musical works would help overcome the hurdles of geographical distance and reduce the costs involved in bargaining and negotiation. A one-stop database providing access to the metadata for diverse world catalogues would enhance the efficiency in rights clearance, help pre-empt illegal use and reduce administration costs. The ability to monitor digital music uses on a global scale could also improve the remuneration of all involved in the creative process.

However, the world the music industry currently operates in is far from ideal. The meteoric growth of data volume created via content streaming platforms poses a serious challenge to the existing management of music data. The issue is particularly contentious within the music industry, as there is a perceived disconnect between the way music is created and disseminated, and the current copyright regimes that underpin payment structures. Research has told us that a myriad of different licensing schemes and regulations render it difficult and expensive for prospective licensees to access music repertoire.⁴⁵ The divergence of standards in existing datasets has led to the multi-layered fragmentation of data. There have been numerous attempts to resolve these problems, ranging from legal interventions to development and investment in technical innovation. However, conflicting motivations are endemic to the landscape of influence, power and information amongst the diverse stakeholders that make up the music industry, and these have frustrated attempts to forge a meaningful solution in this highly complex and political area.

This Music 2025 research sought to bridge the gap between utopian ideals and moribund reality. The impetus for this research has come from the music industry's own recognition that transparent and efficient data management is a key component of a sustainable and successful digital music economy, with the potential to impact the wider digital creative content sector. Having been among the first industrial sectors to be significantly disrupted by digitisation,⁴⁶ the music industry has had to innovate and face up to new socio-economic realities.⁴⁷ Having been heavily criticised for its failure to evolve, it also could prove to be the phoenix of new paradigms.

45 Hargreaves, I., 2011. Digital opportunity: a review of intellectual property and growth: an independent report. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32563/jpreview-finalreport.pdf

46 Klein, B., Meier, L.M. and Powers, D., 2017. Selling out: Musicians, autonomy, and compromise in the digital age. *Popular Music and Society*, 40(2), pp.222-238.; Witt, S., 2015. *How music got free: The end of an industry, the turn of the century, and the patient zero of piracy*. Penguin.

47 Hesmondhalgh, D. and Meier, L.M., 2018. What the digitalisation of music tells us about capitalism, culture and the power of the information technology sector. *Information, Communication & Society*, 21(11), pp.1555-1570.; Kretschmer, M. and Erickson, K., 2018. How much do we know about notice-and-takedown? New study tracks YouTube removals. *Kluwer Copyright Blog*. <http://copyrightblog.kluweriplaw.com/2018/06/12/much-know-notice-takedown-new-study-tracks-youtube-removals/>

The research was commissioned by the UK Intellectual Property Office (IPO) and supported by a Project Board including the two key UK music collection societies, PRS for Music and PPL. It examines the complex data issues involved in digital music content, in order to improve efficiency and transparency and, as a result, remuneration and attribution for all those involved. The significance of this study is recognised in the UK Government's Industrial Strategy as part of the Creative Industries Sector Deal, launched in February 2018 by the Secretary of State for Business, Energy and Industrial Strategy (BEIS) and the Secretary of State for Digital, Culture, Media and Sport (DCMS). This highlighted the explosion of digital music data and commented that any delay in resolving issues of data management could further exacerbate the problem.

Music 2025 brought together a broad range of stakeholders from across the music industry and collected industry experts' lived-in, vigorous and most up-to-date views on this complex and often contentious issue. Our interdisciplinary team, with specialisms cutting across law, social science, technical architecture and music industry practice, developed a holistic approach, aiming to provide a comprehensive and in-depth exploration of the issues. We sought to capture the complex relationships amongst heterogeneous forces and give voice to the blurred interaction amongst stakeholders who often have different interests and perspectives.

As the first comprehensive documentation of these issues, Music 2025 will make a valuable contribution to the discourse, making the invisible visible and challenging the prevailing linear understanding of the subject.

2.2 Aims and objectives

The overarching objective of this research project was to accurately map, for the first time, current systems of music data management. More specifically, the team aimed to engage with as wide a range of music industry stakeholders as possible to examine the operation of existing systems in terms of complexity, contingency and ambiguity, in a way that reflected diversity of opinions across the value chain. Through analysis of qualitative data gathered from stakeholder responses in semi-structured interviews, we have identified key issues in current data management systems and processes and have offered pragmatic recommendations which we feel will facilitate realisation of the full potential of the digital music economy.

2.3 Theoretical approach

The underlying multidisciplinary approach embraced expertise from the creative industries, technology, social science, law, economics and management science. A key influence was ‘The Social Shaping of Technology’,⁴⁸ which sets the context for moving beyond ‘technological determinants’ by providing a comprehensive view of the context for technological development, enabling an understanding of uncertainty, contingency and complexity, as well as the negotiation of heterogeneous actors with different, often conflicting views. The key conceptual framework that guided the research was designed as a ‘socio-technical constellation of the digital recording industry’⁴⁹ which proposed that data, copyright, technology, and industry actors be investigated in two strands, which were termed ‘archaeology’ and ‘architecture’. Overarching concepts were drawn from liminality,⁵⁰ later adapted as ‘Tarzan Economics’.⁵¹ The law element relied on a range of sources but most significantly on Peter Baldwin’s 2014 book ‘The Copyright Wars’⁵² and Dennis Collopy’s 2008 paper ‘Barriers to Harmony’⁵³. The technological architecture research concept was also informed by the 2007 publication, ‘A Visual Musical Structural Analysis System for Browsing Music Interactively’ by Frank Lyons, Kevin Curran and Elaine Smyth. Research by Kevin Curran and Paul O’Hagan into dynamic registration for studio performers also contributed to the overall approach.

2.3.1 Social shaping of technology

The music industry has been extensively studied by legal scholars whose interest is mainly focused on the impact of the law on the market. Comprising a variety of actors, this industry has evolved around diverse factors related to technological, social, political and institutional settings. Innovations in music data management have been part of a complex and contested process that has been influenced by negotiated interactions amongst parties who exercise power and resistance and often have divergent motivations and vested interests. A comprehensive understanding of the issues around music data management, therefore, requires a more sophisticated approach than the prevailing linear approach that focuses primarily on the impact of the market.

48 MacKenzie, D.A., and J. Wajcman. 1985. *The Social Shaping of Technology: How the Refrigerator Got Its Hum*. Milton Keynes: Open University Press.; Williams, R. and Edge, D., 1996. *The social shaping of technology*. *Research policy*, 25(6), pp.865-899.

49 Sun, H., 2019. *Digital Revolution Tamed in the Recording Industry*. In *Digital Revolution Tamed* (pp. 257-286). Palgrave Macmillan, Cham.

50 A concept developed by anthropologists Arnold van Gennep and later Victor Turner that describes a transitional period or phase between one ‘rite’ and the new ‘rite’. Participants are said to ‘stand at the threshold’ between the old and the new.

51 Griffin, J., 2010 ‘Tarzan Economics’: If Music Is Free, How Do Artists Get Paid? Wharton Knowledge. <http://knowledge.wharton.upenn.edu/article/tarzan-economics-if-music-is-free-how-do-artists-get-paid/> and quoted by Silver, J.M., 2014. *Digital Medieval: The first twenty years of music on the web and the next twenty*. Xstorical Publications Media.

52 Baldwin, P., 2014. *The copyright wars: three centuries of trans-atlantic battle*. Princeton University Press.

53 Collopy, D., 2008. *Barriers to Harmony: Divergent approaches to copyright law and collective copyright management.* in: *Music and Intellectual Property*. BNA

'The Social Shaping of Technology (SST)'⁵⁴ sets the context for moving beyond the linear understanding of technological impacts. It was further developed to take 'a broad church' perspective to integrate other areas of research including economics, politics, history and cultural studies.⁵⁵ It is an approach suited to exploring complexity, uncertainty and contingencies that result from the wide array of actors, factors and networks.

2.3.2 Socio-technical constellation of music data management

Capturing this dynamic innovation process involved the development of a conceptual framework of 'socio-technical constellation of music data management'. This concept emphasises the multiplicity of heterogeneous connections amongst all those involved in networks.⁵⁶ This broader perspective allowed the observation of not just those players in close proximity but also those looser and dispersed constellations of the interactions on the fringes of the network.⁵⁷ The framework enabled the identification of four major factors that have influenced innovation in music data management: data, copyright, technology and industry actors.

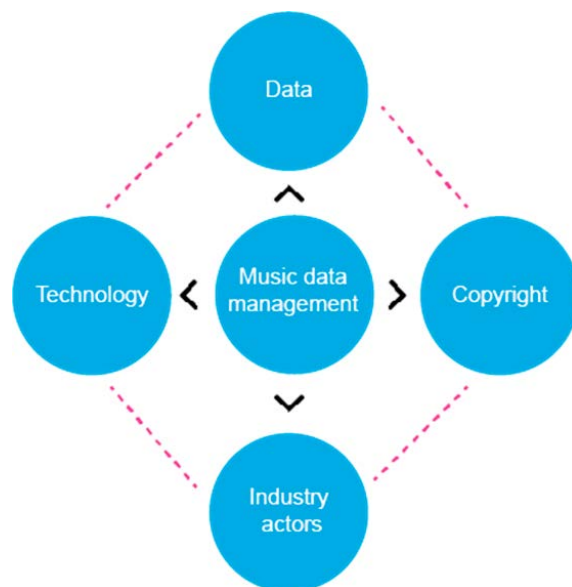


Figure 1. Socio-technical constellation of music data management

54 MacKenzie, D.A., and J. Wajcman. 1985

55 Williams, R. and Edge, D., 1996

56 Williams, R., Stewart, J. and Slack, R., 2005. Social learning in technological innovation: Experimenting with information and communication technologies. Edward Elgar Publishing.

57 Sun, H., 2019

For an analysis of the interactions amongst the industry actors, we drew upon a framework of ‘Digital Music Value Networks’,⁵⁸ which provides a useful tool to capture the complexity of the interactions amongst diverse forces and their interactions in the four major networks of creativity, reproduction, promotion/distribution, and consumption. These factors were investigated through the two strands of the underpinning approach: archaeology and architecture.

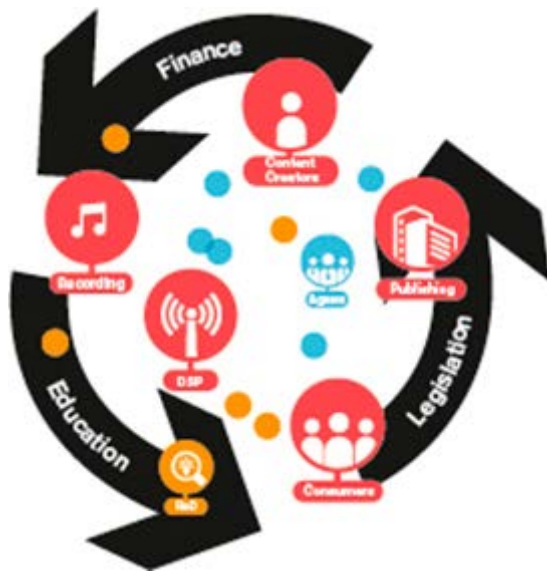


Figure 2. Digital Music Data Value Networks

⁵⁸ Sun, H., 2019. Developed from networks of musical economy in Leyshon, A., 2003. Scary monsters? Software formats, peer-to-peer networks, and the spectre of the gift. *Environment and Planning D: Society and Space*, 21(5), pp.533-558.

2.4 Research design

2.4.1 Qualitative research: interviews and data analysis

Interviews

1) Semi-structured interviews

The research drew upon an in-depth qualitative data analysis of over 50 interviews with a wide range of stakeholders from the music industry. The interviews, conducted between May and October 2018, were semi-structured, covering key questions relating to challenges and opportunities around data management: the measures taken to resolve the issues; how the interviewee foresaw the future and what was needed to improve data transparency and efficiency.

2) Interview questions

The research adopted loosely structured interviews to ensure flexibility in exploring questions the researcher regarded most appropriate and to provide opportunities to seek clarification. The approach allowed interviewees freedom to discuss points they perceived to be more important or relevant. In conjunction with the specific guidelines for the interviews that were core to the research design, questions were later customised for each interviewee.

Table 1. Guide to interview questions

Categories	Questions
Introduction / Personal Background	Introduction to the interview and the research purpose Tell me your background and responsibilities at your company
Company Profile and Experiences	A brief history of your company How did it start and how has it evolved? Experiences in relation to digital music data transaction What opportunities and challenges have you experienced in relation to digital music data transaction? What do you think are the biggest building blocks in digital music data transactions? What did the company take into account in addressing the problems? How have artists and managers been involved in the discussions? What data do you share and how comparable is it with other similar companies? [do you take this into account when setting up systems?] Would you be willing to share your data with the research team on a confidential basis?
Future	What do you think would be the best scenario and what do you think needs to be done to achieve it?

Data analysis

1) Qualitative data analysis

For qualitative data analysis, we employed an ‘interactive model’ where the entire process of data analysis, from collection, reduction, display and conclusion drawing and verifying, was reiterated.⁵⁹ By using the qualitative data analysis tool, NVivo, we coded transcribed interviews organised under key categories by similar and contrasting themes and patterns. The key categories include architecture, artists, change, CMOs, education, future, inefficiency, innovations, ISRC-ISWC, law, practices and previous attempts. The coding scheme was modified to take on board the full range of views on key themes. The analysis was further developed with the review of relevant literature. Quotes were extracted to highlight and represent the views aligned to the key categories. Informed by this analytical process, we structured the key findings as detailed in section 3.3.

2) Multiple viewpoints and triangulation

An imperative in our research was to capture the multiple ‘viewpoints’ that arose as a heuristic process in extended time and dispersed locations in a broad context.⁶⁰ The triangulation of these diverse viewpoints allowed us to provide a rich and deep understanding of the multitude of issues negotiated amongst a wide array of players in multiple locations across many networks.

3. Existing literature and key findings

3.1 Archaeology of music data - the industry context

The data challenges facing the recorded music and music publishing industries are the outcome of the progression and development of the two related but independent industries from their initially dispersed, disparate national roots in the 19th Century to the highly consolidated, competitive and globalised industries of the 21st Century. The current liminal phase for the content industries can be seen as the outcome of the transition from 20th Century ‘analogue’ norms to the emerging hegemony of digital culture. It is also about the changing dynamics and relationships between music publishers, record labels, recording artists, songwriters and composers along with the influence of copyright law, contractual norms and collective licensing practices.

⁵⁹ Miles, M.B. and Huberman, A.M., 1984. Drawing valid meaning from qualitative data: Toward a shared craft. *Educational researcher*, 13(5), pp.20-30.

⁶⁰ Pollock, N., and Williams, R. 2009. *Software and Organisations: The Biography of the Enterprise-Wide System—Or How SAP Conquered the World*, London: Routledge.; Hyysalo, S. 2010. *Health Technology Development and Use: From Practice-Bound Imagination to Evolving Impacts*, London: Routledge.; Williams, R. and Pollock, N., 2012. Research commentary—moving beyond the single site implementation study: how (and why) we should study the biography of packaged enterprise solutions. *Information Systems Research*, 23(1), pp.1-22.

3.1.1 Copyright law

The music industry according to Patrik Wikstrom⁶¹ is a copyright industry and this is evident in the way copyright law underpins the entire music industry from national and EU copyright statutes as well as various international treaties all of which underpin the international collection society structure, the agreements between creators and owners and the complex agreements between rights owners and users. Unfortunately, as Peter Baldwin⁶² describes, there have been conflicts over the past three centuries between the Anglo-American ‘copyright’ and the mainland European ‘authors rights’ systems. UK copyright law’s modern roots lay in the monopoly rights widely employed in the Tudor and Stuart era and then expanded by the 1662 *Licensing Act*. Even after the passage of the 1709 *Statute of Anne* it was not until the 19th Century that copyright became internationalised,⁶³ notably following the passage of *The Berne Convention*.

The early 20th Century saw the first legislative attempts to deal with the emerging new reproduction technologies (broadcasting, sound recordings, motion pictures), which led to the expansion of copyright term and the establishment of three key rights that provided the legislative basis for the modern music publishing and sound recording business. Aside from the 1976 US Copyright Act which finally brought the USA into line with international norms, a key development took place in the 1980s with two major court decisions⁶⁴ that affected the legal relationship between the creative content and technology industries in relation to non-commercial uses of recording devices. The later part of the century saw three further important developments, the first being the extension of the term of copyright for musical works to life plus 70 years in Europe and then in the USA in 1995/6, although sound recordings remained at the time at 50 years from publication. The second innovation was the 1996 EU Directive on rental, lending and neighbouring rights which provided featured artists and session performers with a legal right to receive ‘equitable remuneration’ across the EU. The third significant development, following the two 1996 WIPO treaties, was the passage of the 1998 US *Digital Millennium Copyright Act* (DMCA) that by 2012 had become the default copyright law for online uses of music.⁶⁵ By the turn of the millennium the DMCA norms were introduced internationally which, in the EU, took the form of the 2001 European Copyright Directive (Directive 2001/29/EC). This Directive was in turn adopted by the various EU national legislatures with the UK passing legislation in 2003.

61 Wikstrom P (2009) *The Music Industry: Music in the Cloud*. Polity Press (page 12)

62 Baldwin, P. 2014. p.14-52

63 Seville, C., 2006. *The internationalisation of copyright law: books, buccaneers and the black flag in the nineteenth century* (Vol. 8). Cambridge University Press.

64 *Universal Studios v Sony Betamax* (1984) and *CBS Songs v Amstrad* (1988)

65 Levin, R., 2011. *Free Ride How Digital Parasites Are Destroying the Culture Business, and How the Culture Business Can Fight Back*. New York: Anchor Books. p.15-16

3.1.2 The music publishing industry

The music publishers, as the pre-eminent gatekeepers of music in the 19th Century, were challenged in the early 20th Century by the emergence of the phonogram, film and broadcasting industries. Changes in copyright law (e.g. 1909 in the US and 1911 in the UK) enabled the publishers to move from a single source of income (printing) to several income streams from record sales, broadcasting, film fees and live performances, whilst embracing collective licensing to handle some of the new technologies, notably broadcasting.⁶⁶ The 20th Century music publishing industry involved tens of thousands of publishers and self-publishers but became dominated by the publishing affiliates of the major worldwide record distributors.⁶⁷ By 2002 the global music publishing industry⁶⁸ had grown to \$6 billion⁶⁹ and by 2014 its estimated value was near \$11.34 billion. However, the allocation of publisher revenues⁷⁰ shifted to a greater reliance on performing right revenues and other income such as synchronisation.

Over the past 30 years the impact of the pervasive transition from analogue to digital media, the boom in micro-computing and mobile technologies as well as the advent of the Internet profoundly impacted the music publishing sector, as evidenced by the fact that none of 1987's thirteen substantial UK publishers existed in the same form in 2012. Currently, the only international publishing companies are BMG Rights Management, Iagem (now Concorde), Downtown/Song Trust, Kobalt, Peer Music, Warner /Chappell, Universal Music Publishing Group and Sony/ATV, with the three leading companies (Sony/ATV, Universal and Warner/Chappell) having double rather than single-figure global market shares.

The current main challenge to the hegemony of the major publishers comes from BMG Rights Management and Kobalt. The latter's model of a global rights administration service rather than traditional rights ownership, emphasises service and transparency and reflects on-going disintermediation within the music publishing accounting chain, by eliminating the 'local' sub-publisher element through direct royalty collection from overseas CMOs. Such disintermediation may not stop at this, given Kobalt's willingness to also move into the collective licensing space by buying AMRA. In this highly competitive market most other 'significant' music publishers use a single Special Purpose Vehicle (SPV) for EU digital licensing, with the potential for expansion to global digital licensing vehicles, that could have ramifications for the existing national CMO system.

66 PRS and ASCAP were created in 1914. The French had already established their performing rights society, SACEM, in 1851 and Germany's GEMA was created initially as AFMA in 1903.

67 Read, M., 2000. *Major to Minor: The Rise and Fall of the Songwriter*. Sanctuary Publishing.

68 Hardy, P., 2013. *Music Publishing and how it works*. Omnibus Press

69 National Music Publishers Association (NMPA) report 2002

70 Phil Hardy (2013) *Music Publishing and how it works*. Omnibus Press

3.1.3 The recording industry

Beginning with Edison's invention of phonograph in 1877, followed by Emile Berliner's Gramophone in the following decade, from the 1920s, despite initial tensions in the USA between the recording and broadcasting industries, the record industry became symbiotically linked to the radio industry.⁷¹ New technological developments included magnetic tape and multi-track technology and these along with adoption of vinyl as a cheaper and more durable alternative, led to the Long Play (LP) format.⁷² Even with the emergence of an increasingly internationalised recording industry in the 1960s, and 1970s it was the unprecedented commercial success of Michael Jackson's 1983 *Thriller* video and its parent album that marked the beginning of the superstar economy.⁷³ The introduction of the Compact Disc (CD) in 1982 brought an unexpected economic boom to the recording industry, bringing new life to labels' back catalogues.

From the 1960s through to the 21st century, the recording industry experienced significant consolidation mainly involving the acquisition by larger companies of smaller labels. By 1999, the recorded music industry was controlled by the so-called 'Big Five' - Warner, EMI, Sony, BMG and Universal - whose oligopoly accounted for 70-80% of the global music sales⁷⁴ through vertically integrated economies of scale.⁷⁵

The CD sales boom led to digital disruption after the arrival of Napster,⁷⁶ as mass-scale distribution of free music disrupted the conventional economics of the recording business and led to the industry's, at times, fraught fight against piracy. Its efforts to replicate the CD-driven revenue peaks⁷⁷ were largely unsuccessful, until 2008's Spotify freemium streaming model finally brought a halt to the tidal wave of pirated music and the prospect of renewed growth.

3.1.4 Collective licensing and market analysis

Different IP regimes (Common and Civil code) have spawned different management regimes and structures in CMOs⁷⁸ that create variations of control and ownership in how copyright and authors' rights are managed that are significant for the music licensing system,⁷⁹ as is clearly evident in Page and Safir's findings below. The wide spectrum of control available within the global CMO system runs from the light-touch agency model to full 'rights owning' collection societies pre-eminent in mainland Europe. This means there is disparity in the powers and rights available to CMOs and a gulf between the North

-
- 71 Negus, K., 1992. *Producing pop: Culture and conflict in the popular music industry*. London: Arnold Publishing.
- 72 Coleman, M. 2004. *Playback: From the Victrola to MP3, 100 Years of Music, Machines, and Money*. New York: Da Capo Press.
- 73 Garofalo, R. 1999. From Music Publishing to MP3: Music and Industry in the Twentieth Century. *American Music: A Quarterly Journal Devoted to All Aspects of American Music and Music in America* 17 (3): 318–353.
- 74 Burnett, R. 1996. *The Global Jukebox: The International Music Industry*. London: Routledge.
- 75 Bakker, G. 2012. Adopting the Rights-Based Model: Music Multinationals and Local Music Industries Since 1945. *Popular Music History*, 6 (3): 307–343.
- 76 Witt, S., 2015. *How music got free: The end of an industry, the turn of the century, and the patient zero of piracy*. Penguin.
- 77 Sun, H., 2019.
- 78 Collopy, D., 2008.
- 79 Gervais, D., 2012. The Changing Role of Copyright Collectives (p. 6) in Gervais, D.J. ed., *Collective management of copyright and related rights* (pp. 264-265). Kluwer Law International.

American, UK, Australia (Common law) and the European and Latin American (Civil Code) collective licensing models, which affects digital licensing models. Most countries operate a single quasi-monopoly CMO, but the USA market is distinct in allowing four PROs⁸⁰ to operate in the market. There is a further distinct difference between the US and EU PROs in the rights granted to them by their writer members.⁸¹

CMOs' roles encompass licensing works on behalf their members, monitoring usages, collecting and distributing revenues from the works. CMOs mitigate high transaction costs by administering higher volumes of transactions⁸² through blanket licenses, acting as a central point of administration, offering cost-efficient access to a wide variety of catalogues for licensees and collecting and distributing royalties from the monitored uses of the works for creators which are generally too expensive to be done individually. Prior to digitisation, CMOs operated solely within national territories, administering domestic repertoire along with foreign repertoire, the latter via reciprocal agreements with foreign collecting societies, applying local copyright laws and setting national tariffs. Then interim PRS CEO Jeremy Fabinyi stated at the 2010 annual Midem conference, *“Collective licensing works best on a local basis, but the trans-national nature of digital music distribution and use has caused disruption.”*

In the EU, pan-European mechanical licensing in the 1980s and 1990s produced the first challenges, principally from the Anglo-American rights holders to the EU CMO structure. Even so, it was thought essential to maintain the established inter-CMO structure for digital licensing, but this structure was then challenged by the European Commission (EC) who objected to the first inter-society, Santiago, agreement on competition grounds. The EC's desire to end the typical CMO bilateral agreements and the use of MFN⁸³ provisions led to the 2005 Recommendation that enabled rights holders to remove their rights from most local European CMOs. Whilst intended to improve the efficiency of the burgeoning digital single market, it had the contrary effect leading to even greater fragmentation and uncertainty because of the formation of SPVs for the major corporate and independent international publishers. This led to the current digital licensing hub system to resolve those uncertainties and the creation of ICE (PRS, STIM, GEMA) and Armonia (SACEM, SGAE, SIAE). The outcome of these changes, some argue, is that increased competition has led to more bureaucracy and inefficient administration.⁸⁴ Others claim clearing multiple rights across multiple territories with different legal regulations could undermine CMOs' governance framework.⁸⁵ Particular concerns have been raised over the increased repertoire fragmentation resulting from competition.⁸⁶

80 ASCAP, SESAC, BMI and GMR

81 Kohn, A. and Kohn, B., 2002. Kohn on music licensing. Bob Kohn.

82 Besen, S.M., Kirby, S.N. and Salop, S.C., 1992. An economic analysis of copyright collectives. *Virginia Law Review*, pp.383-411.; Towse, R. and Handke, C., 2007, July. Regulating copyright collecting societies: current policy in Europe. In *Society for Economic Research on Copyright Issues (SERCI) annual congress*, Humboldt-Universität zu Berlin/Centre for British Studies. p. 12-13.

83 Most favoured nations – a common bargaining tool in negotiations. Designed to secure equal treatment with another 3rd party on terms agreed

84 Day, B.R., 2011. In defense of copyright: Creativity, record labels, and the future of music. *Seton Hall Journal of Sports and Entertainment Law*, 21(1); Conley, N., 2007. The Future of Licensing Music Online: The Role of Collective Rights Organizations and the Effect of Territoriality. *J. Marshall J. Computer & Info. L.*, 25, p.409.

85 Ghafele, R. & Gibert, B., 2011. Counting the Costs of Collective Rights Management of Music Copyright in Europe. IDEAS Working Paper Series from RePEc.

86 Gervais, D. and Maurushat, A., 2003. Fragmented Copyright, Fragmented Management: Proposals to Defrag Copyright Management. *Canadian Journal of Law and Technology*, 2(1).

Will Page and David Safir's 2017 SERCI⁸⁷ conference paper⁸⁸ addresses the state of the market post the EC's 2005 intervention in describing the current maze of rights involved in digital music licensing in the EU. They describe "*distorted, diverted, delayed and diluted*" revenues for creators as well as asymmetry between the creators and DSPs caused by the complex web of intermediaries whose transaction costs impact the efficient licensing and payment for the use of musical works in the digital sphere. The authors claim the pathway for licensing of the master recording rights is easy to see when compared to the "*snakes and ladders*" of the authors' rights licensing system. The main cause of the maze of rights is the requirement to "*do the splits*" between mechanical and performing rights and involves various approaches across the different CMOs with their divergent policies and processes across licensing and collection, documentation of works and recordings (insufficient authenticated metadata), reporting and invoicing (sharing accountability and responsibility),⁸⁹ allocation and distribution (what's mine is mine and what's yours is mine too).⁹⁰ They also argue the expectation of lower transaction costs in e-commerce has not been realised in the music publishing sector as the headline administration costs have increased from 7% (for licensing a CD) to 14% for licensing a stream. Using a 2016 CISAC chart of the 29 different EU CMOs⁹¹ they examined how the CMO distribution rules split revenue from the four key types of digital exploitation identifying as many as 11,513 possible splits by country, right and format across the EU. They conclude that "*Digital exploitation (is) characterized by non-exclusive assignment, multi-territorial licensing, inadequate metadata, increased disintermediation*" and argue that "*in this confusing environment, a new approach is both essential and urgent*".

Unlike other IP rights, copyright law allows for almost limitless divisibility of ownership, which contributes significantly to increasing complexity in the licensing of music,⁹² due to fragmentation as well as "*the lack of cohesion, standardization and, to a certain extent, effective organisation of both copyright law and collective management per se*".⁹³ This fragmentation of copyright takes place on many different levels: covering rights stemming from national laws, that recognise several economic rights (reproduction, communication to the public, adaptation, rental etc); within market structures; within licensing practices; within a repertory of works; within different markets (including language and territory); and through interoperable rights clearance systems.

The complexity of the rights involved in the online communication of a sound recording of a performance of a protected musical work is magnified by the different rights holders involved (songwriters, publishers, performers and producers) operating in each territory of reception and of emission. Efforts to resolve this complexity included the 2001 Santiago Agreement which aimed to allow a single collective to grant a worldwide license on

87 Society for Economic Research on Copyright Issues

88 Page, W. and Safir, D. 2017. The Causes and Consequences of allocating revenue between Mechanical and Performing Rights. The Society for Economic Research on Copyright Issues. http://serci.org/congress_documents/2017/Page%20and%20Safir2.pdf

89 They highlight the 'opaque' process and 'tortuous, prolonged and even impenetrable' route from license fees to royalties in those countries where CMO's distribute and account mechanical royalties through the publishers

90 This refers to the minimum use rule, sampling rather than census analysis of distributions and the effect of the divergent allocation of revenues to mechanical and performing rights

91 CIS16-1059, 2016-11-03 European rights splits 2016 (November update)

92 Gervais, D.2012

93 Ibid. .12

behalf of the other participants especially in relation to communication to the public.⁹⁴ It is evident the EC's decision to oppose this solution aimed at improving licensing had certain unintended consequences that have further increased fragmentation.

Fragmentation is also a consequence of recent mergers and acquisitions, which have been a feature of the recorded and music publishing industries across the 20th Century; the 1980s and early 1990s saw another consolidation wave spurred on by the enormous profits from the CD boom, that led to the turn of the millennium oligopoly of major labels. The early 21st Century saw further consolidation across both recorded labels and music publishing, creating the modern triopoly of Universal Music Group, Sony Music Entertainment and Warner Music Group. However, certain recent corporate acquisitions required disposals of some of the acquired company's assets to competitors, an EC competition inspired divestment programme that led to further fragmentation of repertoire which may explain some data integrity and veracity issues within the labels and the music publishers.

3.1.5 Cultural economics

The relationship between creators and the main cultural intermediaries, record labels and music publishers has long been conflicted⁹⁵ because the contracts⁹⁶ were usually skewed in favour of the intermediary, apart from a select number of 'superstars' with superior bargaining power and leverage.⁹⁷ This imbalance appears to be the root problem for creator remuneration⁹⁸ and is evident in recent debates on streaming royalties. A common perception is that, even as digital music revenues are on the increase, distributions to artists are not perceived as fair.⁹⁹ The widespread use of NDAs is also linked to a lack of transparency that hampers efforts to improve remuneration.¹⁰⁰

Some also claim there are issues in how the making available right relates to streaming, given neither the traditional broadcasting right, nor the making available right properly define streaming, thus creating a 'legal limbo'.¹⁰¹ Streaming requires a different interpretation of the reproduction right, long integral to the copyright system.¹⁰² Even

94 Ibid. p.13-14

95 Peacock, A.T. and Weir, R., 1975. The composer in the market place. Faber. p.42

96 Caves, R.E., 2000. Creative industries: Contracts between art and commerce. Harvard University Press.

97 Towse, R., 2001. Creativity, incentive, and reward an economic analysis of copyright and culture in the information age, Cheltenham, U.K.; Northampton, Mass.: Edward Elgar. Kretschmer, M., 2005. Artists' earnings and copyright: A review of British and German music industry data in the context of digital technologies. First Monday, 10(1).

98 Cummings, A.S., 2010. From monopoly to intellectual property: Music piracy and the remaking of American copyright, 1909–1971. The Journal of American History, 97(3), pp.659-681.

99 Tschmuck, P., 2015. Music Streaming Revisited—The Problem of Income Distribution. Music Business Research. <https://musicbusinessresearch.wordpress.com/2015/07/18/music-streaming-revisited-the-problem-of-income-distribution/>

100 Hirschhorn, J., 2015. Less money, mo' music & lots of problems: A look at the music biz. LinkedIn Pulse.; Rethink Music., 2015. Fair music: Transparency and payment flows in the music industry. Berklee Institute of Creative Entrepreneurship. p.5.; Lalonde, P.É., 2014. Study concerning fair compensation for music creators in the digital age. CIAM, International Council of Creators of Music. Nashville, USA, 22(10), pp.2014-23.; Cooke, C., 2015. Dissecting the digital dollar part one. In The Music Managers Forum, London.

101 Borghi, M., 2011. Chasing copyright infringement in the streaming landscape. International Review of Intellectual Property and Competition Law, 42(3); McGugan, F., 2015. Making Available, Communication to the Public & User Interactivity. <https://www.musicstank.co.uk/resources/reports/making-available-communicationto-the-public-user-interactivity> accessed, 24, pp.04-16. The making available right is exercised differently in different regions, creating deep disparity of rules under cross-border situations.

102 Miller, E. and Feigenbaum, J., 2001, November. Taking the copy out of copyright. In ACM Workshop on

though access clearly involves a transient reproduction element, it is arguable whether reproduction should be the key legal determinant of a stream. The other key element is communication to the public, which in turn involves two distinct rights; the ‘broadcasting’ right and the ‘making available’ right. These are subject to different legal frameworks with different protections for rights holders, which lead to divergent treatment across the music publishing and sound recording sectors.

The making available right enables authors as well as performers and producers to have the exclusive right to make the work available to the public, whereas the broadcasting right allows performers just a right to equitable remuneration. In relation to the broadcast of sound recordings, in the UK it is only the owner of the copyright in the sound recording that can exercise their rights. In this framework, performers are entitled to equitable remuneration for the public performance or broadcasting of recordings of their performances.

On the making available right, all users need consent directly from the performers but in practice, most performers assign their exclusive rights to the record labels through their recording contracts, leaving just a few featured performers able to negotiate the making available right royalty rates. This means most legacy performers are unable to receive significant financial benefits from streaming as their record labels currently pay the same 10-20% rate they used to apply to physical record sales,¹⁰³ rather than the 50% rate the performers would expect to receive for a broadcast royalty.

3.1.6 Data management initiatives

Music data has always been time-consuming and expensive to obtain, verify and manage, which meant the distribution of revenue often required collecting societies’ ‘discretion’.¹⁰⁴ The two sides of the industry developed industry identifiers to improve the exchange of accurate data; an International Standard Work Code (ISWC) for the underlying musical works and an International Standard Recording Code (ISRC) for sound recordings. However, combining the data between the two codes into a single authoritative database has not yet been possible. Two attempts to resolve this include the Global Repertoire Database (GRD) and the new US database envisaged as part of the Music Modernization Act (MMA).

From 2008 various stakeholders began to collaborate at the behest of the EC¹⁰⁵ on creating a central, authoritative database, the GRD, to help streamline online music licensing. Despite the broad range of participants and very substantial funding, the project was abandoned in July 2014.

The MMA is an overdue outcome of the US industry’s recognition that the existing highly regulated and fragmented licensing system especially for mechanical rights (but also, with four PROs, performing rights) conflicts with the needs of the oligopsony of digital service

103 Digital Rights Management, pp. 233-244. Springer, Berlin, Heidelberg.
Osborne, R., 2017. Is Equitable Remuneration Equitable? Performers’ Rights in the UK. *Popular Music and Society*, 40(5), pp.573-591.

104 Parker, N., 2004. *Music business: Infrastructure, practice, and law*. Sweet & Maxwell. p.199

105 EC Commissioner Nellie Kroes in September 2008 <https://www.prformusic.com/press/2010/global-repertoire-database-working-group>

providers and the oligopoly of content owners and providers. The MMA's road map, among several other innovations, ameliorates certain dysfunctional aspects of the digital supply chain in the US by reforming the mechanical licensing system through introducing a single point blanket licensing structure, amending compulsory licensing to allow introduction of a 'willing seller- willing buyer' rate standard as well as establishing the Mechanical Licensing Collective (MLC). Building an authoritative and comprehensive database is a prerequisite for the MLC to be able to function.

3.2 Architecture for music data management

3.2.1 Introduction

In software development the term architecture is used to emphasise ideas of 'codification, abstraction, standards and style'¹⁰⁶. This is also an acknowledgement of the existence of formal training networks which exist as a framework for:

- establishing and satisfying system requirements;
- technical design and implementation;
- cost estimation and process management;
- effective and efficient reuse/reapplication;
- dependency and consistency analysis.¹⁰⁷

Architecture, in a music industry sense, can describe the business models and systems that have evolved to acquire, represent, manage and exploit exclusive rights on repertoire. Hence, record labels and publishers seeking the assignment of rights from authors/composers enact a structure which is replicated systemically. The application of technology is not then a neutral process. It engages, interacts, resists and/or supports the frameworks which have evolved historically, socially and politically.¹⁰⁸ As a working out of the 'Socio-technical Constellation' methodology, architecture becomes a way of 'housing' foundational ideas, which can be unearthed and brought to light through archaeology. As an approach, architectural analysis seeks to map the way in which inherited frameworks are constructed by conspicuous and sometimes inconspicuous agents. As far as possible our approach has been:

- topographical - a mapping and interpretation of models, conduits, flows and barriers;
- dynamic - an ongoing appraisal of objectives, contingencies, problem solving, resistances and their effects;

106 Perry D.E. & Wolf A.L., 1992. Foundations for the study of software architecture, ACM SIGSOFT Software Engineering Notes Homepage Archive, 17(4) pp:40-

107 Ibid 52 ACM New York, NY, USA DOI>10.1145/141874.141884

108 Feenberg A. 1999. Questioning Technology, Routledge; 1 edition

- economic - an analysis of commercial imperatives, (dis)incentives, risk and reward structures and zero sum/collaborative games;
- organisational - an observation of the structures, frameworks, hierarchies, divisions and allegiances as they emerge, take form and are dissolved/disrupted;

and has:

- acknowledged that the key to understanding the way in which the data architecture of the music industry is constructed, is to appreciate the importance of attribution and identification;
- accepted that ‘Judgements of identity and recognition lie at the heart of infringement issues in intellectual property.’¹⁰⁹

3.2.2 Topographical modelling

Music industry discourse has tended to frame itself around particular business interests relating to the ownership of rights and the exploitation of intellectual property. This has developed and evolved as a result of legislative responses and technological interventions which incumbents often perceived as challenges to their business models. In the 20th Century, the music industry coalesced around two initially opposing but ultimately inter-related sectors; music publishing and the phonographic industry. Within the music publishing sector, societies representing authors, composers and publishers were authorised to collect license revenue from those who used music commercially and to distribute this accordingly. Similarly, once related rights were established for producers and performers on sound recordings, parallel societies emerged which collected license revenue for the phonographic industry.¹¹⁰ Historically, collecting societies mirrored the division of the industry, representing the separate but related interests of the publishing sector and the recording sector. This ‘binary’ model allowed the music industry to define itself upon a specific axis and promoted a framework that legitimised a discourse around what were believed to be firm points of reference. Constructed on the basis of linked rights, this binary model dictated the analysis of data operations and reporting structures, which were focused upon the content/repertoire held or owned by these interests.



Figure 3: Label/Publisher Binary Model

¹⁰⁹ Drahos P. 2016. 'A Philosophy of Intellectual Property', Taylor & Francis

¹¹⁰ It should be noted that it has only been a very recent development that these separate collection systems have been amalgamated (see PRS/PPL joint licensing- <https://pplprs.co.uk>)

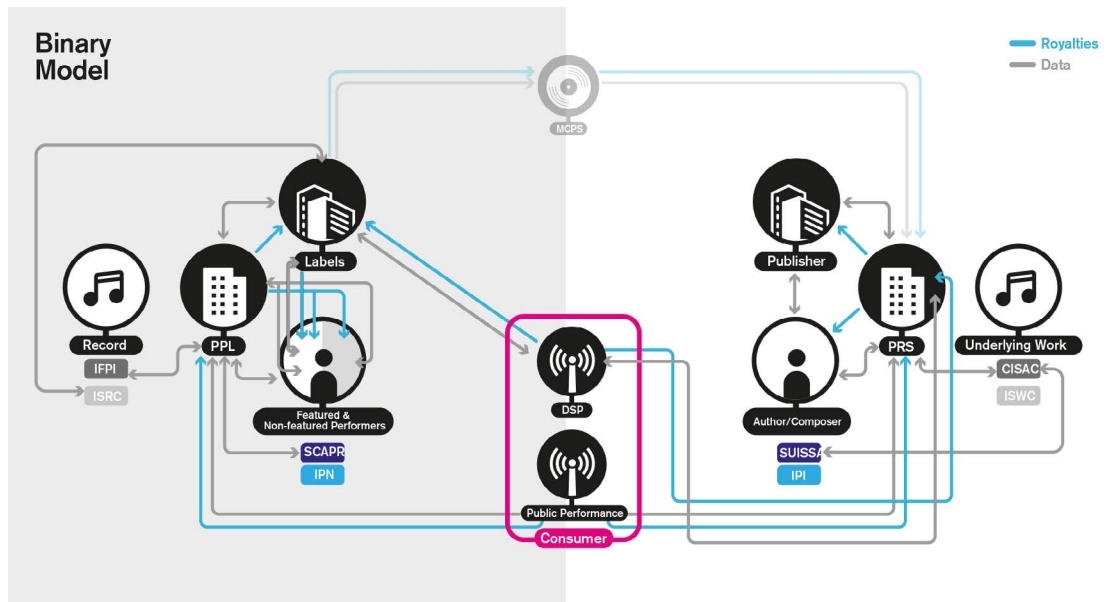


Figure 4: Music industry data binary model

The legislative ‘correction’ that ushered in equitable remuneration created in its wake a new kind of collecting society which specifically represented the performers on a phonographic recording. This was to address problems with regard to the distribution of the performers’ share of collected revenue in respect of related/neighbouring rights. Performers were encouraged to join these new societies and to make claims for payment. This presented a significant challenge because contribution data had not been a priority for the record labels and so there was a dearth of authoritative information regarding attribution. The establishment of a designated directory of performer IDs (International Performer Database), managed by an authority body (SCAPR) was therefore a significant intervention. In the UK, performer CMOs were not given the right to collect from venues directly but relied on the distribution of revenue collected nationally by the previously established record label owned society.

The performers themselves are not a homogenous group. Some are ‘featured’ artists who are contractually involved with record labels while others are ‘non-featured’/‘session’ contributors who generally operate on a freelance basis. Moreover, some of these performers may also be writers who have publishing relationships. It could be argued that these differences in categorisation simply reflect the operational practices of the incumbent label/publisher binary mentioned previously.

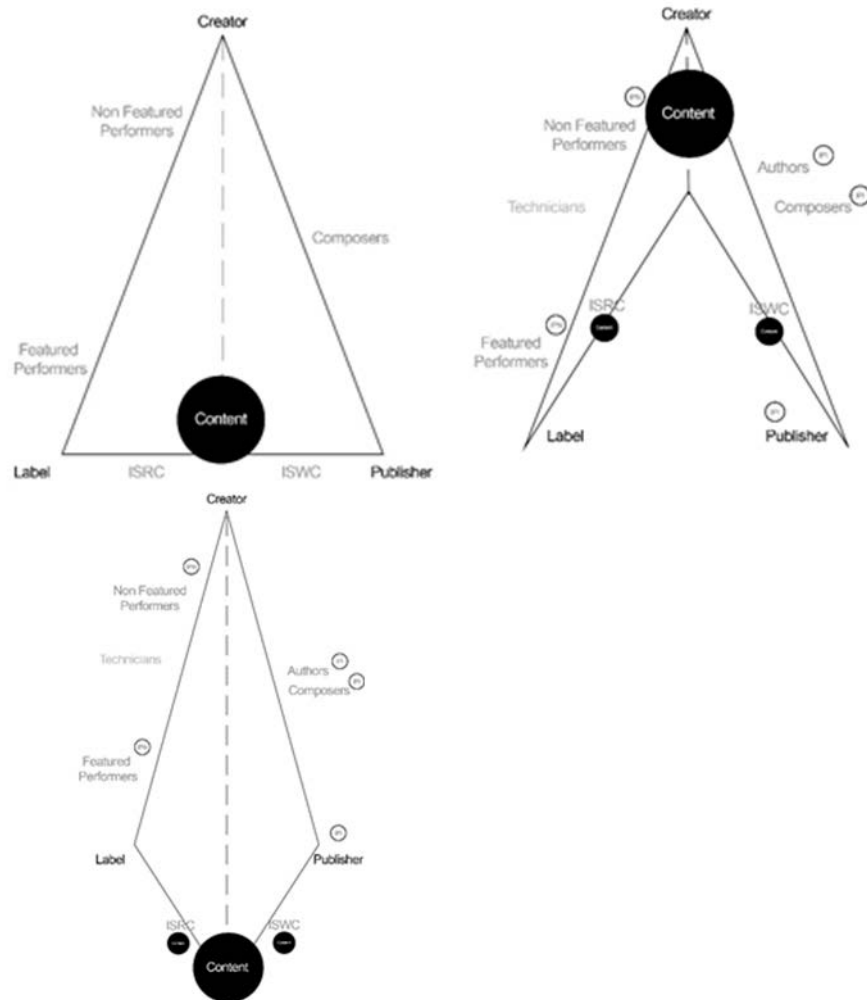


Figure 5: Triangular relationship structure

However as content creators/music makers, these actors have shared interests with regard to rights, payments and working practices which have emerged through the advocacy of representative groups such as the Musicians Union (MU), Featured Artists Coalition (FAC), British Academy of Songwriters, Composers and Authors (BASCA) now known as the Ivors Academy, and related sector bodies such as The Music Managers Forum (MMF) and The Music Producers Guild (MPG). Acknowledgement and understanding of shared interest coalesced into the formation in 2018 of The UK Council of Music Makers, which acts as an umbrella for organisations with a distinct creator-focused agenda. The assertion of a defined creator sector constitutes an interjection into received industry discourse, posing a ternary relationship which challenges prevailing binary notions about the operation of the music industry, intentionally drawing attention to the divisive nature of the inherited contractual frameworks. New relationships are also discernible in the emergence and assertion of new business models which acknowledge the artists' desire to retain ownership of their copyright and eschew the assignment of their rights under the terms of what are often presented as 'standard' record or publishing contracts built upon concepts such as 'recoupable' advances.

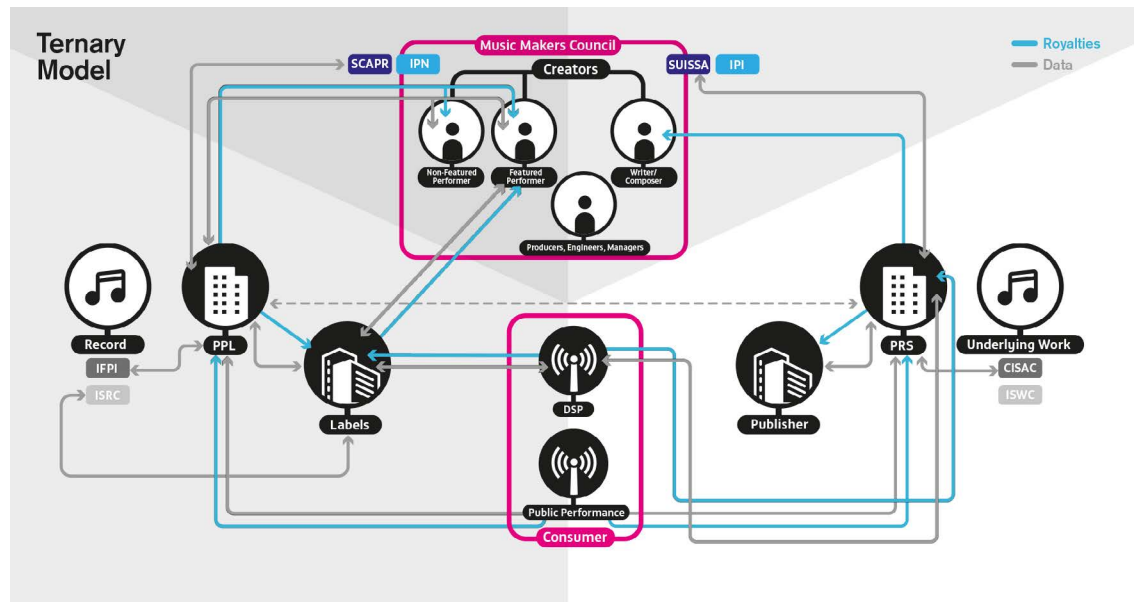


Figure 6: Music industry data ternary model

The technological innovation of the World Wide Web in parallel with the widespread adoption of the MP3 digital file allowed digital service providers to develop platforms which have challenged the systems of content distribution. With unprecedented levels of responsibility being devolved to them, Digital Service Providers (DSPs) have emerged as a fourth pillar of the industry and now negotiate licensing deals with publishers, record labels and creators directly and/or through collecting societies. This fourfold (quaternary) model has been fraught with competing and conflicting interests, as creators, rights holders and DSPs negotiate control over content.

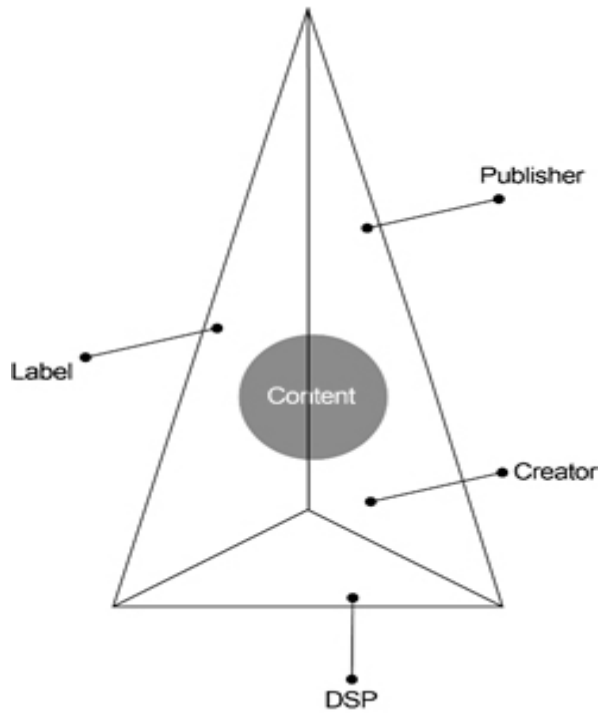


Figure 7: Pyramid relationship structure

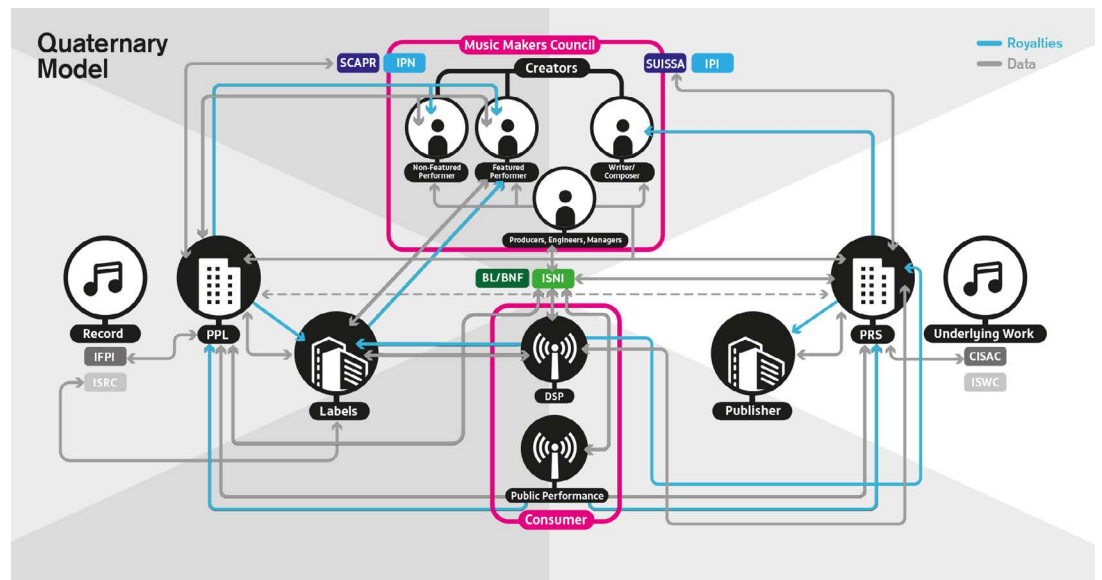


Figure 8: Music industry data quaternary model

The complex and dynamic negotiations which continue to frame the relationships between these pillars has resulted in the authority of systems and operational frameworks, inherited from the pre-digital era, being challenged and limitations being presented as opportunities for commercial exploitation. For example:

- digitisation has facilitated user upload and sharing of digital content. This has been enabled and promoted by social media with an emphasis on no fee for access;
- national structures for the collection of fees from venues and broadcasters for music use have operated as membership organisations when it comes to distribution of funds;
- direct upload to DSPs has emboldened and promoted independent/self-release of content while emphasising models of revenue linked to advertising.

This has given rise to a multiplicity of fragmented allegiances which have altered the competitive landscape allowing the entry of disruptive agencies. These have often sought to capitalise on the opportunities and threats brought about by the discrepancy between technological innovation and legislative or regulatory responses (law lag) to:

- create layers of interaction and combined services which depend upon inherited/established structures, but which present themselves as innovative or new;
- introduce new disruptive services which exploit loose or light touch regulation and the lack of information/awareness of normative operations/requirements around content rights;
- benefit from a competitive landscape which breaks up natural monopolies while still observing a symbiotic relationship with the structures that support these.

Typically, agents offer services promoted as introducing increases in cost efficiency, speed of delivery and the use of new technology. These agents, engaged in problem seeking/solving behaviour to attract investment for their products and services, can magnify fractures and anomalies inherent within the system, which they often characterise as symptoms of a paradigm shift, even when any technologically-driven innovation in business and enterprise is, in effect being 'tamed' by their operation/intervention.

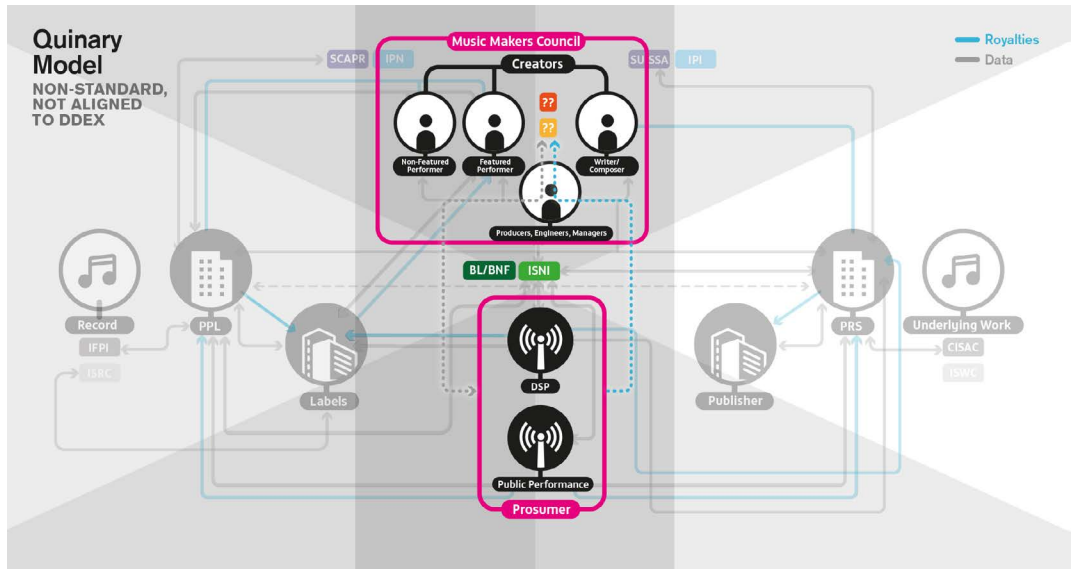


Figure 9: Music industry data quinary model

The impact of disruption and the conditions of flux and resistance that characterise the initiatives and interventions enacted through multiple agents has warranted acknowledgement in the form of a Quinary model. These dynamic interventions introduce pivot points and contortions into the established framework so that inherited static models become distorted, challenged by the activities of the disruptive agents. Driven by venture capital, many agents have sought to build businesses around problem-solving activities, particularly where the existing data frameworks have been challenged by digitisation. These companies are incentivised to locate and maximise the opportunities afforded by system fragmentation, a process that, arguably, they contribute to and exacerbate.



Figure 10: Irregular relationship structure

This disruption across the system has necessarily given rise to a counter impulse which has sought to stabilise the existing and inherited framework. This resistance can (in keeping with our topography) be posited as a Senary model, construed as a push towards the standardisation of system processes and protocols. In organisational terms this should be a body whose role is the promotion of system interoperability and practical responses as an agnostic agent to a range of divergent and often competing interests. (De)centralised procedures and policies must interconnect and be interoperable if the ecosystem is to have functionality. In practice, this means messaging protocols and reporting structures that can accommodate a wide range of business models.

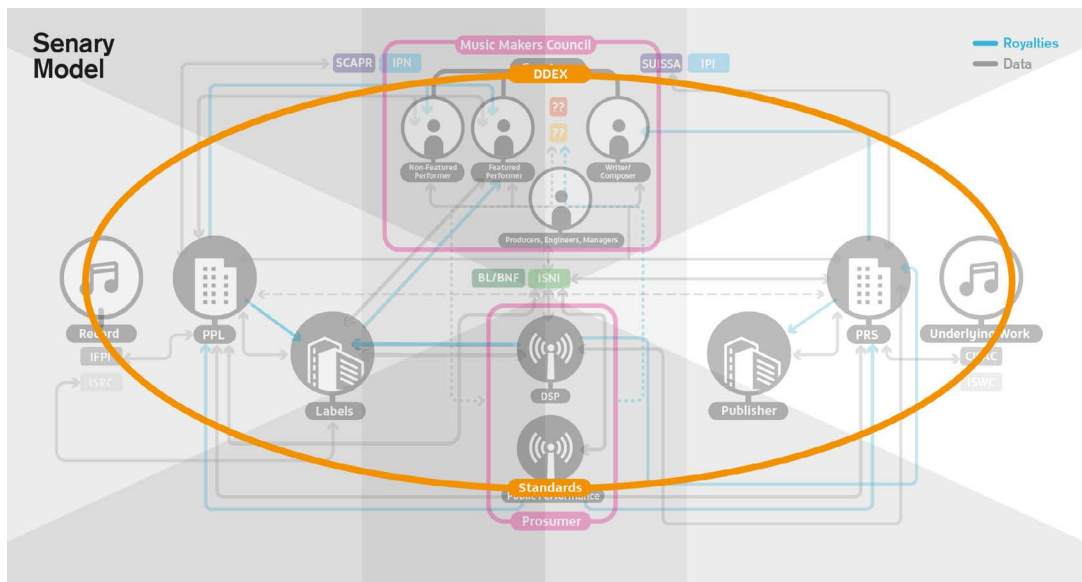


Figure 11: Music industry data senary model

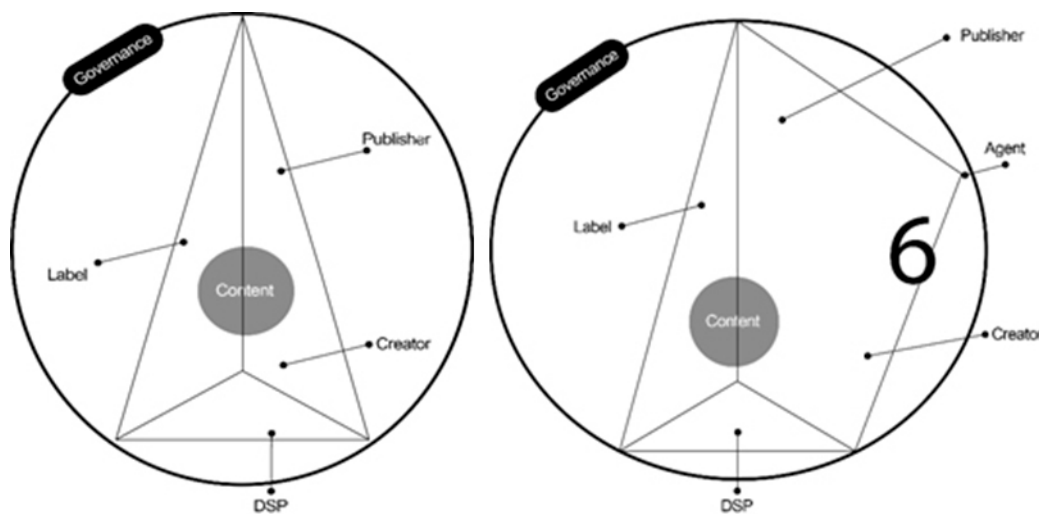


Figure 12: Regulated relationship structure

Finally, the role of education throughout the ecosystem has to be considered. This expands the discourse significantly, and includes the academies and educators who research, analyse and historically document the industry, as well as initiatives undertaken by operating agents to up-skill and re-skill their employees, members and contributors. The changes in the education sector have reflected a wider societal change that now recognises the importance of the creative industries as an important contributor to the national economy. Industry skills are now frequently taught as part of broader academic schemes with practical and theoretical elements being brought together and assessed as part of a qualification framework. From the moment that copyright is expressed, informed decision-making needs to be aligned to an awareness of system requirements and the legislative framework that impacts content production, rights ownership and remuneration. Education is critical to the recognition that informed practice is mutually beneficial to all actors and helps to incentivise and realise the inherent value of creative contributions.

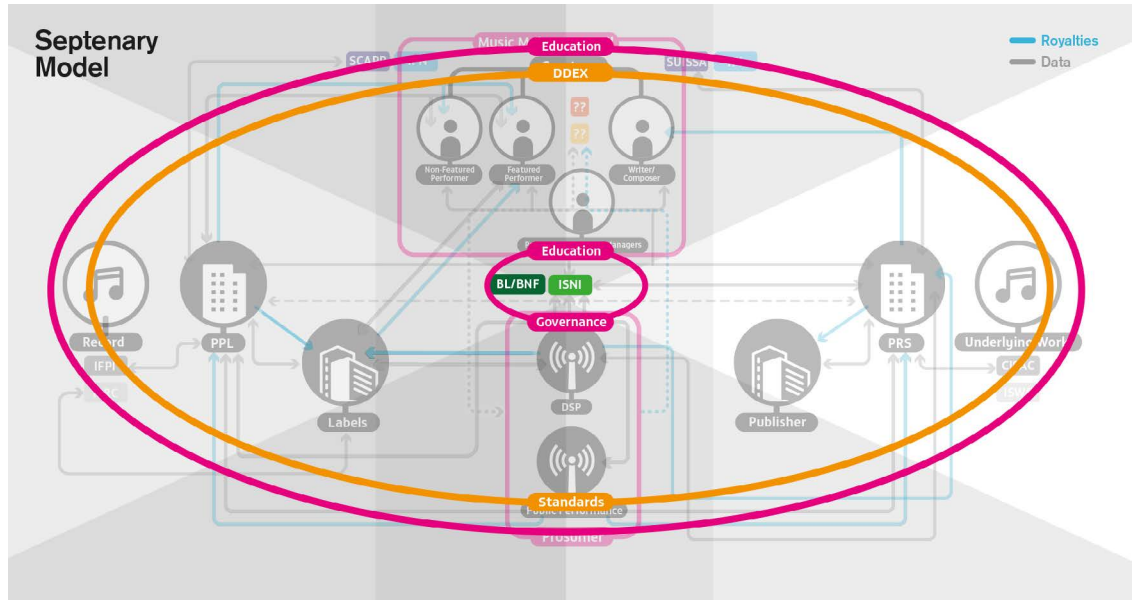


Figure 13: Education septenary model

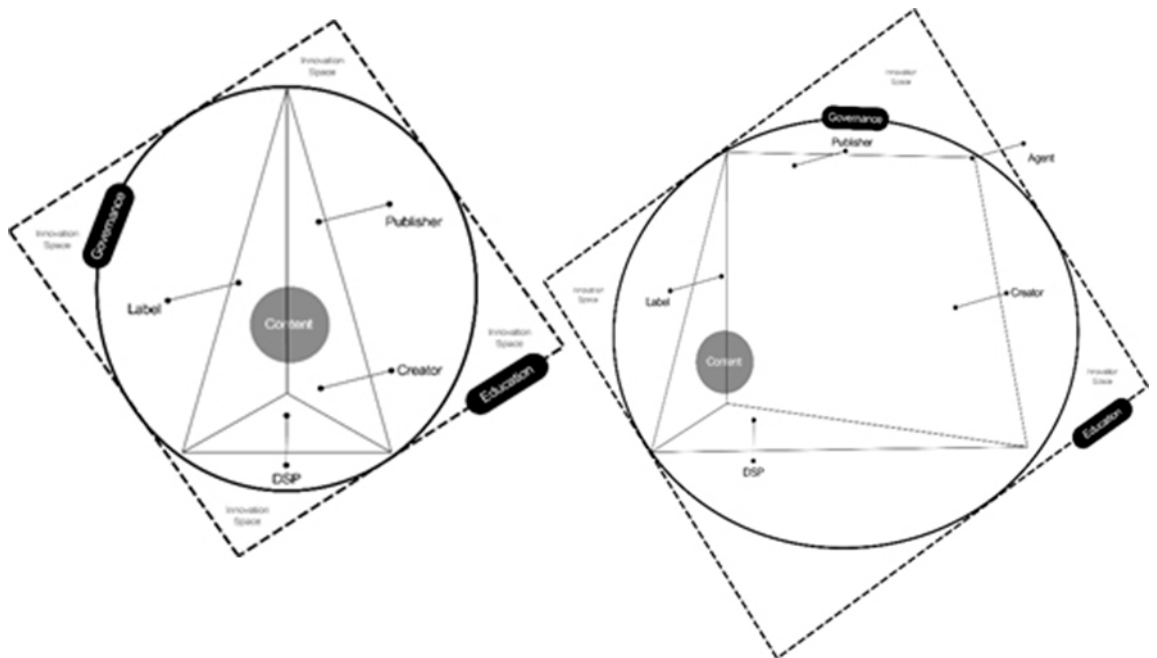


Figure 14: Expanded relationship structure

3.2.3 Industry identifiers

“You cannot solve the problems of rights and licensing without consistently applied identification systems”.¹¹¹

Identifiers are representations of an object’s identity. They are imposed as abstract tools that can simplify relationships, allowing for the effective management of complex or ambiguous phenomena. They also call attention to specifically defined frameworks and perspectives that fulfil the requirements of given authorities and are constructed with ‘customary boundaries and systems of regularities.’¹¹²

The ways in which these ‘abstract’ representations are applied and relate to each other reveals much about how authority is practiced, distributed and defended by those who define rules for systems of information exchange. Criticism that identifiers can be mediated, determinative and in some instances corrupted, has often been conspicuously countered using responses borrowed from a traditional scientific defence. For example:

- appeals to authority and hierarchy of knowledge (e.g. ‘rights owners/writers/contributors are the source of truth’);
- reference to localised difficulties (e.g. ‘what is needed is a global solution/ standardisation’);
- pretence that the problem doesn’t exist, or that it is someone else’s problem (e.g. ‘our data systems are fine and work well for us’).¹¹³

Any dynamic framework, dealing with uncertainty and built upon the consensus of authority will undoubtedly encounter anomalies, inconsistencies and interruptions, which may have serious implications for its operation. This should be carefully considered, and flexibility is essential in architectural design, so that system confidence can be maintained when encountering the inevitable disruption. This necessarily means the availability of easy to access, low cost, early intervention dispute resolution services, as the identification of any particular object relies fundamentally upon consensus between parties.

111 Paskin N. & Rust G., 2014 Principles of Identification V1.1 Linked Content Coalition <http://www.linkedcontentcoalition.org/index.php/downloads/category/4-principles-of-identification?download=11:lcc-principles-of-identification-v1-1>

112 Foucault M. 1970. The Order of Things, (Les Mots et les Choses) first published 1966 by Editions Gallimard, Paris English edition first published in the United Kingdom 1970 by Tavistock Publications, Routledge 2002

113 Woolgar S., 1988. Knowledge and Reflexivity - New Frontiers in the Sociology of Knowledge, London Sage

This in itself is not as straightforward as it sounds, given the range of context and the varied information models that an identifier must navigate. An identifier, if it is to be unique and persistent, must balance the contradictions and distinctions specific to the multiplicity of domains where it is used, while also maintaining consensus between parties. Fundamentally, managing and directing a system of identifiers requires an understanding of:

- what is to be identified;
- what the purpose of the identification is;
- who is asking for the identification.

Taking the conditions around the creation of a song (i.e. musical work) as an example, it becomes clear that particular distinctions are already in evidence due to the imposition of the system of copyright. In this respect any combination of the following actions (whether individual and/or collaborative), has implications for the assertion of ‘authorship’ and therefore ‘ownership’ of a piece of music and thus determines its attribution:

- direction of a performance (use of a lead sheet or similar instructions);
- use of an already existing work (cover version/sample);
- iterative composition (‘jamming’ through an evolving idea).

These processes can be further complicated by the use of, or reference to, unintended and/or unattributed contributions from Orphan Works, Public Domain Material and User Generated Content, which are often difficult to quantify, given that a comprehensive, agreed identification system has yet to be applied to common pool resources.¹¹⁴ The basis for any systematic application of identifiers is the simplification of complex processes of interpretation, thus enabling clear actionable decisions. A model or system will usually contain:

- entities, including actors and identifier systems;
- relations, between entities;
- qualities, as desirable properties of entities;
- actions, as processes carried out upon entities. (Typically undertaken in order to make qualities apply to entities).¹¹⁵

114 Ostrom E., 2015. *Governing the Commons*, Cambridge University Press

115 Nicholas N., Ward N. & Blinco K., 2012. *Abstract Modelling of Digital Identifiers* <http://www.ariadne.ac.uk/issue62/nicholas-et-al/>

This is the basis of an identifier framework which operates and generates collective authority, attribution and provenance in relation to the above processes. (Note - the asserter is also an entity/actor and their assertion of an association between (say) an identifier and its referent is critical to the trustworthiness of the association).

The Linked Content Coalition,¹¹⁶ have proposed guidelines for the practical application of an identifier framework, and pointed to critical underpinnings and requirements needed for a functioning dynamic identifier system, these are:

- public persistent identifiers;
- ongoing flexible managed change;
- mapping of links between identifiers;
- standard technical protocols;
- readily available access to identifiers and registration.

Furthermore, four key principles of identity management¹¹⁷ have also been recommended:

- unique identification - every entity should be uniquely identified within an identified namespace;
- functional granularity - it should be possible to identify an entity whenever it needs to be distinguished;
- designated authority - the author of an item of metadata should be securely identified;
- appropriate access - everyone requires access to the metadata on which they depend, and privacy and confidentiality for their own metadata from those who are not dependent on it.

116 The Linked Content Coalition (LCC) is a not-for-profit global consortium of standards bodies and registries. LCC members are organizations who create and manage data standards associated with content of one or more types, particularly for identifiers, metadata and messaging. The purpose of the LCC is to facilitate and expand the legitimate use of content in the digital network through the effective use of interoperable identifiers and metadata. <http://www.linkedcontentcoalition.com>

117 Rust, G. and Bide, M., 2000. The < indecs > metadata framework, principles, model and data dictionary. WP1a-006-2.0, June.

A system-wide view is encouraged with regard to the use of identifiers, particularly as interpretation of their use varies with context. Misinterpretation can arise in various ways, and it is important that those using any system be aware of implementation guidelines and can challenge instances of false assertion. It is recommended that registries should therefore represent information persistently within a defined scope that is subject to clear and agreed procedures and policies. Problems that could be minimised or countered through the operation of an interconnected registry of identifiers includes three particular issues:

- co-reference – where there is more than one ID for each referent (as in shared ownership of the ID);
- ambiguity – where the same ID is used for two or more referents;
- malign actions – where the ID is fraudulently or erroneously manipulated.

The following diagram (Figure 15) shows the framework that bounds the application of an identifier; both the referent and the recipient of an agreed identifier are joined in a relationship of co-responsibility which creates the consensus which allows its operation. The identifier does not contain metadata itself but refers to the range of fields that have been allocated and agreed under the terms and rules of governance.



Figure 15: Metadata

“The introduction of international standard numbering systems is critical for the ability of the music rights societies to manage their businesses more effectively in the digital age.”¹¹⁸

Figure 16 shows the division of the data flow into layers to show the sedimented nature of information that is ingested from workflow. The term sedimented is preferred because ‘stratified’ or ‘structured’ data is the result of an organised process, whereas here there is a lot of raw data that has not been processed in any way (particularly in terms of User Generated Content). In addition, sedimentation promotes the idea of filtering (as in the

use of organic silt beds) while also alluding to layering of data over time. At the base level is the 'Event' information, which is essentially captured workflow. At a specific time, the ingested information has a complex field of reference; questions of relationship, consent, information asymmetry, employment, ownership and value imbue the contextual framework of the song creation. The structuring of 'raw' information into structured data fields and data sets forms the basis of any subsequent actions. The data layer provides the bedrock for the application of an identification framework.



Figure 16: Sedimented information

Attribution between contributing parties and content is dependent upon this identification process which determines contributions in the context of content creation, although it should be noted that this does not automatically confer rights ownership. It is important that this distinction between attribution and payment be understood and maintained as not all contributors are entitled to the ongoing revenue attached to content creation. A Rights Layer exists as a further abstraction from the Attribution Layer which takes into account the legislation, practice and contractual interest of key stakeholders with regard to copyright (which changes with each territory/jurisdiction). This in turn allows payment systems to operate so that revenue from the exploitation of the work/recording commercially can be determined and distributed.

The difference between (Core) Payment Metadata and Descriptive Metadata (Credit) is critical to understanding the origins of the suite of IDs used by the music industry.¹¹⁹ As organisations developed identifier frameworks, they were employed to maintain revenue structures in accordance with the business objectives pertinent to each sector. Thus, the systems of ISO Identification reflect the operational objectives of the stakeholders within each given sector.¹²⁰ This is particularly evident in the music industry, where the use of two distinct content ID systems (ISWC/ISRC), reflecting music publishing and record label interests respectively were generated by the nature of copyright and related rights used on a recorded medium.¹²¹

119 DDEX 2018?

120 Brooke T. 2014. Descriptive Metadata In The Music Industry: Why It Is Broken And How To Fix It - Journal of Digital Media Management

121 Hill, K., 1999.

The diagram shown at Figure 17 represents the relationships between entities on the publishing side of the system and how these contrast with relationships around the sound recording. In mapping the use of the common identifiers for music content (e.g. ISWC and ISRC), it can be revealed that systems are asymmetrical. This reflects the fact that the identifier frameworks have evolved out of business operations as opposed to a holistic system design.

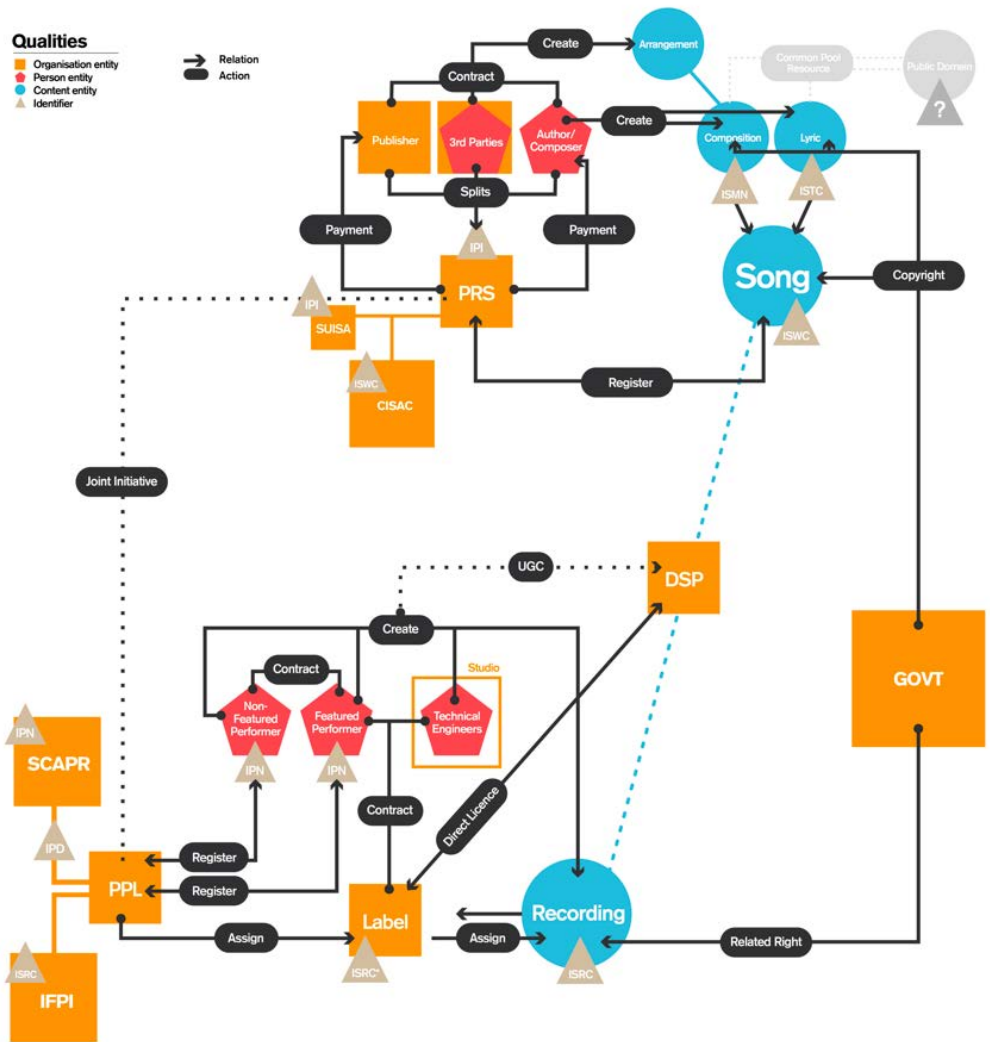


Figure 17: Data flow model for ISWC/ISRC

A layered approach to data and information offers a way of clarifying and making visible the particular process and objective of identification, which is generally opaque to the majority of consumers and creators of music.¹²² However, this process is far from neutral, as the record of an event or action is characterised by an ‘intentionality’,¹²³ which in effect means asking:

- who requires the information?
- what is it to be used for?
- how will access be managed/categorised?
- where will it be stored?
- when is it needed?
- how can the information be trusted?
- where has it come from?

Music data has also to be considered against the backdrop of previous and future requirements as well as the current need.¹²⁴ This produces further problems when minimum data sets are proposed; the question ‘for what purpose?’ needs to remain constant when referring to the construction and implementation of any system architecture. The table below shows that there are particular intentions behind the application of identifiers to music content which relates to royalty payment structures and the application of copyright.

Resource	Attribution	Person ID	Content ID
Musical Work	Author	IPI/ISNI	ISWC
	Composer	IPI/ISNI	ISWC
Score	Arranger	IPI/ISNI	ISMN
Lyric Sheet	Lyricist	IPI/ISNI	ISTC
Publishing	Administrator	IPI/ISNI	ISWC
Sound Recording	Performer	IPN/ISNI	ISRC
	Producer	ISNI	ISRC
	Engineer	ISNI	ISRC
	Label	ISNI	ISRC

Table 2: Application of identifiers

122 Ludovico, L.A., 2009. IEEE 1599: A multi-layer approach to music description. *Journal of Multimedia*, 4(1).
 123 Drummond, J., 2003. *The Structure Of Intentionality* from Welton, D. ed., 2003. *The new Husserl: A critical reader*. Indiana University Press. p 66
 124 Brooke T. 2014.

The musical work identification ISWC, has three significant challenges which contribute to the current problem of linking:

1. Timeliness of assignment; recent changes have improved matters, but it is still not possible for a work to secure an identifier when the recording is still being finalised in the studio. This means that the recording leaves without any work identification and it is necessary to 'match' the work and recording later.
2. The database of ISWC codes although well engineered is however treated by the societies as a proprietary resource with only a web-page made available for queries. Many have suggested that an API is important to allow machine to machine interactions, but this is being resisted by the societies, presumably due to a fear of substitution by some other entity that could aggregate the data they currently hold.
3. There is considerable uncertainty about the quality of the data and very little public information about how it is used or can be used (ISWC is said by some not to be implemented comprehensively, although PROs are incentivised to make assignments so that payments from international societies can be processed).

The systems for recording identification ISRC are regarded by IFPI as reasonably good. The granularity (the way in which new identifiers are assigned based on a recording being the same as, or different from, another recording,) is generally accepted as appropriate for industry needs. The identifier is compact and easy to obtain and to parse so it can be checked for compliance. In some respects, however, it has some shortcomings, for example:

- country code and registrant code are often assumed to have significance beyond their designation as the origin of the identifier. (It is known that royalties have been sent to a country on the mistaken understanding that the country code means that the content itself is owned in that country);
- although large companies in general comply with guidelines, they sometimes take minor shortcuts or make decisions without seeking advice from experts, but this seldom creates dislocation in the system as a whole. On a wider scale guideline adherence can be patchy;
- when smaller labels move from one distributor to another, there is little control if the new distributor decides to assign new consecutive codes rather than ingest all the codes assigned by their predecessor. This could be to the detriment of the label who finds that their sales and reputation do not roll up over the transition;
- some assignors don't understand that the code has to be assigned in compliance with a standard and in accordance with the instructions of the registration authority.

3.2.4 Interconnecting systems

Interoperability

*“Interoperability is the ability of independent systems to exchange meaningful information and initiate actions from each other, in order to operate together to mutual benefit. In particular, it envisages the ability for loosely-coupled independent systems to be able to collaborate and communicate”.*¹²⁵

To facilitate identifier interoperability, three areas for development were suggested by the ISO:¹²⁶

- information associated with an identified entity should be ‘painlessly referenced’ in the context of one class of entity even though it originated in another;
- agreed meanings and vocabulary should be defined and mapped between identifier schemes;
- agreed methods of information sharing should be implemented. (Minimum data sets cannot fulfil the requirements of all parties, and therefore need to be carefully considered).¹²⁷

*“Until recently almost every Industry Sector, if not every Industry Player, had its own Party Identifier, making it all proprietary and not at all interoperable. This was due to the fact that Party-related information carries a lot of sensitive data such as birth dates, personal contact information, contractual clauses, or commercial terms. Information sharing in this context may have grave implications and repercussions.”*¹²⁸

Although there has been considerable emphasis on promotion of identification schemes and the adoption of standard or reference metadata sets, there has been less emphasis on the impact of cross-sector interoperability. While the music industry has been attempting to solve the problem of matching the distinct ISWC/ISRC systems for over a decade, the explosion of digital multimedia content, in response to demand generated by technological innovation in content distribution and the ubiquitous use of media recording and playback devices, has made it imperative that organisations understand the implications of using one industry identifier in another context, and the importance of importing metadata from one identification scheme into a system based on another.

*“It is clear that interoperability of all these media identifiers and metadata schemes will be required... and metadata is now becoming key to interoperability.”*¹²⁹

125 Paskin N., 2006. Identifier Interoperability A Report on Two Recent ISO Activities, D-Lib Magazine Volume 12 Number 4

126 Ibid.

127 Ibid.

128 Nuttall F.X. & Oh S.G. 2011 Party Identifiers, Cataloging & Classification Quarterly, 49:6, 528-537, DOI: 10.1080/01639374.2011.603075

129 Paskin N., 2006.

Interoperability means much more than the technological systems of metadata exchange, however. It is fundamentally about the quality of the relationships across an ecosystem and the actions required to make these relationships productive.

Standardisation

This process, fundamental to interoperability, is aligned to messaging systems and information protocols which involve consensus, collaboration, negotiation and adoption across a range of shared interests. Standardisation of terminology and identification provides faster time to market, improved operational and data quality, shared cost reductions between partners throughout the digital supply chain, and counters duplication of work by homogenising the required data feeds. However, parties with systems that support a standard have also to consider that others in the data supply chain may operate systems built around their own proprietary models or may have already committed to supporting different or competing models based on their distinct ‘intentionality’. The granularity required for these systems will therefore be different for each application. Although standardisation is desirable, industry has to consider how first to establish an agreed system of governance across these multiple, variable frameworks. Any proposed holistic solution needs to address the current, system imbalances, while offering potential adoption to wider constituencies. In this way, standardisation can offer benefits to all parts of the value chain.

Digital Data Exchange (DDEX), a “consortium of leading media companies, music licensing organisations, digital service providers and technical intermediaries, focused on the creation of digital supply chain standards”,¹³⁰ has been instrumental in promoting practical, technical solutions throughout the ecosystem. DDEX governance structure (see below) aims to reflect a balance of members, “currently split roughly one third for owners or administrators of musical work, one third owners or administrators of sound recording rights owners and one third digital music retailers and technology service providers.”¹³¹

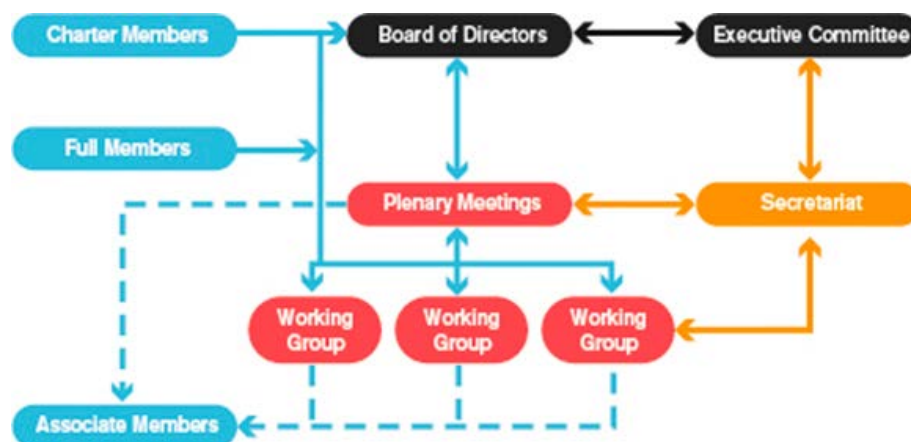


Figure 18: DDEX Governance structure (DDEX 2019)

130 About DDEX <http://ddex.net/about-ddex/> Accessed 30 April 2019.

131 Ibid

DDEX offers three types of membership (Charter, Full and Associate) with corresponding degrees of access and benefits. Membership fees reflect these levels of access although any organisation can take out a license to use DDEX standards, free of charge.

Data privacy and confidentiality

In most countries, the aggregation of private data within a database is highly scrutinised. Furthermore, legislation has sought to strengthen the protections given to individuals through the establishment of the General Data Protection Regulation (GDPR).¹³² To be usable in an international environment, descriptive elements of contributing parties have to be kept to a strict minimum. The dates of birth and death (or creation and dissolution for legal entities) are widely used, as they provide due to their permanence, a unique and reliable indication of the party, yet some countries prohibit public exposures or exportations of such information.

“In many, particularly European, countries, it is required by law that any database that maintains information about individuals be declared to a governmental organisation. Party Identification databases typically fall in that category; anyone creating such a database is bound to a legal obligation to declare it.”¹³³

Although this promotes transparency and redress mechanisms, there is a concern that the cross linking of identifiers across a system could expose confidential and sensitive data. One proposed solution is to consider proprietary identifiers as a ‘private layer’ operating in individual secure silos. On top of this private layer, an open ‘public layer’ could be built as a cross identifier. Some propose that this would maintain confidentiality without the need for modifications to existing IT systems.¹³⁴ (Effectively, data associated with the IPN/IPI etc. is kept private even if the identifier itself becomes disclosed.)



Figure 19: Party identifiers - Public/private layers (Nuttall & Oh 2011)

132 The General Data Protection Regulation (EU) 2016/679 (“GDPR”) is a regulation in EU law on data protection and privacy for all individuals within the European Union (EU) and the European Economic Area (EEA). <http://data.consilium.europa.eu/doc/document/ST-9565-2015-INIT/en/pdf>)

133 Nuttall F.X. & Oh S.G. 2011

134 Ibid

3.2.5 Recent technological initiatives and developments

Elixir

Elixir is a project initiated by three major PROs, PRS for Music, SACEM and ASCAP in July 2017 with the vision to create a trusted and authoritative reference of recordings linked to works using ISRCs, ISWCs and other related proprietary identifiers. This project aims to resolve the issues around ISRC and ISWC reconciliation and to address the complexity and confusion around licensing, payments and data fragmentation. Establishing robust links between these two pieces of data offers a practical solution with enormous potential for improving the processes of royalty matching, which will in turn speed up licensing, reduce errors and reduce costs. The goal of the project is to prototype how the music industry could create and adopt a shared, decentralised database of musical work metadata with real-time update and tracking capabilities. While the project has adopted an inclusive approach, the question of authority and control has been raised with regard to governance and the acceptance of competing systems which may challenge determinations.

Some commentators viewed the SACEM /PRS /ASCAP project as ‘partly defensive’, noting, *“if metadata management is coming to the music business anyway, better that it be designed to the benefit and specifications of the PROs than risk having to conform their processes to a system designed by and for others.”*¹³⁵

This reflects the impact of two underlying, related dynamics:

- the increasing complexity of the market for music rights, as the number of use-cases for music explodes, creating a demand for more efficient and integrated licensing solutions;
- the need to track more uses and make more but smaller payments to more but smaller rights owners. This is likely to generate pressure to drive down costs through greater scale, shared infrastructure around cost-centres like metadata management and the adoption of technology.¹³⁶

PPL’s new feature to link the musical work at the point of registering the recording on its registration portal has been regarded as highly complementary to Elixir, which focuses on sharing the links between organisations: a) because new links created ‘at source’; and b) it allows for PPL to verify links with the recording rights holder (a key question is whether this validates the ISWC by accessing the CISAC registry at the point of recording registration).

PPL/PRS collaboration on linked data and joint licensing is significant in establishing the context for future relationships that can build interconnected, interoperable systems.

¹³⁵ Sweeting P., 2017. Why Rights Organizations Want to Make Music Together, Rights Tech Project, <https://rightstech.com/2017/04/why-collection-societies-want-to-make-music-together/>

¹³⁶ Sweeting P., 2017.

Back-office

ICE is a pan-European multi-territorial copyright administration, online processing and licensing hub operating as a back office on behalf of seven collecting societies¹³⁷. ICE presents a model that may be applicable to multiple territories. However, CMO consolidation may encounter resistance from localised groups if there is a perception that there is a threat to local interests, authority and control, particularly if the system is seen to favour Anglo-American repertoire to the detriment of indigenous content. PPL provides back-office services to seven countries, although the structure of relationships between performer and producer (label) societies in these territories may not mirror the UK, which could be regarded as an outlier in organisational terms. In one of the countries cited, Ireland, for example, these two types of societies are completely separate organisations and PPL provides services to the label/producer society only.

Smart speakers

The rapid adoption of this technology suggests voice recognition could drive how music is discovered and consumed. It highlights the importance of the recommendation algorithms of voice assistants and the underpinning issues around metadata for the song's era, genre, lyric themes, place in culture and other context-rich topics. Smart speakers therefore could incentivise the supply of accurate metadata to streaming services on songwriters and publishers related to individual recordings to ensure relevant songs are served up to listeners.

Smart registration

Performer/creator registration at the point of creation is compounded by a host of problems, not least the focus on creative 'flow'. The ingesting of data at the point of creation needs to be aligned to low cost, easily attainable party and content identifiers that operate in accordance with industry accepted standards, to be effective. DDEX RIN is a metadata standard innovation aimed at capturing studio performance data and 'cohabiting' contribution data. This is an important development that can incorporate music production data direct from recording software platforms and which provides a potential framework for IoT (Internet of Things) data transfer. PPL has already developed an innovative recommendation engine that speeds up the process of reviewing sound recording metadata to ensure performer line-ups are accurately completed, while the myPPL portal facilitates iterative reporting, registration and enquiry by rights holders. Auddly/Session, a Swedish technology company backed by Björn Ulvaeus (ABBA) among others, has partnered with PPL, PRS and AVID to implement a registration application that attempts to address registration of music content contribution at the writer/performer level. Given the democratisation of music production and the ubiquitous use of technology, education and awareness is critical with regard to any prospect of widespread adoption of registration solutions.

137 PRS, STIM, BUMA-STEMRA, SABAM, TONO. TEOSTO AND KODA

Content recognition systems

Many organisations, and particularly DSPs, continue to invest in Content Recognition (Fingerprinting) Systems for content attribution. Installation of Content Recognition Systems in venues for monitoring public performance brings another layer of complexity to the variety of data sources being added to the disambiguation process. Developments in this area reflect an increase in the amount of businesses seeking to capitalise in the ‘problem’ area of data and content. Again, this introduces complexity and opportunities for disruption as a variety of reporting methods and data sources are introduced. ‘Watermarking’, the process of hiding digital information in an audio recording can be used to verify the authenticity or integrity of the recording or to show the identity of its owners.¹³⁸ Issues around their application include robustness and perceptibility however the use of hidden information to refer to relational databases is currently a focus of research.

Blockchain solutions

Adopting Distributed Ledger Technology, specifically blockchain, is not merely a technological decision but also a business decision. Good use cases should solve real problems for organizations. Great use cases solve real problems at a cost that is significantly lower than the benefits the adoption brings. Blockchain’s unique properties, however, mean that a new analytical framework is useful, in part because of the fact that Blockchain has emerged at a unique point in society’s technological development. Blockchain is about the exchange of value; it is intended to enable individuals to exchange currency and other assets with one another without relying on a third party to manage the transactions. It also implies the dramatic redefinition of the business processes associated within and between companies. The major weakness of Blockchain in providing a solution for the music business is that storing data or large files on the Blockchain is a non-starter as it can barely sustain small strings of text that simply record a balance transfer between two parties.

It remains unclear as to whether Blockchain is a practical solution for music publishing due in main to the complexities of modern song writing (especially for hit records and catalogues) and the multitude of outlier cases such as what happens to song infringements or when sampling of songs occur. There is also the immutability of the Blockchain which can be an issue when we later discover that a recording needs amending due to incorrect attributions. Blockchain’s most compelling use cases are in areas such as cryptocurrencies or harvesting unused computer processors where in both cases, all parties involved are untrusted and transactions must be immutable. Although Blockchain generates trust in the database, its shortcoming is that it cannot resolve the music sector’s problem with trust in the data, an issue, which is something that requires a different sort of governance to what DLT provides.

The music business is complex. The different actors, the various jurisdictions and their concomitant licensing constraints make predicting the actual effects of changes very hard. Blockchain looks like a partial solution to ease the strictures of the royalty framework, but in practice the music industry requires more exceptions and localised ad-hoc solutions

¹³⁸ Cox, I. et al., 2007. Digital Watermarking and Steganography 2nd ed., Elsevier Science.

than the seamless application of a top down business process. What would be needed is the bringing together of representatives of all the activities in the music value chain, from individual creators up to multinationals, covering all stages of music making (composition, performance, production, metadata capture, registration, archiving, contracts, distribution, merchandising, accounting and collection of royalties, and legal issues).

If a Blockchain is to be implemented, then the most sensible route would be through a permissioned public shared ledger. A permissioned, public, shared Blockchain is a form of hybrid system that can provide for situations where whitelisted access is required but all the transactions are publicly viewable. It applies here where only key players within the music rights industry can write to the network, but all transactions can be publicly verified.

3.3 Research findings from the interviews

This section outlines the diverse range of views highlighting key issues around music data management which emerged from the semi-structured interviews.

3.3.1 Critical juncture for change

From the interviews, it was evident there is a growing consensus for urgent change to address the mounting data issues. This consensus is partly attributable to the increasingly fast-changing business environment driven by data and by the recognition that better quality data is vital to realising the full potential of the digital music economy.

3.3.1.1 Unparalleled growth of data

The accelerating growth of data sparked by the rise of music streaming is the catalyst for change in the new data-driven music industry economy. Faced with unprecedented levels of data volume, the industry is undergoing a potentially transformational change in the way music is consumed, licensed and remunerated. As one interviewee put it,

“The reason for doing it is now stronger than ever. Now there is growing recognition that we’ve got to do something.”

At the same time, there is an increasing recognition across the industry that current models of music data management need to become much more efficient.

3.3.1.2 Existential threat

Historically, significant changes in the music industry have been in response to technological development. More recently, the industry has experienced structural changes where *“the concentrating power of multinational companies is considered a ‘threat from within’ for CMOs.”*¹³⁹ The music industry is also experiencing the shift to an ‘oligonomy’, which is a market dominated by an oligopoly of suppliers and oligopsony¹⁴⁰

139 Kefalas, A., 2017. The relevance of traditional Collective Management Organisations in the digital age: Current challenges and future possibilities Master’s thesis, University of Agder. p.24

140 De Voldere, I., Romainville, J.F., Knotter, S., Durinck, E., Engin, E., Le Gail, A., Kern, P., Airaghi, E., Pletosu, T., Ranaivoson, H. and Hoelck, K., 2017. Mapping the Creative Value Chains: a Study on the Economy of Culture in the Digital Age. Publications Office of the European Union, Luxembourg. p.32

of rights purchasers (FAANGs).¹⁴¹ Apple, which opened the gates to the digital music business,¹⁴² set the rules for digital music management, including a requirement for a mandatory ISRC. Apple continues to exert formidable influence in how digital music is consumed and distributed. There is an increasing awareness within the music industry that the big technology companies have brought about a fundamental shift in how the music and wider cultural industries work which may lead IT-driven businesses in time to become the dominant players in the industry.¹⁴³ Apple, Amazon and Google are arguably the 21st Century equivalent of earlier technology companies such as Philips, RCA and Sony, that drove the music industry in the 20th Century. However, some question whether these new tech companies are as interested in investing in new talent or in nurturing existing talent as those earlier companies were.¹⁴⁴

Google however has shown it is invested in the music business through its adoption of ISNI as a bridging identifier. If adopted more widely this is perceived by many as a potential game changer. The oligopsony music services such as Spotify, Apple and Pandora are also exerting an ever-increasing control over the licensing of repertoire and the market more generally. Our observations indicate that the potential challenges from a multitude of directions to the industry incumbents contribute to a sense of existential threat for conventional intermediaries but can be viewed as the catalyst for improving data transparency and efficiency.

3.3.1.3 Economic imperatives

From a business perspective, having good quality data is fundamental to generating value from creative content. Data is increasingly becoming an important source to understand consumers and their patterns of consumption. One interviewee called this a “*strategic shift*” that had to take place in the age of what Herbert Simon (1974) called ‘Attention Economy’.¹⁴⁵ The sheer abundance of content available makes it difficult for consumers to choose their music, creating the ‘Tyranny of Choice’.¹⁴⁶ With the emergence of increasingly automated search and discovery systems, many stakeholders argued that good quality data is essential to help users find the music they want and therefore is conducive to growth of the digital music economy. Another interviewee stated:

“The industry is starting to recognise that we have got to find a way to unlock the potential value of music across all these other potential licenses and distributors. There is a real awareness of it.”

141 Facebook, Apple, Amazon, Netflix, and Google

142 Arditi, D., 2014. iTunes: Breaking barriers and building walls. *Popular Music and Society*, 37(4), pp.408-424.

143 Negus, K., 2018. From creator to data: the post-record music industry and the digital conglomerates. *Media, Culture & Society*, p.0163443718799395.

144 Hesmondhalgh, D. and Meier, L.M., 2018. p.1565

145 Simon, H.A., 1971. Designing organizations for an information-rich world. in Greenberger, M., (ed) 1971. *Computers, communications, and the public interest*. Johns Hopkins University Press.

146 Mulligan, M., 2014. Tyranny of Choice. *Music Industry Blog*.

3.3.2 Issues with ISRC and ISWC

As mentioned earlier, there was an intention to link ISRC numbers to an ISWC and to establish a data exchange relationship between the sound recording and the musical work.¹⁴⁷ Whilst both were developed to promote standardisation and interoperability within their specific areas of operation, our findings conclude that linking ISRC and ISWC has remained a perennial and substantial issue since inception. This report sought to find where the problems lie with ISRC and ISWC respectively and explored the difficulties in linking the two.

3.3.2.1 ISRC

As an ISO standard, ISRC was developed in 1986 to identify a recording. In the UK, IFPI was designated as the registration authority in 1989. Currently, ISRC is claimed to be the most widely used and accessible identifier. Its significance is heightened as it is de facto the unit of consumption. The main function is to fix the performance, but it does not capture all of the information associated with the recording.

As a rule, each new recording needs a new ISRC; for example, any new musical elements, such as a new drum beat, new sessions etc. should require a new ISRC. This is to give a unique identification for each type of use, which, in principle, is not a problem as long as it is well managed.

Another important step is to map multiple ISRCs as a cluster of recordings; this can refer to (a) clustering together of different instances of the same recording that have been erroneously assigned different ISRCs, or (b) clustering together similar recordings that have something in common such as parental advisory/edited versions. Through ISO standardisation, ISRC ensures interoperability and interaction with other registries. In the UK, PPL strives to ensure that ISRC registration is well managed and maintained. An employee at PPL asserted that PPL's success at effectively collecting revenue and distributing it to members stems from its sourcing of data directly from rights holders and the operation of a transparent process to detect conflicts, which makes its data 'collectively authoritative.'

It was observed that the ISRC, as an official industry identifier for sound recordings, was generally regarded by record labels as working well, although there are issues around the ISRC that vary according to where in the value chain an organisation sits and whether they have the capacity for managing the ISRC process. In addition, the granularity of ISRC requires a consensus process across the value chain which is often subject to misinterpretation and can lead to misuse, as discussed below:

1) ISRC misuse

Many interviewees agreed that whilst the ISRC as a system of identifying recordings is not broken, there is room to improve. For an industry identifier to function well, good practice needs to be maintained throughout all of the networks. Music value networks comprise a

¹⁴⁷ Hill, K., 1999.

number of diverse parties ranging from major labels to bedroom artists each with different levels of expertise, capacity and available resources. The ease of ISRC assignment can lead to misuse without strict policy implementation and this can become the source of dispute, especially when a recording becomes popular.

When the ISRC was first designed in 1989, the first priority was to ensure cost-efficient and convenient ISRC registration. Although the ISRC was updated in 2001 and more recently in 2018, as an industry expert says, the very ease of use that was once its strength is now its weakness.

Ease of use, per se, should not be a problem, as long as there is a mechanism to ensure proper use. In addition, there is no standardised cross-industry policy on, or obligation for, proper use of the ISRC, which is run on a self-policing principle without a current mechanism in place to incentivise good practice or penalise bad practice. There is also no obligation to ensure that the data is correct or is corrected. An interviewee succinctly described this situation:

“It comes back to authority and authentication again. There is no mechanism in place within the ISRC standard where you know if you do it wrong you can be penalised or get a slap on the wrist of some sort. I mean those are the sorts of things that have got to start to come in.”

2) Examples of ISRC misuse

Here we present examples of ISRC misuse relating to production, record labels, intermediaries and DIY artists.

Production

ISRC misuse could start from the issuing of ISRCs at the production phase of the recording process. No formal education process is available for those who register ISRCs or administrate data and it was generally observed that artists do not pay enough attention to properly recording metadata relating to their work. Some issues relate to the complexities of the creative processes involved in producing a sound recording with few who participate being fully aware of the important principles of issuing ISRC.

Record Labels

Record labels and aggregators acting as ISRC managers generate most of the ISRC codes; how they register and maintain ISRCs is crucial for maintaining good practice. We heard that there is widespread misuse of ISRCs by some record labels. ISRC was never designed to include all information and has a very specific purpose. Ironically, that leaves ISRCs subject to misuse which, as one person explains, “does not break the system,” and allows poor practice to continue. ISRC misuse causes the duplication of ISRCs, which undermines its value as a unique identifier.

Intermediaries

Some interviewees suggested that some issues around ISRC are linked to levels of human and system resources, capital and knowledge that an organisation can allocate to data management. The varying levels of resources devoted to data management is particularly pronounced, especially in the independent label sector where the size of labels can vary from a large company like Beggars group to single owner-/manager operations. Beggars' experience demonstrates how good quality data management is possible when sufficient resources are dedicated to a manageable number of catalogues. For smaller labels, indie distributors such as The Orchard, 51 State, or INgrooves, serve as a middleman to ensure data is well managed. However, this process is not immune from ISRC misuse, as some stated how the large number of processes involved in the system can lead to data mismanagement.

In addition, smaller companies do not always control their own data; they are faced with the problem of having to prepare various sets of data for a range of different parties. However, what matters is not necessarily control of information but whether that data can be used to ensure that reports are correctly compiled, and royalties are accurately routed.

DIY Artists

ISRC problems are compounded with the advent of DIY artists, most without essential digital business acumen or the ability to rigorously conform to standards and handle administration correctly. Even aggregators that help such artists to distribute their music to DSPs, have data systems that largely rely on self-policing and cannot comprehensively guarantee good practice.

3.3.2.2 ISWC

Introduced in 1995, ISWC was developed to identify musical works. Its main aim was to replace the antiquated practice of paper-based management used for musical works with a better system to ensure greater efficiency, automation and speed in processing information by “enabl(ing) the creators, rights holders, and their societies to be able to identify uniquely musical works across all geographical boundaries.”¹⁴⁸ Three major issues relating to ISWC were identified: (1) the complex nature of music publishing (2) competing time pressures (3) open standard, closed data; although the ISWC standard is open, the data associated with it is ‘closed’ and this undermines confidence that the information is reliable.

1) Complex nature of music publishing

There is systemic complexity within the ways rights in musical works are managed around the world with competing IP Rights systems and different collective licensing business models (private agencies versus statutory mandated societies) together with an international licensing system that was already under extreme pressure in the analogue era. The increasing complexity of publishing data mirrors the dynamic nature of rights assignment and control due to increased portability of rights for ‘hit’ repertoire, multiple writers with divergent ownership and/or control and widespread use of samples.

148 Hill, K., 1999. p. 1230.

The complex nature of publishing data often renders it difficult to track and maintain good quality ISWC data, resulting in inconsistent use of the ISWC. Most currently successful songs often have multiple songwriters usually with different publishers and different types of ownership and rights controlled, all of which are subject to constant change. One particular problem is that there is no standardised way to fill out the information; for example, in the case of Elton John, it also can be logged as E. John, Elton John, John Elton etc., which creates challenges in identifying the correct version.

2) Competing time pressures

One of the critical issues with ISWCs lies with the delay in assigning the ISWC. Currently an ISWC can only be assigned when all of the creators and rights holders have been uniquely identified. The multiple ownership of and associated complexity in licensing of rights however often mean a significant time delay in issuing the ISWC and in some cases ISWCs are not assigned at all. This is particularly problematic because the ISWC is rarely linked to the recording at the time of its release. Although the complexities of publishing partly explain this problem, it could also be the result of the ‘different sense of urgency’ felt within the publishing sector which has arguably been less impacted by digital disruption than the recording sector. Equally, this could be the result of the additional complex layers of intermediation that exists in the licensing of music publishing rights that contribute to the delays in assigning ISWCs.

3) Open standard; closed data

Authoritative and up-to-date information is essential to pair sound recordings and the underlying musical works. ISWC codes are maintained exclusively in CISAC’s repositories and these follow proprietary standards that offer no common interface or integration beyond a web page where low volumes of data can be accessed. Although this has ensured a high level of data security, it is felt that restricted access hinders timely identification of the appropriate ISWC.

The largest rights owners internally match the ISWC and ISRC of any and all common repertoire under their control internally. For example, WMG can match Led Zeppelin masters and publishing. Sony can match Bob Dylan recordings and compositions and UMG can link Abba’s recordings with their songs. The key issue, therefore, for every company is linking ISRCs and ISWCs where this common ownership does not exist. For example, WMG own Jay Z’s publishing, but his masters go through UMG. UMG own Coldplay’s publishing but WMG owns the masters and Sony own Ed Sheeran’s publishing but WMG own his masters. The absence of punctual, reliable data for ISWCs is therefore considered a major problem,

3.3.2.3 Issues with linking ISRC and ISWC

Proper linking of the ISRC and ISWC is essential to ensure proper remuneration for all parties involved in value networks. When matched with the associated metadata, the linked ISRC and ISWC becomes a valuable resource for rights remuneration. Many stakeholders, whilst acknowledging that CMOs in the UK are exemplars and have high levels of trust within the industry, stressed that issues still remain in linking ISRC and ISWC. Not only is this inefficient, as some indicated, it also raises questions on the reliability of industry identifiers:

“You can’t easily join them (ISRC and ISWC) to get a complete set... We are not really making use of the identifiers in the music industry identifiers in our systems properly, because they have never been reliable enough... matching ISRCs to ISWCs... it would require wiping the slate starting again and because the existing repositories that all contribute to it have so much strange anomalies in it.”

We discuss this in more detail below, under: ISRC duplication, delay in ISWC assignment, and royalty inconsistencies.

1) ISRC duplication

As discussed in the previous section, there are duplicate ISRCs which creates problems in identifying the correct ISRC to be matched to ISWC. Many stakeholders emphasised that the duplication of ISRCs is the crux of these problems and some suggest that it would be beneficial to be more open and honest about this.

2) Delay in ISWC assignment

Proper linking of the sound recording and the underlying musical work requires authoritative data sources and authoritative matching.¹⁴⁹ Currently, these requirements cannot be met easily given the ISWC is not always available to link to ISRC at the time a recording is first released. When a recording is released, DSPs receive the recording information from the labels, however they rarely get the corresponding ISWC information in a timely fashion, resulting in the CMOs having to play catch up to match the ISWC information to the relevant ISRC.

3) Royalty inconsistencies

Within the music publishing system, the royalty particularly on the streaming services will often only be paid when the total shares agreed by all relevant parties equals 100%. There is also the systemic complexity and the fluctuation of the rights and ownership of songs and writers, that can contribute to the inconsistencies within royalty distributions. An interviewee explains how easily income can remain unattributed:

¹⁴⁹ Nuttall F.X. & Oh S.G. 2011. p.26.

“In reality what happens is that because that process is mainly manual, those two (data) records are just kept on file somewhere so there’s one (data) record that says you have half (the information) and the rest is blank, and the other half (of the information) is on the (other data) record. That’s before you even get to any overlapping claims and conflicts and anything else... no money is being paid on it.””

3.3.3 Embedded industry practices

Earlier we outlined how many structures in the music industry were designed around physical products; this accounts for some of the problems the industry now faces, including legacy data, archaic systems and manual processes, NDAs, and unallocated income.

3.3.3.1 Legacy data

Before the digital era, data management was more loosely structured and related to physical products for which a Universal Product Code (UPC) was assigned which involved less tracking of the data. Although data has long been the basis of royalty payments, arguably the industry’s business practices were less data-centric than now. Over the past 20 years, the record industry’s main new services licensing model involved securing large advances accompanied by Non-Disclosure Agreements (NDAs) and this also meant many tech services operated without licenses. As such the industry at the time had little incentive to improve the accuracy of its data.

Despite the meteoric growth of incoming data, when it comes to making money, according to an interview with a major record label executive, approximately 80% of the music business relies upon their back catalogues. Yet not all of the metadata on these back catalogues is accurate because the data was often lost in the creative process; sometimes, old tracks were recorded using now obsolete technologies making it almost impossible to retrieve all of the data. At the time few could have expected that keeping accurate records at the outset would become so important.

3.3.3.2 Archaic systems and manual processes

The UK, as a global supplier of music content, has had a profound influence on the way music is made, distributed and consumed. Whilst the cultural and economic benefits are vast, managing the immense historical catalogues is not easy. The majority of active data relating to both the publishing and recording industries has long been digitised. However, much of the music industry’s still archaic systems, many built on paper-practices, still require intensive re-investment and further manual processing to repurpose it for the digital world. The substantial costs involved in reconciling the incoming data, where this is possible, often leads to a ‘follow the money’ philosophy in prioritising the high value items.

3.3.3.3 NDAs

Contracts are the most common means for artists and companies to share the risks involved in the production of musical content and the control of rights in the output. Companies are typically better placed to control the rights and most recording agreements favour the companies over the artists. This is because artists, apart from a select few, are given advance payments in exchange for control over the rights in their works.¹⁵⁰ The use of NDAs has been criticised as a barrier to transparency¹⁵¹ and our findings confirm the view that use of NDAs creates increased opacity in the data flow. NDAs are commonly employed in transactions between labels and many other parties from artists to DSPs. It was also argued that the major labels received lump sum payments from streaming services, and they were also given equity shares by at least one of the streaming services in exchange for licensing deals for the use of their catalogues. The lack of transparency in data, compounded by the industry practice of advance payments, has been perceived by some as reducing the incentives for the major players to maintain correct data because these companies could benefit from market share-based distributions of unattributed income.¹⁵²

3.3.3.4 Unattributed income

A key justification for promoting data accuracy, improved data integrity and velocity is to ensure income is allocated to the correct people in an acceptable time frame. Without the timely exchange of accurate data, repertoire cannot be properly and punctually licensed, meaning creators cannot always be paid accurately or in a timely way for the exploitation of their copyright.

Opacity in music data arising from inaccurate or missing datasets as well as the absence of a link between the ISRC and ISWC has been widely criticised,¹⁵³ especially in relation to unallocated income. As a result, there is a belief in parts of the creative community that artists do not necessarily benefit from the increasing revenues generated from music streaming platforms. Referred to as ‘black box’, this unallocated income is one of the more contentious issues in music data management. One interviewee stated they had not received any accountings or royalties after their original label was purchased by another. This suggests that key data can go missing during a merger and acquisition process, creating ideal conditions for royalty income to remain unattributed. Paul Resnikoff, editor of Digital Music News has raised concerns “*over unmatched ‘black box’ royalty holding balances now believed to be in excess of \$300 million*”¹⁵⁴ held by US collecting society Soundexchange.

150 Caves, R.E., 2000

151 Rethink Music. 2015. Fair Music: Transparency and Payment Flows in the Music Industry. Rethink Music. [http://www.rethink-music.com/research/fair-music/transparency-and-payment-flows-in-the-music-industry.](http://www.rethink-music.com/research/fair-music/transparency-and-payment-flows-in-the-music-industry;);

Cooke, C., 2015. Dissecting the digital dollar part one. In The Music Managers Forum, London.

152 Singleton, M., 2015. This was Sony Music’s contract with Spotify. The Verge, 19. <https://www.theverge.com/2015/5/19/8621581/sony-music-spotify-contract>.

153 Rethink Music 2015; Cooke, C., 2015.

154 Resnikoff 2019

3.3.4 CMOs' roles and responsibilities

Historically, CMOs have played a crucial role in managing music data, especially given their 'trusted' intermediary role between rights holders and licensees. The CMOs' primary role is to provide efficient administration of rights for creators and rights holders who are not in a position to track each and every use of their content, as well as providing a fair and cost-effective means of licensing for licensees who cannot afford to contact all the relevant rights holders around the world. As they can aggregate large volumes of catalogues, users can benefit from using this resource at a reduced cost. CMOs typically have operated as a natural monopoly as there were few if any legal alternatives to gain such access to the global music repertoire. In general, the positives of the CMO model are seen to outweigh the negatives of a monopoly but this has sometimes nonetheless led to complaints about potential abuses of market power. Despite the rationale of cost-efficient collective administration of rights, the unchallenged high cost of administration in certain markets, together with a lack of competition, raised concerns that some CMOs have little incentive to invest in improvements to meet the new market conditions. Even with the aforementioned UK CMOs' relative high standards of operation, it was observed that for CMOs in general, there remain concerns about bureaucratic and archaic governance structures.

3.3.4.1 Roles and responsibilities

On the publishing side, systemic complexity and increasing fragmentation of datasets, as well as flaws in legacy data, produce inefficient data processing and difficulties in correctly identifying musical works to be linked to sound recordings. PRS has a very long history of collective management and its old management system, as some pointed out, is difficult to integrate with other systems and is therefore not efficient. Slow data processing and slow payments continue, partly also a result of CISAC's rigorous processes. Whilst designed to ensure data privacy and security, this process adds an extra set of challenges, especially given situations where the IPI becomes complicated through the dynamic process of ISWC assignment and multiple song splits. Many interviewees pointed out that for data accuracy and efficiency, speedier allocation of ISWC is essential. Yet CISAC have shown they are aware of the problem and are investing in improved technology in an effort to upgrade the system.

As to PPL's role, some suggested it would be beneficial if collective licensing were applied to interactive streaming, especially given a key benefit of collective management of licensing is to provide equal access to all parties, including those without the same bargaining power as the major stakeholders. Since collective licensing is not used in interactive streaming, artists have to negotiate their streaming royalty rate and distribution directly with the labels, which is concerning when most artists lack sufficient bargaining power to negotiate their contract terms with labels. This was even more of a concern for 'session musicians', 'non-featured artists' and contributors because they are not entitled to ongoing remuneration from the exploitation of their performance, as neighbouring rights are not recognised under the 'making available' designation of interactive streaming platforms.

3.3.4.2 Data control

CMOs have maintained databases to provide ‘collectively authoritative data-sets’ where unique and persistent identifiers could be assigned to musical works and sound recordings so as to ensure appropriate payments are made. As a result of the unresolved issues around linking ISRC and ISWC, combined with the absence of a comprehensive and authoritative database publicly available to affirm identifiers, tensions have arisen in relation to the exclusive database owned and controlled by CMOs.

CMOs have invested substantial effort and capital to build their own data systems, which they naturally see as valuable assets. In addition, CMOs are required to take measures to protect data as commercially sensitive information. New technologies sprang up to disrupt this model where music content can be distributed online. New solutions also emerged to provide alternative ways to access contribution data such as MusicBrainz and Gracenote. There is a common belief that these changes put pressure on CMOs to change their protective mind-set over their databases. Given these circumstances, one interviewee indicated that the CMOs’ protective mindset could actually make their role less relevant.

“[The] Collection Society mindset, where everything has to be protected and hidden, and the name of the song writer is the greatest secret on the planet. So, it’s protectionism. In technical standards it gets a bit worse because technical standards define how you exchange information...It actually creates the opposite effect...by blocking the system, they’re actually isolating themselves.”

3.3.5 Recent industry initiatives

Acknowledging the significance of data issues, the industry has embarked on a number of industry-wide initiatives to tackle data issues, such as Global Repertoire Database (GRD) and DDEX. In addition to these initiatives, many companies are also developing their own solutions that could mitigate problems they face in music data management. This section discusses the achievements and shortcomings of these initiatives.

3.3.5.1 GRD

The intention of GRD was to build a central database of musical works. Despite widespread anticipation that this could offer a solution in resolving data information deficiencies, the project was abandoned. Many pointed to political issues as the main reason why this ambitious initiative did not work out as envisaged. One industry executive who was directly involved with the GRD initiative believed, fundamentally, that failure was due to diverse stakeholders not being able to reach agreement on who should have control of what. They stated:

“It was all about control. It was essentially, you’re asking me to pay 4 million bucks into a project, when I’m not on the board. We had 30 people on the board and every single party [but]...Society A would not allow Society B to represent them.... so, it became unwieldy and unmanageable, [with] lots of political vested interest.”

3.3.5.2 DDEX

Formed in 2006, DDEX is an international consortium set up to address data issues by encouraging participants to adopt standards for data messaging and communications based upon accepted and agreed protocols and identifiers. Many interviewees were keen to highlight the positive impact of DDEX's approach to promote collaboration.¹⁵⁵ DDEX indeed has achieved substantial success in gaining increasing adoption and membership around the world. However, DDEX is not considered to be the magic bullet for all the data issues facing the music industry; for example, market dominance still remains an issue, even among DDEX members. In addition, it does not solve the problem of duplication of resources across the industry but as an instrumental approach that offers flexibility of interoperation, it leaves the responsibility for structuring internal silos to the asset holder. Critically, without a framework of meaningful incentives and sanctions that promotes mutually beneficial processes, interconnected protocols are threatened by fragmentation and non-adherence to and divergence from standards.

Whilst industry-wide implementation is essential for the standardisation to be truly meaningful, DDEX relies upon self-regulating principles which can leave some parts of the value networks, such as the mushrooming DIY artists or small independent labels, on the fringe of the participation. Although DDEX has implemented measures to resolve some anomalies and merge silos developed by individual companies,¹⁵⁶ the effort required to manage change and the possible political fallout suggest that a more sophisticated form of governance is required to coordinate and guide collaboration.

3.3.5.3 Internal systems/silos/duplication

Industry stakeholders all agreed on the need to improve their data management and we observed many in the value networks striving to improve the accuracy of their data by investing more capital and human resources. However, our findings show that much of this is happening locally using isolated systems. We observed that many companies are building their own internal systems to match ISRCs and ISWCs and all the repertoire under their control. Furthermore, every company on the twin sides of the music licensing system, both tech and content, operate their own internal systems with purpose built IT unique to them. The main difference between the two sides is illustrated in the following observation:

“The largest content owners are usually part of a much larger conglomerate (e.g. Sony and UMG) that dictate the internal data system standards. As such any industry data standards need to be interoperable with each content owner’s own system. Even so the difference in royalty processing systems is not substantial as almost all publishers use a bespoke version of a standard system originally designed in the 1980s or 1990s. Therefore, many companies are more accustomed to adapting any standard to its own internal reporting and data systems.”

¹⁵⁵ It should be noted that DDEX was not conceived to deal with these types of problems, but acts when requested to do so to facilitate meaningful discussion and guide collaboration

¹⁵⁶ This is discussed in more detail in the next section Internal systems/silos/duplication

The tech companies by contrast have an avowed walled-garden approach to their entire operations. Apple, Google and Microsoft each sought to dominate the Internet by applying its own 'closed' standards across their hardware and software.¹⁵⁷

The duplicated expenditure and effort invested by individual companies which, it is said, amounts to 'a behemoth of an entity,' indicates that industry-wide collaboration could save significant money and resource:

"The problem is that they're all dealing with the same problem locally. So what that means for our industry is that they are all wasting time and money fixing stuff locally... To actually build their own internal systems that manage all the data requirements. It's a behemoth of an entity because you've got to deal with every single eventuality of data requirement that the industry needs because they have clients who are representing rights in all of those different spaces."

There is recognition that industry-wide measures could be developed and adopted to fix the problems. Despite the apparent benefit that can be achieved from the collaboration, the market-led competition has been the sine qua non in dealing with data issues.

3.3.6 Further barriers to progress

3.3.6.1 Lack of understanding of data

We observed there are varying degrees of awareness and understanding of the importance of data management. Digitisation has produced an increasingly diverse range of creators, including what are known as 'new amateurs'.¹⁵⁸ Whether on an amateur or professional level, there are not enough mechanisms to ensure that all those who need to deal with identifiers have the tools and knowledge necessary for effective data management.

Many interviewees indicated a lack of awareness of the importance of data as a core issue. This is partly due to the historical context where the importance of getting the data right at the point of creation has not been deemed a priority and has often been perceived as a chore for many creators. For them, creative work is their priority, and the creative process has often been more chaotic than systematic. In many cases, not enough attention was paid to effective data housekeeping until a piece of music became popular. Essential to the efficient management of data should be a focus on the generation of accurate data at the point of creation.

Although there are many education programs available throughout the industry, they function with a limited remit and therefore do not have the necessary impact across the entire sector. Many were of the opinion that the knowledge resulting from education about the importance of the data relevant to their music could positively impact creators' earnings. However, it should be noted that this lack of awareness lies not only with creators but also with many other stakeholders in the value networks. In general, there is

¹⁵⁷ Arthur, C., 2012. The history of smartphones: Timeline. The Guardian, 24. He explains this as part of "Digital Wars" Some of these are more closed than others, though; notably Apple is more restrictive than Microsoft

¹⁵⁸ Prior, N., 2010. The rise of the new amateurs. Handbook of cultural sociology, pp.398-407.

insufficient awareness and understanding of the incentives for good practice nor of the impact of bad practice. This situation is compounded by the emergence of DIY creators and more diverse ways of distributing music that have brought further changes in the way music data is registered and managed.

3.3.6.2 Politics and asymmetrical power relations

The music industry, with its diversity of stakeholders, comprises a range of asymmetrical power relationships, which, as many interviewees noted, create obstacles to industry-wide collaboration. It was suggested that, no matter how complex the data issues are, with the right approach they are not beyond resolution.

“I think it’s fixable. But there’s been too much messing about that has prevented it being fixed because there’s too many vested interests, I don’t think it’s just data. So, speaking particularly of the music industry, things that are basic to much more automated industries, like web services, barely exist (in the music industry) which in the 21st Century is frankly ridiculous. And so, everything is done here. Certainly, exchange data is done very clunky old fashioned...(but) technology is not the problem, people are.”

Many agreed that the main issues which hampered industry-wide collaboration and created lack of trust were less about technology than about political will and understanding across the range of industry interests.

3.3.6.3 Fragmentation and insufficient collaboration

The rapid growth of data along with the diversification of music distribution outlets and increasingly sophisticated communications have resulted in unprecedented levels of complexity in data management. The lack of cooperation in data exchange in the industry has resulted in increasing fragmentation of datasets. For example, it was suggested that one major publisher’s licensing model differed from other publishing companies, as it had its own unique system to reconcile ISRC and ISWC without relying on the CMOs for accurate data. This company like many others, maintains its own centralised proprietary global database to reflect the data for all of the repertoire under their control. Despite efforts to match the two codes, there remain delays in confirming the ISWC as this is not always issued quickly by the relevant CMO members of CISAC.

Extensive merger and acquisitions amongst record labels and publishing companies during the 21st Century has exacerbated fragmentation in the datasets. The problem is particularly acute in the publishing sector where rights have been disaggregated and re-aggregated especially since the 2005 EC Recommendation that led to the widespread adoption of ‘Option 3’.¹⁵⁹ This fragmentation of data also explains the recent industry wide impetus to improve reconciliation between ISRC and ISWC.

The competitive environment within the market, however, has driven most companies

¹⁵⁹ Option 3 was to provide rightsholders with the right to authorise a single collecting society to license all uses of their repertoire across the EU. Source: http://europa.eu/rapid/press-release_MEMO-05-369_en.htm

to develop their own solutions, in isolation, which further increases fragmentation. In the absence of overarching rules to regulate the efficient flow of the data, we observed some stakeholders often manage their data in their own way, creating inefficiencies as well as fragmented datasets.

“The fragmentation of this industry is its own worst enemy. That’s what’s killing this industry or stopping it from thriving in the way it should be thriving... If you’re trying to unlock the value of music, there are people who value music tremendously and they start the conversations going.”

3.3.6.4 Lack of governance

From the interviews we conclude that a lack of governance in data exchange can result in serious inefficiencies. Reflecting upon the processes of data ingestion, registration, and verification, as well as the ability to effectively and efficiently enquire, audit, hold to account and challenge decisions, many stakeholders felt that the current market-led approach has created hierarchies and friction which make it difficult to realise the full potential and value of digital music. Preoccupation with market control and cost management structures within the current framework can hamper investment in innovation and lead to entrenched defensive positions that inhibit the development of collaborative, interconnected systems.

Describing the music industry as “a complex monopoly with a lack of governance”, one expert emphasised that the industry needs governance to encourage stakeholders to move beyond their own interests and to find ways to tap into the huge potential of digital music value.

Standardisation of data exchange is necessary to meet the requirements of bilateral agreements between music licensing companies (MLCs) that administer the rights of producers and performers across multiple territories. This is based upon an understanding that reconciling and mapping identifiers is beneficial to a wide range of parties and is fundamental to any system which aspires to realise the opportunities of a data-based economy. There is no doubt that DDEX’s contribution to data governance and their promotion of practical collaborative data frameworks and standard protocols is significant and deserves continued support. It was argued, however, that standardisation alone is not sufficient; the industry needs a mechanism that can ensure all stakeholders can work together productively. Without this, particular actors across the industry will find ways to manipulate solutions to suit their own needs, which may be detrimental to the overall ecosystem. An industry executive suggests:

“We need an industry protocol that is beyond metadata to be able to work out how we behave with each other. And there’s got to be some sort of incentive to get people to come to terms in a way that enables us to pay out accurately because if no one is deciding who owns what, how on earth can you do it. You find that the business is adapting in all sorts of ways rather than solving the problem and they come back to it again. It’s not just the metadata issues themselves and of course we’re coping with it....This cannot simply be seen as a technical problem. The data...I describe it as a necessary but not sufficient condition.”

3.3.7 Creators in music data value networks

A primary rationale for an efficient and transparent data management is to remunerate creators properly. It is widely claimed that a large amount of royalties often goes to major rights holders or a few high-earning creators.¹⁶⁰ Despite the growth in revenues being generated by music streaming platforms, we noted a clear perception that this ‘winner takes all’ trend is growing in digital music bringing problems relating to creators’ earnings and the divergent views around the legal structure of streaming.

3.3.7.1 Music data and creators’ earnings

As the music business has become increasingly data-driven, the importance of that data has been heightened and there is an increasing awareness that data is an important asset. The creators’ ability to understand data on the uses of their music therefore has increasing significance but our interviews revealed that many of them were not fully aware of this. To compound this problem, there are insufficient mechanisms in place to ensure data accuracy.

3.3.7.2 Data as an asset

Creators’ enhanced ability to track uses of their music through technology increases their access to essential information and this data enhances their knowledge about their fan base, their career development and their potential future revenues. Although creators’ increased awareness of data ownership is important, as one interviewee advocated, this needs to be accompanied by resolving the problems of ownership and politics in the industry, which have hampered innovation. The main benefit of resolving these problems could be to ensure proper remuneration for creators. For this change to take place, however, there has to be a new understanding of the creator’s role, at the centre of the music business rather than at the periphery.

3.3.7.3 Creators’ earnings and attribution

It has been widely acknowledged that in the music economy a small minority of high-earning artists receive the majority of music sales revenues,¹⁶¹ and this is equally evident in the growing digital music economy. However, many feel revenue distributions have become even more skewed towards the ‘top’ artists. To balance this trend, especially given the increasing significance of discovery in the digital music economy, the need for proper attribution of all those in the creative value chain is gaining importance.

¹⁶⁰ Towse, R., 2001.

¹⁶¹ Towse, R., 1999. Copyright and economic incentives: an application to performers’ rights in the music industry. *Kyklos*, 52(3), pp.369-390; Kretschmer 2001

3.3.7.4 Debates on the legal definition of streaming

In relation to artists' earnings on streaming platforms, a range of interviewees raised concerns over the current legal definition of streaming. Currently, streaming is subject to the making available right whose main purpose was to ensure rights holders had the exclusive right of "making available to the public, by wire or wireless means, in such a way that members of the public may access them from a place and at a time individually chosen by them."¹⁶² A number of interviewees questioned whether it was appropriate to define streaming under the making available right. The prospect of a successful challenge would mean that neither the traditional broadcasting right, nor the making available right properly defines streaming, leaving streaming in a "legal limbo".¹⁶³ The crux of the challenge is likely to be that the passive listening populated by automated streaming playlists raises questions whether streaming can continue to be defined under the making available right; in the case of the making available right, the recording should be accessed from a place and at a time individually chosen by the user. The significance of redefining streaming is not merely about the law, but also the practical ramifications, such as the designation of royalty rates, the applicability of equitable remuneration and the role of collective management.

There were divergent views on the current legal framework for streaming, even though labels robustly defended their interpretation of the current law. Some interviewees argued that labels' interpretation of the existing legal structure enables them to typically pay creators a 15-20% rate for a retail sale, rather than the 50% rate that would apply for broadcasting uses. It was also noted that labels have significantly greater bargaining power by not going through PPL for the licensing of streaming. This was in contrast to the views of certain creators, who tended to believe the current legal structure unfairly benefits the labels and that revenues would be much greater for creators if streaming were defined as a broadcasting right. It was also clear that on revenue distributions, creators tended to trust PPL more than the labels.

Calls to challenge the current definition have come from performer representatives, particularly those representing session musicians. Currently only featured artists are able to negotiate their royalty rates for streaming with labels, whereas session musicians or non-featured artists are paid a one-off fee for their performance. The majority of session musicians or non-featured artists have relatively weak bargaining power to negotiate terms. In the absence of legal protection such as equitable remuneration¹⁶⁴ which is not applicable in the making available right, this group of creators receive no ongoing payment from interactive streaming.¹⁶⁵

162 WCT 8, WPPT 10, 14

163 Borghi, M., 2011. Chasing copyright infringement in the streaming landscape. *International Review of Intellectual Property and Competition Law*, 42(3).; McGugan, F., 2015. Making Available, Communication to the Public & User Interactivity. pp.04-16. <https://www.musictank.co.uk/resources/reports/making-available-communication-to-the-public-user-interactivity>. The making available right is exercised differently in different regions, creating deep disparity of rules under cross-border situations.

164 It entitles performer to be paid when their performance is played in public or otherwise communicated to the public, is not applicable in interactive streaming and is not waivable other than a collecting society.

165 For more discussion on how views on this varies amongst diverse stakeholders, see Aguilar, A., 2018. We Want Artists to Be Fully and Fairly Paid for Their Work: Discourses on Fairness in the Neoliberal European Copyright Reform. *J. Intell. Prop. Info. Tech. & Elec. Com. L.*, 9, p.160.

3.4 Conclusions and recommendations

3.4.1 Conclusions

Data management issues are at the core of the future of the music industry. In the midst of the growing digital music economy, concerns have been raised over some of the major issues such as the remuneration for artists and the stifled innovation arising from the data management inefficiencies. Although there was a consensus that these data management inefficiencies should be improved, there was a lack of understanding and agreement on how and where to start. The existing discourse has often been dominated by legal considerations. Whilst important, these often limit the focus on the other key issues impacting upon the market. Music data management is multifaceted, and the context is evolving around social, technological, legal, cultural, political, and industrial factors.

We therefore designed the research to capture the complexity involved in the management of music data process. Drawing upon the framework of socio-technical constellation of the music data management, we sought to take on diverse views from a broad range of stakeholders. The empirical analysis gained from over 50 interviews with the industry stakeholders from across the music value networks allowed us to move beyond the prevailing linear views which often resulted in blaming certain parts of the industry or an over-emphasis on the changes in the legal structures. Instead, we observed that the issues around music data management are much more sophisticated and nuanced. Whilst the industry stakeholders are striving to adjust to the changes brought by digital technology, there are fundamental issues that need to be addressed. To borrow Einstein's famous quote, we cannot solve our problems with the same level of thinking that created them. It is our hope that our holistic view of the data issues can serve as an opportunity to re-examine this critical matter and facilitate conversations that the industry needs in order to make meaningful and constructive changes in this field.

3.4.2 Summary of key findings

Five main themes emerged from the interviews with industry stakeholders.

Firstly, the music industry universally agrees that there is a need to change the way in which digital music data is managed. The impetus for change is three fold: (1) the unparalleled level of growth in data volumes poses a challenge in managing that data, (2) the potential existential threats arising from the power of multinational companies on both sides of the licensing system, and (3) the economic imperative that better quality data is essential to building a digital music economy that benefits all parties in the value networks.

Secondly, our report concludes that considerable inefficiencies arise from difficulties in linking two industry identifiers, ISRC and ISWC. When matched with the associated metadata, the linked ISRC and ISWC becomes a valuable mechanism for accurate and timely rights compensation. Despite stakeholders' strenuous efforts to modernise the system of managing the identifiers, many of the issues in linking between ISRC and ISWC remain unresolved. In response, the UK's two major CMOs, PRS for Music and PPL, have

developed systems to link these identifiers; although these initiatives are encouraging, the on-going lack of a single authoritative source of data poses a challenge to any future developments. ISNI, on the other hand, has been developed with the potential to act as a ‘bridge’ across other types of party identifiers. ISNI has the potential to change the way music data is managed when linked to a content identifier, however it still needs to overcome some technical issues and resistance from parts of the industry to be widely accepted for applications in music. Fundamentally, we believe measures to ensure link ISRC and ISWC could significantly improve the efficiency in music data management.

Thirdly, we concluded that a lot of standard industry practice has not sufficiently adapted to the digital environment and this poses challenges to a more efficient and transparent management of digital data. We discuss this in three parts: (1) industry practices, (2) CMOs’ roles and responsibilities, and (3) internal systems and duplicated efforts.

(1) Industry practices

The legacy catalogues assembled in the analogue era involved little systemic data collection and this has meant much of the data may have been lost during the transition to digital. In addition, existing business practices such as Non-Disclosure-Agreements (NDAs) and lump-sum advances were widespread and accurate data was not deemed a priority. Some of the existing infrastructure still relies upon manual processes and transactions, so reconciling the legacy data requires significant financial and human resources to manage time-consuming manual processes. The unintended consequences of these practices are increased opacity in the data flow as well as increases in inaccurate data leading to higher levels of unattributed, so-called ‘black box’ income, that cannot be distributed to those entitled to receive remuneration.

(2) CMOs’ roles and responsibilities

Many industry stakeholders, although acknowledging UK CMOs’ high standards of operation compared to CMOs in other territories, expressed concerns about the high level of bureaucracy and in their view, archaic governance structures which characterise the sector overall.

On the publishing side, the systemic complexity and the increasing fragmentation of datasets, as well as the flaws in legacy data, leads to inefficient data processing and difficulties in identifying the correct musical works to be linked to sound recordings. With no alternative measures available from the CMOs, many businesses are building their own solutions or adopting expensive intervention measures. It was noted that the publishing sector has a different sense of urgency and this seems to be reflected in the sector’s slower response to the challenges of ever-growing data volumes. Slow data processing and slow payment continue partly because of the need for rigorous processing. Whilst ensuring data privacy and security, it adds another layer of challenges in matching to the IPI. For ISWC, CISAC has proposed an initiative to increase the speed of allocation. However, this has not been implemented as yet.

On the recording side, the linking of IPNs to ISRCs is necessary to facilitate the identification of performers and attribution in respect of their recorded performances. Labels themselves administer these data systems in isolation for interactive streaming without the CMO procedures which underpin and maintain ‘collectively authoritative data’ with concerns raised around trust and transparency. Specifically, in relation to the absence of the CMO’s role, some argued that the legal definition of streaming was predisposed to protect labels’ interests rather than those of the artists. Some suggested it would be beneficial if collective licensing was applied to interactive streaming. The absence of a centralised database for ISRCs suggests that there is often more than one version of the truth, which further complicates linking with other identifiers.

Most concerns about CMOs’ roles focused on their protection of their data. CMOs have invested enormous amounts of effort and capital to build their own data systems and would understandably conceive these as valuable assets. Unsurprisingly, with music content so widely distributed online, new technologies have emerged to also disrupt this model, including alternative ways to access the necessary data such as MusicBrainz and Gracenote. Some interviewees suggested that CMOs’ protective mind-set over their ‘proprietary’ data may, in time, make the CMOs’ role less relevant going forward as they could be bypassed.

(3) Internal systems and duplicated effort

Most companies acknowledged the need to improve their data management and have taken measures to address this. Our findings show that many companies are building internal systems to suit their own specific needs. However, many interviewees suggested that there were growing amounts of duplication and effort in dealing with common issues, but that industry-wide collaboration could address inefficiencies and therefore save money, time and labour. Despite the apparent benefits of collaboration, free market competition models have been the sine qua non in dealing with data issues.

Fourthly, we identified a number of major barriers to improving efficiency and transparency in music data management which need to be addressed: (1) the lack of awareness about the importance of data, (2) the politics arising from asymmetrical power relations, (3) the lack of collaboration and (4) the lack of governance.

(1) Lack of awareness about the importance of data

Historically, the importance of getting the data right at the point of creation has not been deemed a major priority. The lack of systematic data collection has compounded data problems. The emergence of DIY, User-Generated Content (UGC) and an increasing number of ways of distributing music adds another layer of problems. Although there are many education programmes available, they function only within a limited remit. In addition, there is insufficient awareness and understanding of incentives for good practice or of the impact of bad practice. Our team proposes a more systematic education programme.

(2) Politics and asymmetrical power relations

The GRD initiative highlighted the differing political motivations across the music industry. Vested interests and asymmetrical negotiating power impede data efficiency. Improved collaboration could help address the difficulties of managing individual interests. This has resulted in multiple silos, fragmented datasets and the development of similar solutions operating in isolation. With little or no desire to build another centralised database, and with significant investment already put into building individual solutions, we recommend finding a solution to make existing systems interoperable as a constructive way forward.

(3) Lack of collaboration

The rapid growth in the volume of data exchange, the emergence of diverse digital music distribution outlets, and an increasingly sophisticated communication between creator and user, has resulted in unprecedented levels of complexity in data management. A lack of cooperation between all players however has resulted in an increasing fragmentation of datasets, along with increasing administration costs for data management and a duplication of data solutions built by individual organisations. We therefore suggest a more bespoke model for building collaboration across the industry.

(4) Lack of governance

Many interviewees highlighted a lack of governance as the source of inefficiencies in music data management, without specifying exactly what the term referred to. Some stakeholders advocate that the market-led approach, which has created hierarchy and friction, is not suited to realise the full potential of the value in digital music. However, contributors were not clear about how this might be resolved. Although DDEX standards help in resolving data issues and deserves continued support, standardisation by itself can't solve all the problems. Unless there is oversight and governance in place, actors will always find ways to manoeuvre around the system to promote self-interest, regardless of the impact on the greater good.

Finally, our findings illustrate that creators are often not sufficiently taken into account when systems of data management are instigated. Creators, themselves, are often not fully aware of the importance of capturing data and registering contributions. Inaccurate reporting, data errors and inefficiencies and the resultant unattributed income goes unaccounted, unaudited and unreported. An opaque system means it is impossible to know how this affects artists' earnings and therefore it becomes much more difficult to incentive good practice at the grass roots.

Divergent views around how the current legal structure of streaming operates, have been highlighted by calls from artist representatives for its re-examination, to assess how the current model impacts content creators.¹⁶⁶

¹⁶⁶ #FairInternet4Performers <https://www.fair-internet.eu>

Our observations show that there is a clear divide between organisations representing creators and those representing DSPs/record labels on this issue; the former advocating the need for change and the latter tending to favour the status quo.

The legal framework relating to streaming is outside the scope of this research. There are differing views on this issue, with some interviewees suggesting that a reassessment of the legal framework of streaming should be considered.

3.4.3 Recommendations

The following recommendations emerged from the semi-structured interviews with the key stakeholders and industry players and must be considered in light of the priorities articulated in the UK Industrial Strategy, the Bazalgette Review and the Creative Industries Sector Deal.

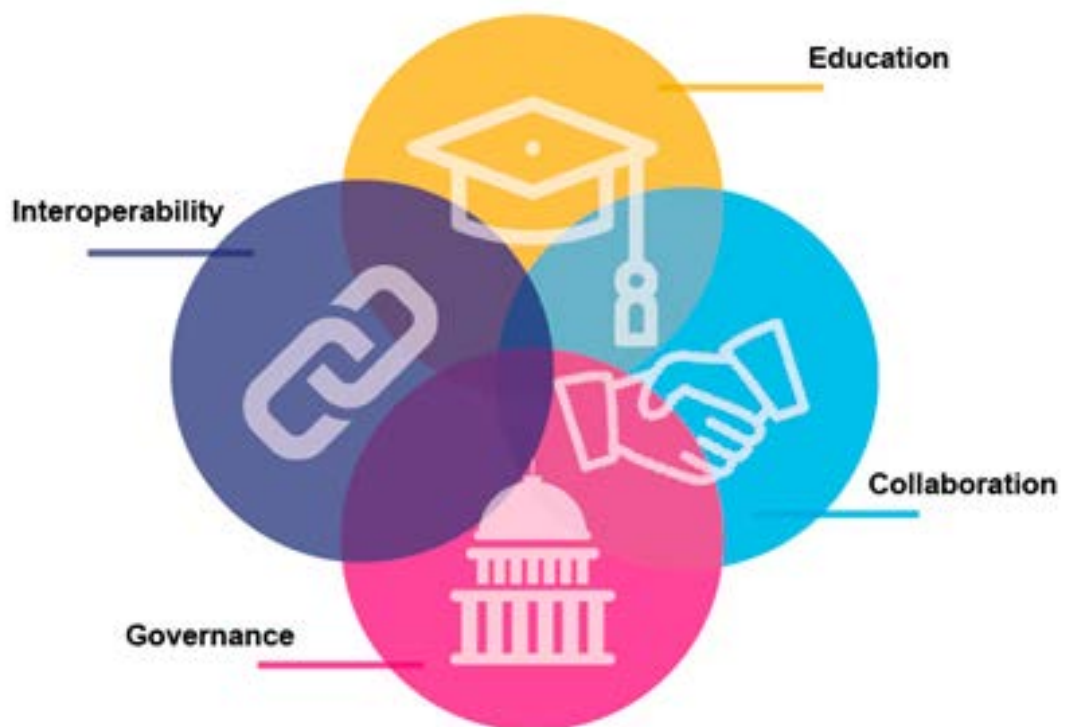


Figure 20: Recommendations

3.4.3.1 Education

Many interviewees indicated a lack of awareness about the importance of data management as a core issue.

To address this we recommend that industry, academia and education providers should collaborate to develop, promote and deliver educational opportunities with accredited levels of proficiency around data management and that there should be:

1) Accredited Education Programmes for Data Entry Specialists

Despite the increasing importance of identifiers, the industry has not paid enough attention to creating specialist qualifications or systematic education for those who are in charge of registering industry identifiers. Data entry is often carried out by interns or new employees, most of whom have not been given any bespoke education or training. In addition, the lack of industry-wide standardisation for data entry requirements gave space to a proliferation of different guidelines and rules set by various entities. In complex music data networks where, diverse stakeholders have different levels of resources and capital to ensure data accuracy, the lack of emphasis in this field has created room for data inaccuracy.

2) Enhanced Education Programmes for Creators

Historically, the importance of getting the data right at the point of creation has not been deemed a major priority. The lack of systematic data collection has compounded data problems. In addition, the emergence of DIY and of diverse ways of distributing music make it difficult to control data management. Given the increasing significance of data as an asset for artists, this lack of understanding is particularly problematic. Although there are many education programs available, they function within a limited remit and therefore do not have far-reaching impact across the industry. Essential to the efficient management of data should be a focus on the generation of accurate data at the point of creation.

The linking of creative endeavour and professional practice by way of progression through industry- focused digital rights education programmes is a fundamental tenet of our recommendations.

3.4.3.2 Interoperability

Interoperability has been flagged up as the key element for improving data management. The industry has revolved around separate legal frameworks, publishing rights, performers' rights and sound recording rights. Management entities have evolved in silos with the single rights type. In addition, vested interests and power struggles have made it difficult to build an integrated system. With little or no desire to build another centralised database, many parties have built their own systems. Although standardisation promoted by DDEX is having a positive impact in facilitating transactions to work across different systems, satisfying requirements across a range of industry stakeholders, it has been suggested that for increased interoperability, a range of other important issues need to be addressed. Communities and organisations have differing views and perspectives when it comes to defining interoperability. Its application across the music ecosystem goes beyond a purely technical application.

1) It is recommended that all content uploaded to a commercial digital platform be identified and attributed using internationally recognised, publicly accessible, linked identifiers; i.e. there should be no entity without identity.

Upon upload to a digital platform, the content and contributor both need to be represented by an authority-regulated identifier. This is fundamental to the technical operation of an interoperable system and underpins automated processes of disambiguation, empowering efficiency, reducing cost and enabling enriched experience through search and discovery. This unavoidably places a responsibility upon DSPs to become 'active' conduits of content, ensuring that legislative/regulatory frameworks and agreed systems of governance are adhered to.

2) It is recommended that mandatory procedures of ISRC assignment upon upload to a DSP should also include an ISWC assignment; i.e. no ISRC should be allocated without a linked ISWC.

The linking of unique, persistent identifiers, including ISRC and ISWC is essential to ensure all parties involved in the value networks are properly remunerated. When matched with the associated metadata, the linked ISRC and ISWC becomes a valuable resource for rights remuneration. Whilst diverse initiatives and measures arose to tackle this problem, no comprehensive solution is currently readily available.

At the centre of this issue lies the velocity of ISWCs, which relies on the dynamic complexity of rights assignment and split calculations within the publishing sector. To resolve this, some have proposed a provisional ISWC that can be linked to the sound recording upon release which could be later reconciled via centralised database. However, the duplication of ISRC, in addition to the absence of the consolidated database for ISRC, could render it difficult to link these identifiers.

Solutions may be found in pre-existing industry-led processes; for example, where the instigation of an ISRC is a mandatory constituent of commercial music content released on a digital platform, a process which began with Apple in the early 2000s. Recognising

the importance of early content identification as critical in the operation of reporting and payment systems, DSPs are now implementing this as a widespread procedure.

3) It is recommended that research into standardised processes and interoperable data gateway systems be prioritised for support and investment. The development of a registry focused upon the wider attribution of content contributors is also recommended as a subject of further research.

Data silos are a pragmatic reality when it comes to digital content¹⁶⁷. Diverse competing interests operating in an environment where data innovation and disruptive technology make for an uncertain market. These interests are being challenged to look beyond the parapets of their own walled enclosures and to facilitate an interconnected ecosystem that may benefit their rivals as much as themselves. Proprietary silos are structured according to commercial requirements and business objectives subject to resources and investment, so inevitably, when interoperability is raised for discussion, questions of economic imperative need to be considered. The construction of a global database with defined rules of operation to which all participants adhere, involves considerable commitment and resources. On a practical level, storage, access, ownership and structuring of a database needs clear designation of responsibilities and obligations. Large organisations with significant budgets for investment have been consolidating and structuring their data over time but market entrants and smaller organisations can lack the requisite funds to establish the state-of-the-art structures required for interconnection and scale.

An interconnected protocol that connects diverse platforms should be investigated with reference to technical innovations that are currently in development in music and related sectors and where appropriate piloted.

In considering interoperability, stakeholders have been urged previously to consider four key infrastructure requirements to implement control mechanisms for the management of digital content:

- unique persistent identification;
- global resolution for identifiers;
- information management standards and
- Trusted Certification Authority services.¹⁶⁸

4) It is recommended that funding for research be directed towards academic, governmental and industry partnerships appropriate for the management of data as a proprietary asset, acknowledging the status of data as a public good.

It is acknowledged that DDEX have already established a forum for technical discussions on standardisation and the implementation of these requirements.

167 Ohlhorst 2015

168 Hill, K., 1999.

3.4.3.3 Governance

From our research, we conclude that ineffective governance is considered to have led to serious inefficiencies that undermine confidence in the system. The market-led, self-regulatory approach, adopted during the analogue era, is perceived to be hampering further innovation in the digital era. Market hierarchy, friction and politics arising from asymmetrical power relations is not conducive to a digital music management environment where interconnected collaboration is key to ensure efficient and transparent data flow.

1) It is recommended that a networked system of data governance which takes into account requirements across the ecosystem be the subject of adequately funded research and development; this should promote harmonisation of process, set infrastructure standards and implement rules of practice that facilitate collaboration amongst all parties in the value chain. It is further recommended that a working group be established to look at the issue of data governance across the industry as a priority.

The music industry has largely relied upon legal-intervention-driven measures and has struggled to address the diverse anomalies emerging from complex digital music rights management issues. A range of concepts has been developed to define appropriate frameworks that can be applied to specific areas of industry and organisations.¹⁶⁹ Given the particular specifics of the music data management, we believe further research is required to consider whether any of the existing frameworks could be applied to the music data management and if lessons can be learned from other fields, such as banking, telecommunications and internet domain names, which have similar challenges and have had some success in addressing them. Tentatively, we suggest that a governance framework could oversee the entire ecosystem, promote harmonisation, set the infrastructure standards and facilitate collaboration amongst all parties in the value chain.

3.4.3.4 Collaboration

1) To inform any potential or future governance framework, it is recommended that bespoke fora are established to facilitate multi-layered collaboration and communication which engage a greater number and a wider range of stakeholders, on a more frequent and regular basis than at present.

Many interviewees recognised that collaboration and improved communication are key to efficient data management. The rapid growth in data exchange volume, emergence of diverse music distribution outlets and increasingly sophisticated communications have resulted in unprecedented levels of complexity in data management. The lack of cooperation in data exchange in the industry has resulted in increasing fragmentation of datasets. The increasing administration costs for data management and the duplication of the same type of solutions built by individual organisations suggest that increased collaboration and communication can reduce administration costs and increase productivity. The facilitation and promotion of multi-layered collaboration and communication, engaging a greater number and a wider range of stakeholders on a

¹⁶⁹ Kuhlmann, S., Stegmaier, P. and Konrad, K., 2019. The tentative governance of emerging science and technology—A conceptual introduction. *Research policy*, 48(5), pp.1091-1097. p. 1092.

more frequent, regular basis needs a framework which builds on successful models of interaction, taking account barriers to interactivity and which can learn the lessons from previous failures.

As a standards organisation DDEX promotes data solutions which emphasise messaging and communication strategies based upon accepted and agreed protocols and identifiers. This does not solve the issue of duplication of resources across the industry but as an instrumental approach that offers flexibility of interoperation, it leaves the responsibility for structuring internal silos to the asset holder. Critically, without an incentive/sanction framework that promotes mutually beneficial processes, interconnected protocols are threatened by fragmentation. Trust and authority are cornerstones that need to be established and proactively supported by interested organisations. Effectively this means 'buying into' the idea that technological intervention needs to be considered in terms of the public good.

The policing of an interoperable protocol for data is a social responsibility that requires regulatory oversight.

3.5 Final remarks and future research

At this critical juncture, we have found an unprecedented willingness across the music industry to consider how to improve data management, but we also detected a sense of frustration. This research set out to map the key issues involved in the way music data has been and is currently being managed. The unequivocal support we received throughout the interviews and workshops highlights the vast improvements that a transparent and efficient music data management system could provide for the digital music economy. A strong will *per se*, however, does not necessarily provide the answers to how the problems should be approached. There are competing motivations and vested interests, as well as variable levels of resource and capital available for data management amongst heterogeneous stakeholders in the music industry. This has so far frustrated numerous attempts to resolve data issues; from the ambitious plan to build an industry-wide central database (GRD), developing and maintaining standards for the exchange of data, competition policy, legal changes, through to technological interventions, the industry's approaches to data management have been beset with difficulties.

The growing volume of data and an understanding that data management systems need to improve, has in our view been hampered by the lack of an industry-wide solution. This has in turn driven industry stakeholders to invest in developing individual solutions, resulting in increasing fragmentation and siloed systems operating in isolation and significant duplication and inefficiencies. Amidst the music industry's prolonged transition from analogue to digital data management, big IT companies are poised to bring a fundamental change in digital data management which could potentially challenge the current system. The industry is now faced with a critical choice; either to stay with the current status quo of bifurcated efforts or to work together, for the benefit of all.

In making the decision, it is important to remember that what is at stake is not just the data phenomenon, picking a winner or slicing the pie. Music is a vital part of our culture and music data management in that sense is about finding ways to cultivate creativity and properly remunerate those involved in the creative process. The previous efforts serve as a prompt to reflect upon what the industry needs. The explosion in numbers of digital streaming businesses signals a shift from market-led competition to a digitally networked environment wherein everyone can potentially benefit from collaboration and networking. Data has enormous value but only when properly used, managed and understood. The big question therefore is how music data can be managed in order to benefit society and protect creators' rights, whilst creating a healthy environment for business (recording, publishing and tech industry) to innovate and prosper.

Every successful project begins by identifying the problems that need to be solved. This scoping research took a holistic approach in interrogating a broad range of issues to trace the complex and interrelated relationships amongst the music industry's diverse stakeholder community, with limited resources and time available. We therefore traded depth for breadth. A deeper exploration of issues covered in this report would provide a richer understanding. From the interviews and the workshops held, four key themes stood out for further exploration. Tension around the legal definition of streaming was expressed and demonstrates in our view the need to clarify where streaming stands in the digital music sphere. The industry stakeholders were of one voice for the need to develop a bespoke education strategy. A keen interest in wider governance came through loud and clear and we believe that future research into how a governance framework for music data management might work would be beneficial.

APPENDICES

Appendix 4.1 Archaeology of Music

4.1.1 Music Industry and Licensing Overview

4.1.2 Copyright definitions

4.1.3 Copyright and Technology Timeline

4.1.4 Streaming

4.1.5 Creator Remuneration

4.1.6 Music Data Management – standards and codes

4.1.7 Legislative Developments – Article 13 and the 2018 Music Modernization Act

Appendix 4.2 Architecture of Music

4.2.1 Current Blockchain Initiatives

4.2.2 Use case: Blockchain and the Music Industry

4.2.3 Artificial Intelligence, Deep Learning, Big Data

Appendix 4.3 Research Interviews

4.3.1 Key Quotes

4.3.2 List of Interviewees

Appendix 4.4 NVivo Analysis

Appendix 4.5 Bibliography

4.1 Archaeology of Music

4.1.1 Music industry and licensing overview

Major publishers

According to Peter Tschmuck¹⁷⁰ the 2014 figures produced by Will Page and published in *Music Business Worldwide* showed the global revenues for the music publishing sector as \$11.34bn but the majority of this income was made up performing right revenues, as shown below:

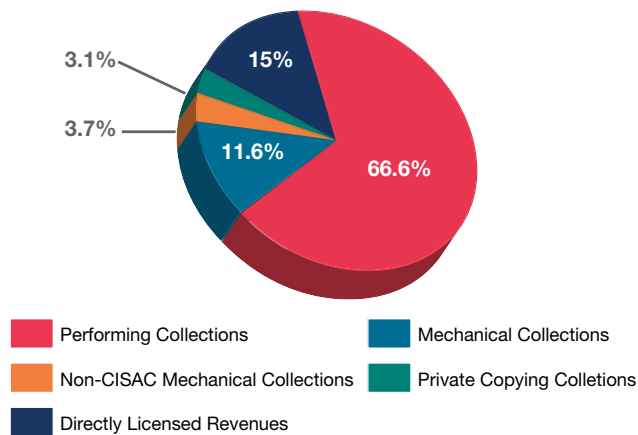


Figure source 1: Global revenues for music publishing

<https://musicbusinessresearch.wordpress.com/2016/01/31/the-global-music-publishing-market-an-analysis/>

Tschmuck also showed the income trend based on his meta-analysis of the global music publishing industry between 1994 and 2014 and the graph below highlights the growth of the music publishing industry throughout the early years of the 21st Century, at a time when recorded music revenues were declining substantially.

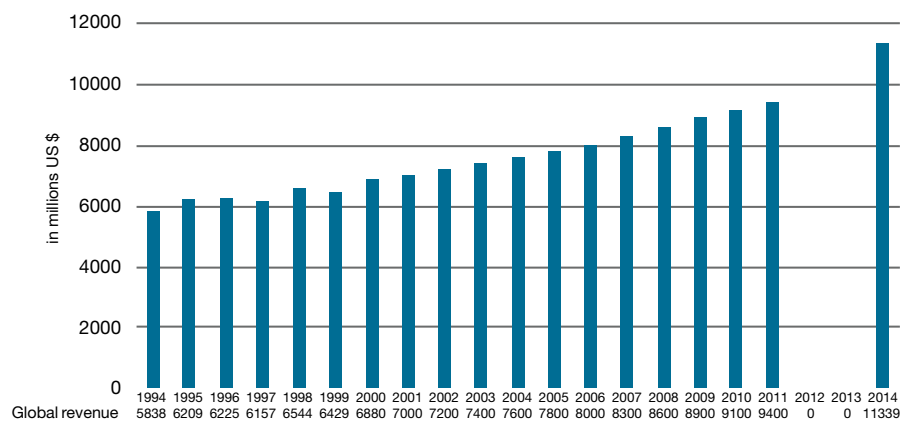


Figure source 2: Growth of Music Publishing

<https://musicbusinessresearch.wordpress.com/2016/01/31/the-global-music-publishing-market-an-analysis/>

¹⁷⁰ <https://musicbusinessresearch.wordpress.com/2016/01/31/the-global-music-publishing-market-an-analysis/>

The global market is dominated by the major publishers, which comprise Universal Music Publishing Group (including BMG Music Publishing since 2008), Sony/ATV Music (including EMI Music publishing since 2012) and Warner / Chappell Music. Each belongs to a larger conglomerate created by the acquisition and merger of catalogues and publishing interests. In the UK, post the acquisition of a 40% share in EMI Music Publishing, Sony/ATV became the effective UK market leader with, at the time, an estimated more than 30% market share followed by Universal Music Publishing (UMPG) at 22% and Warner Chappell at 12%. The shares may have varied since then but the pre-eminence of these three firms remains. According to Music & Copyright¹⁷¹ the combined global market shares of the 3 majors in 2017 was around 58.8% with Sony/ATV at 27.3%, Universal at 19.5% and Warner Chappell at 12% leaving a healthy and competitive independent sector at 41.2%.

Major record labels

The Association of Independent Music (AIM) defines a ‘major’ as “a multinational company which (together with the companies in its group) has more than 5% of the world market(s) for the sale of records or music videos.” Since 2012, there have been only three labels that can be referred to as “major labels” (Universal Music Group, Sony Music Entertainment, and Warner Music Group).

One noticeable difference between the music publishing and recorded music market is the greater dominance of the recorded music market by the three majors, whose collective global market share for both physical and digital was estimated at 67.8% according to Music & Copyright in 2018.¹⁷² However, the three major labels have a greater share of digital with 71.6% of the market leaving 28.4% to the independents.

Music publishing digital licensing innovations – Special purpose vehicles

The 2005 European Commission (EC) Recommendation’ that “liberated” rights holders to remove rights from most local European CMOs and led to the formation of SPVs (Special Purpose Vehicles) for the major corporate and independent international publishers. These include Sony/ATV’s SOLAR with PRS and GEMA, Universal Music Publishing’s DEAL with SACEM, and Warner Chappell’s PEDL which operates with several EU CMOs. More recently, BMG set up their ARESA SPV with GEMA, and a group of independent publishers (including Bucks Music, Beggars Music and Reservoir Media) moved their IMPEL licensing arm from MCPS to SACEM.¹⁷³

The current digital licensing hub systems in the EU formed to resolve the uncertainties produced by the advent of Option 3 post the 2005 EC Recommendation led to the creation of ICE (PRS, STIM, GEMA) and Armonia (SACEM, SGAE and SIAE).

There have been further significant changes among the CMOs in the North American licensing market with PRO SESAC acquiring the mechanical rights agency Harry Fox Agency in 2015, Canadian PRO SOCAN acquiring both Medianet Digital and Audiam

171 Ovum, 2018. Music & Copyright Newsletter 9 May 2018 p. 5

172 Ibid

173 <http://www.musicweek.com/publishing/read/our-vision-is-to-turbo-charge-our-members-digital-income-impel-names-sarah-williams-ceo/075991>

¹⁷⁴in 2016, and US NRO Sound Exchange acquiring the Canadian mechanical rights agency CMRRA in 2017.¹⁷⁵ Soundexchange launched its own 20 million song database,¹⁷⁶ which, whilst not listing every ISRC ever issued, nonetheless contains the vast majority of commercially active recordings.

4.1.2 Copyright

*“Works are created by their authors, reproduced and distributed by their disseminators, and enjoyed by the audience. These three actors, each with their own concerns, negotiate a delicate dance. Most generally, all must be kept content: the author productive, the disseminator profitable, and the audience enlightened. Get the balance wrong and things fall out of kilter. If authors become too exacting, the audience suffers. If the disseminators are greedy or the audience miserly, culture and eventually the public domain [is] dessicate[d]”.*¹⁷⁷

According to WIPO,¹⁷⁸ exhaustive lists of works covered by copyright are usually not to be found in legislation. Nonetheless, broadly speaking, works commonly protected by copyright throughout the world include:

- literary works such as novels, poems, plays, reference works, newspaper articles;
- computer programs, databases;
- films, musical compositions, and choreography;
- artistic works such as paintings, drawings, photographs, and sculpture;
- architecture;
- advertisements, maps, and technical drawings.

Copyright protection extends only to expressions, and not to ideas, procedures, methods of operation or mathematical concepts as such. Copyright may or may not be available for a number of objects such as titles, slogans, or logos, depending on whether they contain sufficient authorship. There are two types of rights under copyright:

- i. **Economic rights** allow the rights owner financial reward from the use of their works by others;
- ii. **Moral rights**, which protect the non-economic interests of the author.

¹⁷⁴ <https://www.billboard.com/articles/news/7445889/socan-acquires-audiam>

¹⁷⁵ <https://www.billboard.com/articles/business/7793209/soundexchange-buying-cmr-ra-reflects-evolving-markets>

¹⁷⁶ <https://www.hypebot.com/hypebot/2016/03/soundexchange-launches-free-20-million-song-search-database.html>

¹⁷⁷ Baldwin, P., 2014. p. 14-52

¹⁷⁸ <https://www.wipo.int/copyright/en>

Most copyright laws state that the rights owner has the economic right to authorise or prevent certain uses in relation to a work or, in some cases, to receive remuneration for the use of their work (such as through collective management). The economic rights owner of a work can prohibit or authorise:

- its reproduction in various forms, such as printed publication or sound recording;
- its public performance, such as in a play or musical work;
- its recording, for example, in the form of compact discs or DVDs;
- its broadcasting, by radio, cable or satellite;
- its translation into other languages;
- its adaptation, such as a novel into a film screenplay.

Examples of widely recognised moral rights include the right to claim authorship of a work and the right to oppose changes to a work that could harm the creator's reputation.

Registration

In the majority of countries, and according to the Berne Convention, copyright protection is obtained automatically without the need for registration or other formalities.

Most countries nonetheless have a system in place to allow for the voluntary registration of works. Such voluntary registration systems can help solve disputes over ownership or creation, as well as facilitate financial transactions, sales, and the assignment and/or transfer of rights.

"In recent years a number of issues have been raised concerning registration of copyright and related rights in the evolving digital environment. With the advent of digital technology, the overwhelming flow of content and multiplying scores of creators, often completely unidentified, justifies a renewed interest in readily available and accurate ownership data and therefore in documentation and recordation under different forms.

The absence of voluntary national registration systems, together with the lack of communication or interaction among them, results in a highly asymmetric international scenario. Moreover, voluntary registration is very different from one country to another including systems where the work is actually deposited (registration) and others where only declarations are submitted, without deposit of the work (recordation). Some countries have expressed the need of a greater interaction among voluntary registration systems." (WIPO 2019)

Related/neighbouring rights

The rights granted in national laws to the three types of beneficiaries of related rights as follows (although not all rights may be granted under the same law):

- Performers have the right to prevent fixation (recording), broadcasting and *Communication To The Public* of their live performances without their consent, and the *right to prevent reproduction of fixations of their performances* under certain circumstances.
 - The rights in respect of broadcasting and communication to the public may be in the form of *Equitable Remuneration* rather than a right to prevent. (See above)
 - Due to the personal nature of their creations, some national laws also grant performers moral rights, which may be exercised to prevent unauthorised use of their name and image, or modifications of their performances that present them in an unfavourable light.
 - Under the Beijing Treaty, these rights will extend to performers in relation to their audiovisual performances.
- Producers of sound recordings have the right:
 - to authorise or prohibit reproduction, importation and distribution of their sound recordings and copies thereof, and the right
 - to *Equitable Remuneration* for broadcasting and *Communication To The Public* of their sound recordings.
- Broadcasting organizations have the right to authorise or prohibit rebroadcasting, fixation and reproduction of their broadcasts.

(Performers are those who perform a work (including those in the public domain) or folklore but does not include 'extras' - It is understood that the definition of "performers" includes those who perform a literary or artistic work that is created or first fixed in the course of a performance – improvisation).

The Beijing Treaty – Audiovisual Performance [BTAP 2012]¹⁷⁹ deals with the intellectual property rights of performers in audiovisual performances. It grants performers four kinds of economic rights for their performances fixed in audiovisual recordings, such as motion pictures [The term of protection must be at least 50 years.]:

- i. **Reproduction** - the right to authorise direct or indirect reproduction of the performance fixed in an audiovisual fixation in any manner or form.
- ii. **Distribution** - the right to authorise the making available to the public of the original and copies of the performance fixed in an audiovisual fixation through sale or other transfer of ownership.
- iii. **Rental** - the right to authorise the commercial rental to the public of the original and copies of the performance fixed in an audiovisual fixation. There is no provision for equitable remuneration for commercial rental.
- iv. **Making available** - the right to authorise the making available to the public, by wire or wireless means, of any performance fixed in an audiovisual fixation, in such a way that members of the public may access the fixed performance from a place and at a time individually chosen by them. This right covers, in particular, on-demand, interactive making available through the Internet.
- v. **Authorisation** of broadcasting and communication to the public of their performances fixed in audiovisual fixations.
- vi. **Equitable remuneration** - for the direct or indirect use of performance fixed in audiovisual fixations for broadcasting or for communication to the public where contracting parties deposit a notification and where a commercial phonogram is embodied in an audiovisual product.

*“No guidance is providing (in the WPPT) as to the meaning of ER... (so) therefore remain for determination under law.”*¹⁸⁰ *but “national laws may establish how the single equitable remuneration is to be claimed, for example, whether by the performer, phonogram producer, or by both, and the terms on which it is to be shared (in the absence of agreement between the performer and phonogram producer)”*¹⁸¹ *“equitable remuneration may mean something less than market value’ given the parties will not be negotiating in a free-market environment”.*

[“Phonogram” means the fixation of the sounds of a performance or of other sounds, or of a representation of sounds, other than in the form of a fixation incorporated in a cinematographic or other audiovisual work.]

179 https://www.wipo.int/treaties/en/ip/beijing/summary_beijing.html

180 Ricketson, S. and Ginsburg, J.C., 2005. International Copyright and Neighbouring Rights : The Berne Convention and Beyond. 2nd Edition. Oxford University Press. New York. p.1268

181 Ibid

Article 19 of the Rome Convention (“...once a performer has consented to the incorporation of his performance in a visual or audio-visual fixation, article 7 - Minimum Protection for Performers, shall have no further application”) does not limit the performers’ freedom to negotiate contracts when they authorise the audiovisual fixation of their performances, nor their right to benefit from national treatment under the BTAP.

Articles 12(1) and 12(2) authorise contracting countries to decide whether performers’ rights are initially owned by the producer and Article 12(3) declares that contracting countries may additionally provide audiovisual performers with equitable remuneration for the making available to the public, broadcasting and communication to public of their audiovisual performance.

Transfer of rights - Contracting Parties may stipulate in their national laws that once a performer has consented to the audiovisual fixation of a performance, the exclusive rights mentioned above are transferred to the producer of the audiovisual fixation (unless a contract between the performer and producer states otherwise).

Independent of such a transfer of rights, national laws or individual, collective or other agreements may provide the performer with the right to receive royalties or equitable remuneration for any use of the performance, as provided for under the Treaty.

4.1.3 Copyright and technology timeline

Date	Event
1847	The Paris Concert Café Ambassadeurs is successfully sued by popular music composers Ernest Bourget, Victor Parizot and Paul Henrion. The exclusive right of the author to approve public performances – although established in France in 1791– did not thus become a reality until over 50 years after the law’s enactment.
1849	Following the Ambassadeurs Case the Cour d’Appel de Paris on 26th April orders the owner of Ambassadeurs Café to pay ‘compensation’ (effectively ‘royalties’) to composer Ernest Bourget for unauthorised use of his music.
1851	SACEM – the world’s first copyright collecting society for musical works (specifically for performing rights) – is established in France (Société des Auteurs et Compositeurs et Editeurs de Musique).
1886 - 1887	The seminal Berne Convention for the Protection of Literary and Artistic Works is signed (in Berne, Switzerland). It intends to give international copyright protection to the creative works of the citizens of European member state signatories.
1877	Thomas Alva Edison, succeeds in recovering Mary’s Little Lamb from a strip of tinfoil wrapped around a spinning cylinder. He demonstrates his invention in the offices of Scientific American, and the phonograph is born.
1887	Emile Berliner is granted a patent on a flat-disc gramophone, making the production of multiple copies practical.
1887	The Aeolian Company was founded by New York City piano maker William B. Tremaine as the Aeolian Organ & Music Co. to make automatic organs.
1893	Manchester, UK, Amalgamated Musicians Union Formed.
1894	First Musicians Strike in UK at the Liverpool Court Theatre when the orchestra were asked to take a pay cut. ¹⁸²
1895	The first true Pianola was completed by Edwin Scott Votey at his home in Detroit. Votey later joined the Aeolian Company.
1896	American Federation of Musicians (AFM) formed
1897	Marconi establishes a radio station on the Isle of Wight, England.
1898	The Aeolian Company put the pianola on sale in the USA in the autumn of 1898, and in Europe a month or two later.
1900	Valdemar Poulsen unveils his invention ‘The Telegraphone’, which recorded magnetically on steel wire to the public at the Paris Exposition.
1901	The Victor Talking Machine Company founded by Emile Berliner and Eldridge Johnson. Experimental optical recordings are made on motion picture film.
1903	The Aeolian Company has more than 9,000 roll titles in their catalogue, adding 200 titles per month.
1904	Edwin Welte in Germany developed a new kind of player piano, known as the Welte-Mignon, which over the years came to be known as the reproducing piano. Nearly all major pianists of the early twentieth century made rolls for the reproducing piano.
1905	US President Theodore Roosevelt: “Our copyright laws urgently need revision. They are imperfect in definition, confused and inconsistent in expression; they omit provision for many articles which, under modern reproductive processes, are entitled to protection; they impose hardships upon the copyright proprietor which are not essential to the fair protection of the public; they are difficult for the courts to interpret and impossible for the Copyright Office to administer with satisfaction to the public.” ¹⁸³

182 Williamson, J. and Cloonan, M., 2016. Players’ work time: A history of the British Musicians’ Union, pp.1893–2013.

183 Retrieved 2011-11-27. CS1 maint: Archived copy as title (link), The House Report on the Copyright Act of 1909.

Date	Event
1906	Composer - John Philip Sousa to US Congress: <p>“These talking machines are going to ruin the artistic development of music in this country. When I was a boy ... in front of every house in the summer evenings, you would find young people together singing the songs of the day or old songs. Today you hear these infernal machines going night and day. We will not have a vocal cord left. The vocal cord will be eliminated by a process of evolution, as was the tail of man when he came from the ape.”¹⁸⁴</p>
1907	Marconi established the first permanent transatlantic wireless service from Clifden, Ireland to Glace Bay, Nova Scotia.
1908	White-Smith Music Publishing Company v. Apollo Company, 209 U.S. 1 - decision by the Supreme Court of the United States which ruled that manufacturers of music rolls for player pianos did not have to pay royalties to the composers.
1909	Enrico Caruso is heard in the first live broadcast from the Metropolitan Opera, NYC.
1909	US Copyright Act created (codified in Section 1(e))[4] the first compulsory mechanical license to allow anyone to make a mechanical reproduction of a musical composition without the consent of the copyright owner provided that the person adhered to the provisions of the license. (Congress intended it to govern piano rolls.) <p>Congress declares: “The main object to be desired in expanding copyright protection afforded to music has been to give the composer an adequate return for the value of his composition ...” The law also prohibits “unauthorized mechanical reproduction of musical compositions”.</p>
1910	In the UK Mecolico (the Mechanical Copyright Licences Company) formed to license the mechanical right in anticipation of the 1911 Copyright Act.
1911	In 1911, Copyright Act (implemented 1 July 1912) in the UK brought provisions on copyright into one Act for the first time – This established Related Rights for Producers & Performers on Phonographic Recordings, as well as a Mechanical license.
1912	Major Edwin F. Armstrong is issued a patent for a regenerative circuit, making radio reception practical.
1913	The first ‘talking movie’ demonstrated by Edison using his Kinetophone process, a cylinder player mechanically synchronised to a film projector.
1914	In the UK PRS (the Performing Right Society Ltd) formed to administer the ‘Performing Right’ (non dramatic performance and broadcasting right) in UK, Eire and British Empire. The Society was founded to collect fees for live performance from sheet music, which were distributed to its members. <p>In the US, ASCAP was founded by Victor Herbert, together with composers Louis Hirsch, John Raymond Hubbell, Silvio Hein and Gustave Kerker, a lyricist Glen MacDonough, publishers George Maxwell (who served as its first president) and Jay Witmark, and a copyright attorney Nathan Burkan at the Hotel Claridge in New York City.</p>
1919	The Radio Corporation of America (RCA) is founded. It is owned in part by General Electric.
1948	Audio Engineers Society formed in NYC, USA.
1952	First use of Bar Code product identifier.
1956/57	The Copyright Act, 1956, comes into force on 1st June, 1957. It takes into account further amendments to the Berne Convention, and also the Universal Copyright Convention, to which the UK is a signatory. Films and broadcasts are now protected in their own right. The Performing Right Tribunal, predecessor of the Copyright Tribunal, is established.
1959	Toshiba released the first commercial helical-scan video tape recorder. In 1963, Philips introduced its EL3400 1” helical scan recorder (aimed at the business and domestic user), and Sony marketed the 2” PV-100, its first open-reel VTR intended for business, medical, airline, and educational use.

¹⁸⁴ Lessig, L., 2008., Remix: making art and commerce thrive in the hybrid economy. London: Bloomsbury Academic. Chapter 1.

Date	Event
1961	The Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organisations is signed. This proves important to the recording industry, and assists in the prevention of recorded music piracy.
1962	The standard audio cassette was invented in by the Philips company. They named it the “Compact Cassette”. ¹⁸⁵ The compact cassette technology was originally designed for dictation machines, but improvements in fidelity led the Compact Cassette to supplant the Stereo 8-track cartridge and reel-to-reel tape recording in most non-professional applications. ¹⁸⁶ Its uses ranged from portable audio to home recording to data storage for early microcomputers. [Philips was competing with Telefunken and Grundig in a race to establish its cassette tape as the worldwide standard, and it wanted support from Japanese electronics manufacturers.” ¹⁸⁷ Philips’ Compact Cassette became dominant as a result of Philips’ decision (under pressure from Sony) to license the format free of charge].
1964	Sony introduces the first VCR Home Video Recorder.
1967/70	The United Nations Convention establishing the World Intellectual Property Organisation is signed (of which the international bureaus set up to administer the Paris and Berne Conventions, almost a century earlier, were forerunners). (WIPO, as an international copyright umbrella organisation, commences operations in 1970.)
1968	The first cassette player (although mono) designed for use in car dashboards was introduced.
1969	Creation of ARPANET, the predecessor of the Internet. UNIX is developed by a group of AT&T employees at Bell Labs.
1971	The Convention for the Protection of Producers of Phonograms Against Unauthorised Duplication of Their Phonograms is adopted in Geneva on 29th October (sometimes referred to as the Geneva Convention).
1971	Intel releases world’s first microprocessor.
1974	The first use of UPC or Universal product Code BAR CODE UPC scanner.
1975	Bill Gates and Paul Allen found Microsoft.
1977	Steve Jobs, Steve Wozniak and Robert Wayne found Apple Computing Inc.
1980’s	Home Taping is Killing Music – BPI Campaign.
1982	The introduction of MIDI technology (Musical Instrument Digital Interface) begins to revolutionise music production.
1982	The introduction of the CD (Compact Disc) constitutes the first mass consumer product (or sound carrier) which holds music in digitised form.
1983	ARPANET officially changes to use the Internet Protocol, creating the Internet.
1984	Sony Corp. of America v. Universal City Studios, Inc., 464 U.S. 417 (1984), ¹⁸⁸ also known as the “Betamax case”, is a decision by the Supreme Court of the United States which ruled that the making of individual copies of complete television shows for purposes of time shifting does not constitute copyright infringement, but is fair use. The Court also ruled that the manufacturers of home video recording devices, such as Betamax or other VCRs (referred to as VTRs in the case), cannot be liable for infringement. The case was a boon to the home video market, as it created a legal safe haven for the technology.
1984/85	Richard Stallman, working at MIT, founds the Free Software Foundation, which is believed to be the first anti-copyright organisation of the digital era. Stallman’s GNU Manifesto sets out case for what became known as ‘Copyleft’.
1985	The first .com domain name, symbolics.com, is registered by the Symbolics corporation.

185 How Music Technology Evolved Over the Years? – SpeakStick”. speakstick.net. Retrieved 2016-07-14

186 Camras, M. and Martin, D.W., 1989. Magnetic recording handbook. Van Nostrand Reinhold.

187 Nathan, J., 2001. Sony. Houghton Mifflin Harcourt. p. 129.

188 Sony Corp. of America v. Universal City Studios, Inc., 464 U.S. 417 (1984)

Date	Event
1987	The Fraunhofer Institute in Germany began research code-named EUREKA project EU147, Digital Audio Broadcasting (DAB) – later to become MP3.
1988	The United States finally becomes a signatory to the Berne Convention.
1988/89	The Copyright, Designs and Patents Act (CDPA), 1988, supersedes the various amendments to the Copyright Act, 1956. In addition to economic rights, this Act introduces the concept of moral rights for the first time (The Right of Paternity and The Right of Integrity). (This present Act continues to be amended, and now incorporates various European Directives.)
1990	The US Copyright Act is amended in order to prohibit the commercial lending of computer software.
1991	The first GSM Mobile Phone network opened in Europe. Microsoft introduce Windows Media Player. Tim Berners-Lee introduces the web browser called WorldWideWeb.
1993	Severe Tire Damage – US Garage Rock Band become first band to perform live over the internet.
1994	The WTO (World Trade Organisation) TRIPS Agreement (Agreement on Trade Related Aspects of Intellectual Property) extends the principles established by the 1886 Berne Convention to all countries in the global free trade area. While reinforcing creator's rights ('author's life' terms), it also emphasises the concept of transferable property rights – in order to give economic stimulus to the exchange of 'cultural productions'.
1994	Jeff Bezos founds Amazon as an Online Bookstore.
1994	Emergence of the MP3 compression standard for music.
1995	ESPN SportsZone streamed a live radio broadcast of a baseball game between the Seattle Mariners and the New York Yankees to thousands of its subscribers worldwide by the company that became RealNetworks.
1994	John Perry Barlow (a former lyric writer for The Grateful Dead, and co-founder of the Electronic Frontier Foundation) declares, in a widely read manifesto, that intellectual property law "cannot be patched, retrofitted, or expanded to contain digitized expression".
1994	Google begins life as a research project by Larry Page and Sergey Brin when they were both PhD students at Stanford University in Stanford, California.
1995/96	The period of copyright is extended, in Europe and then America, to the life of the author plus 70 years pma (post mortem auctoris) for most printed works. (Sound recordings remain at 50 years.)
1996	In the US, the TRIPS Agreement restores, from 1st January, 1996, copyright protection to many works of foreign origin which are already in the public domain in the United States.
1996	On 1st December, the UK formally adopts European Union Directive 92/100/EEC which concerned rental, lending and neighbouring rights matters. This meant that those featured artists and session performers who performed on sound recordings which were broadcast or performed in public after 1st December 1996 in the UK now had a legal right to receive "equitable remuneration" for this use of the copyright.
1996	WIPO issues its Performances and Phonograms Treaty.
1997	Winamp was released by Nullsoft – it grew quickly, popular with over 3 million downloads, ¹⁸⁹ paralleling the developing trend of MP3 (music) file sharing. South Korean company SaeHan Information Systems develop first MP3 player - MPMan F10.

189 Bronson, Po., 1998. Rebootlegger. Wired. <http://archive.wired.com/wired/archive/6.07/newmedia.html>.

Date	Event
1998	<p>PayPal established in December as Confinity,¹⁹⁰ a company that developed security software for handheld devices founded by Max Levchin, Peter Thiel, Luke Nosek, and Ken Howery. PayPal was developed and launched as a money transfer service at Confinity in 1999, funded by John Malloy from BlueRun Ventures.</p> <p>X.com, an online bank founded by Elon Musk (November 1999) later merged with Confinity which was renamed as PayPal.¹⁹¹</p>
1998	<p>In the US, the Copyright Term Extension Act is enacted on 27th October (also known as the Sonny Bono Copyright Term Extension Act, and pejoratively as the Mickey Mouse Protection Act). This Act extends the period of copyright in the United States by 20 years (from pma +50 years to pma +70 years). The Act does not revive copyrights that have already expired.</p> <p>The Recording Industry Association of America, (RIAA) file an application for a Temporary Restraining Order to prevent the sale of the Rio MP3 player in the Central claiming the player violated the 1992 Audio Home Recording Act – RIAA were denied, on appeal, the Ninth Circuit held that the Rio's space shifting was fair use and not a copyright infringement.</p>
1998	<p>The Digital Millennium Copyright Act (DMCA) is enacted in the United States. It is soon criticised as being already out of date in respect of new Internet and other technological developments. Around this time a general concern emerges in the music industry that the potential removal of long-existing copyright 'intermediary' structures will reduce or otherwise permanently alter the infrastructure and the bargaining power, or relationship, between creators and consumers.</p>
1998	<p>SoundJam MP - an early MP3 player was released and was available until June 2001. Apple, Inc. purchased SoundJam MP in 2000 and further developed the code to create iTunes.</p>
1999	<p>Napster was founded by Shawn Fanning and Sean Parker. Initially envisioned as an independent peer-to-peer file sharing service by Shawn Fanning. Its technology allowed people to easily share their MP3 files with other participants.</p> <p>SubPop is the first label to distribute music tracks in the MP3 format.</p>
1999	<p>Apple introduces streaming into its QuickTime Media player Format.</p>
2000	<p>Gnutella (based on GNU) developed by - the first decentralised peer-to-peer network of its kind, leading to other, later networks adopting the model.</p> <p>[The next day, AOL stopped the availability of the program over legal concerns and restrained Nullsoft from doing any further work on the project. This did not stop Gnutella; after a few days, the protocol had been reverse engineered, and compatible free and open source clones began to appear].</p>
2001	<p>The European Copyright Directive (Directive 2001/29/EC) which harmonises certain aspects of copyright across the 15 member states is approved by the European Parliament and the European Council (22 May).</p>
2001	<p>Creative Commons founded by Lawrence Lessig, Hal Abelson, and Eric Eldred¹⁹² with the support of Center for the Public Domain.</p> <p>Wikipedia, a Wiki free content encyclopaedia, goes online.</p> <p>The Dot Com Bubble Bursts and thousands of DotComs go bust.</p>

190 Forrest, C., 2014. How the 'PayPal Mafia' redefined success in Silicon Valley. TechRepublic. <https://www.techrepublic.com/article/how-the-paypal-mafia-redefined-success-in-silicon-valley/>

191 Doeden, M., 2015 SpaceX and Tesla Motors Engineer Elon Musk. Lerner Publications.

192 <https://web.archive.org/web/20111007165253/http://creativecommons.org/about/history>

Date	Event
2001	A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (2001)[1] - landmark intellectual property case in which the peer-to-peer (P2P) file-sharing service Napster, could be held liable for contributory infringement and vicarious infringement of the plaintiffs' copyrights. This was the first major case to address the application of copyright laws to peer-to-peer file-sharing.
2001	Apple Computer releases the iPod.
2002	Effective from 1st January, 2002, the German Bundestag (Parliament) introduces a new law to provide for collective bargaining between organisations representing creators and exploiters of intellectual property, aimed at encouraging fairer remuneration for creators – including the statutory right for creators to ask for payment reviews and audits of companies involved in such exploitation.
2002	CD Price Fixing - The US Federal Trade Commission opened an investigation into price fixing leading to decreased competition and reduction of discounting among music distributors and retailers. A settlement in 2002 included the music publishers and distributors; Sony Music, Warner Music, Bertelsmann Music Group, EMI Music, Universal Music as well as retailers Musicland, Trans World Entertainment and Tower Records. In restitution for price fixing they agreed to pay a \$67.4 million fine and distribute \$75.7 million in CDs to public and non-profit groups but admitted no wrongdoing.
2004	MGM Studios, Inc. v. Grokster, Ltd ¹⁹³ - United States Supreme Court decision in which the Court unanimously held that defendant peer-to-peer file sharing companies Grokster and Streamcast (maker of Morpheus) could be sued for inducing copyright infringement for acts taken in the course of marketing file sharing software. The plaintiffs were a consortium of 28 of the largest entertainment companies (led by Metro-Goldwyn-Mayer studios).
2005	The need to improve the functioning of collective management organisations identified in Commission Recommendation 2005/737/EC (1). setting out a number of principles, such as the freedom of right-holders to choose their collective management organisations, equal treatment of categories of right-holders and equitable distribution of royalties. It called on collective management organisations to provide users with sufficient information on tariffs and repertoire in advance of negotiations between them. It also contained recommendations on accountability, right holder representation in the decision-making bodies of collective management organisations and dispute resolution.
2005	Three former PayPal employees—Chad Hurley, Steve Chen, and Jawed Karim—create Youtube - Google bought the site in November 2006 for US\$1.65 billion; YouTube now operates as one of Google's subsidiaries. Mark Zuckerberg and Dustin Moskovitz begin running The Facebook Social Networking Site full time.
2006	In the UK (in December), the Gowers Review of Intellectual Property recommends that the 50-year copyright protection term on sound recordings and performers' rights is not extended – as many music creators and record companies had wished (having argued for an extension of a further 45 years). Performers Societies AURA & PAMRA merged with PPL.
2006	“The Wealth of Networks: How Social Production Transforms Markets and Freedom” by Harvard Law School Professor Yochai Benkler is published by Yale University Press. The one billionth song is purchased from Apple iTunes.
2006	Music streaming service Spotify developed by Daniel Ek and Martin Lorentzon Daniel Marhely developed the music streaming service Blogmusik, in Paris.
2007	Blogmusik sued by SACEM for copyright infringement – after coming to an agreement it was relaunched as Deezer.

193 MGM Studios, Inc. v. Grokster, Ltd., 545 U.S. 913 (2005).

Date	Event
2008	IFPI report “Tens of billions of illegal files were swapped in 2007. The ratio of unlicensed tracks downloaded to legal tracks sold is about 20 to 1” IFPI also criticised a “lack of interoperability between services and devices, lack of investment in marketing of new services”. ¹⁹⁴
2014	Directive of the European Parliament and of the Council on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market - designed to help make sure royalty payments are timely and accurate while significantly improving the transparency and governance of European Collective Management Organisations (CMOs). The Directive also creates a level playing field for the multi-territorial licensing of online music services.
2015	<p>“Thinking Out Loud” by Ed Sheeran became the first song to pass 500 million streams on Spotify.</p> <p>Apple launch Subscription Streaming Service – Top Artists exclusively release on Apple Music to lure customers.</p> <p>Spotify dispute with Apple - Universal Music Group CEO Lucian Grange told employees that UMG is prohibiting its artists from offering music exclusives.</p>
2017	<p>Spotify Settles \$43 Million Class Action Copyright Lawsuit.</p> <p>Wixen Publishers sue Spotify for \$1.6 Billion for Copyright Infringement for non-clearance of rights.</p>
2017	As part of renegotiated licenses with Universal Music Group and Merlin Network, Spotify’s financial filings revealed its agreement to pay more than \$2 billion in minimum payments over the next two years.
2017	Streaming companies Spotify, Rocket Internet & Deezer write to EU Anti Trust Commission complaining that Apple and Google are abusing their market position and acting as ‘gatekeepers’.
2018	US Music Modernisation Act.
2018	<p>Spotify files for a direct listing on the New York Stock Exchange.</p> <p>Sony buys EMI Music Publishing for \$2.3 Billion creating world’s biggest music publisher with a catalogue of more than 4m songs.</p>

4.1.4 Streaming

“We have hung on to two income streams in the music industry for 100 years: the mechanical royalty and the performing royalty, and we have shoehorned everything down those two paths.” But we are now in a situation whereby those names no longer apply, because, a stream, what is it? A stream is not a sale, so it is not a mechanical, and it is not a performance, because it is a singular, one-to-one experience.”¹⁹⁵

Growth

BPI figures¹⁹⁶ for 2019 show that the UK music market is becoming increasingly digital:

- 69.3% of turnover now derived from streaming and downloads. 91 Bn audio streams were served across services such as Spotify, Deezer, Apple Music and Youtube Music in 2018, an increase of 33.5% on 2017’s total;
- Kantar’s Worldpanel survey estimated that over one in five users paid to stream music in 2018. 25 to 34-year olds were the most engaged, with over half having watched a video or streamed music;
- Mobile phone is the most dominant mode of access (71.6%) while Home Assistants (Smart Speakers) were used by 25.7%;
- 80% of the UK population own a mobile phone and of those two thirds use them at least twice weekly to listen to music;
- 37% of smart speaker owners had started paying to stream since acquiring a smart speaker, showing that ownership is a clear driver for subscription uptake with 83% of those users listening weekly to streamed music.

Global Recorded Music Industry Revenues 2001-2018 (US\$ Billions)

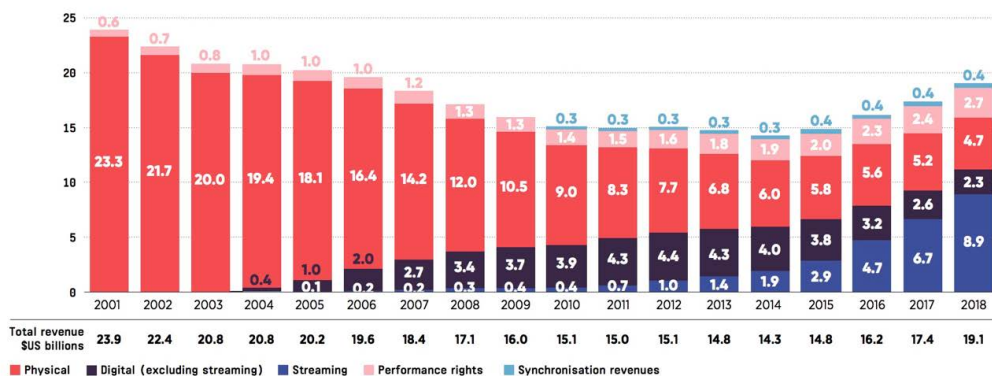


Figure 3: Global revenues

¹⁹⁵ Fletcher, G., 2017. Interview with former PRS Chair Guy Fletcher, Music Week, <http://www.musicweek.com/interviews/read/the-big-interview-prs-for-music-s-guy-fletcher/067154>

¹⁹⁶ BPI 2019

(Source: IFPI 2019 report)

Streaming - Digital Audio			
	Streaming	Download	Physical
Revenue	Paid Subscription Ad Supported Revenue	Payment per download	Payment per Product
Channel	File from Host Database Buffered or Cached	Download from Host or P2P Exchange	Carrier – CD, Mini Disk, SD Card

Streaming - Technical

Streaming involves delivering an audio file in small packets with some buffering but resulting in real-time playback.

- delivers digital audio, including music, without requiring a download file from the Internet
- formats vary but are often compressed digital audio files, i.e.: MP3, WMA, AAC, OGG or FLAC

Higher quality WAV or AIFF require more bandwidth or a physical carrier.

Some services offer different levels of quality for different internet connections,¹⁹⁷ which requires a steady stream of data packets for uninterrupted listening.

- caching the file on a hard drive facilitates offline access
- some paid streaming music services actively allow the option to both stream and download

Streaming - Legal

Spotify, Apple Music, Pandora, Deezer, Youtube, Soundcloud & Bandcamp all offer different variations of streaming services which have implications for digital rights.

- no single legal definition can be employed
- 'webcasting' used as equivalent to describe rights framework
- temporary (*not permanent*) access to a piece of creative content

Several different types of streams depending use:

- on-demand
- semi-interactive
- '*lean back*' .

This appears to play a central role determining the rights involved, i.e.:

- communication to the public
- making available, or
- distribution right/sync etc.

4.1.5 Creator remuneration

Streaming has given rise to a shift in music consumption from ownership to access, requiring an amendment to the way the reproduction right is interpreted. As the oldest form of copyright the reproduction right has long been integral to the copyright system. Access almost always involves an element of reproduction, albeit transient but it is open to question whether reproduction can continue to be the core determinant of whether a stream constitutes a distribution to the public. Under *'Communication To The Public'*, there are two major rights:

- **Broadcasting** - the content is delivered only at a given time of the transmission, chosen/curated by the service provider - related/neighbouring rights apply and performers are entitled to Equitable Remuneration [ER] for the use of their work [i.e. 50% of the royalties collected by the CMO];
- **Making available** - the content is delivered at a given time and space individually chosen by the user - related/neighbouring rights **do not** apply and only the contracted featured artist receives royalties on the streamed content [i.e. 15-20% in respect of contract].

Importantly, the non-featured artist/session performer is not entitled to any revenue from the use of the content on an 'interactive' streaming platform. Furthermore, direct deals between record labels and DSPs have negated the role of the PPL, a trusted party in the UK in respect of reporting and auditing structures of remuneration - *In 1995, as per PPL members' request, PPL reassigned all online licensing rights, apart from simulcast rights back to the members Interactive streaming licensing, therefore, is not administered by PPL.*

Whilst on-demand Digital Service Providers, such as Spotify and Apple Music, are still considered interactive, this has been subject to challenge as services have increasingly invested in methods which push content to the consumer through curation and algorithm determined playlists.

Three themes have been particularly prominent:

1. whilst the digital music revenue is on the increase, revenue distribution is not perceived as fair with record labels being seen as the chief beneficiaries;
2. by preventing key information, such as contract terms and revenue details, from being disclosed under NDA's, organisations have become hampered by a lack of transparency. Not being able to effectively audit payment structures has given rise to frustration and suspicion of sharp practice;
3. building a fair digital music value chain that properly compensates artists is crucial to the realisation of an undistorted, functioning digital music market.

	Legislation	Copyright	Royalty Payments
TV, Radio	Broadcast/ Performance	Performing	Rate set – CMO
		Neighbouring	Equitable Remuneration
Digital Radio (Programmed)	Communication To The Public	Performing	Rate set - CMO
		Neighbouring	Equitable Remuneration
Interactive Streaming	Making Available	Performing Mechanical	Varying rates linked to type of service/number of plays
Download	Reproduction	Mechanical	Volume of sales (Contract)
Physical	Reproduction	Mechanical	Number of pressings
			Volume of sales (Contract)

Creative Industries Federation research has observed that the mean income for music content creators consistently falls well below the UK national average and that the increasing ‘precarity’¹⁹⁸ of creative work has led to sense of insecurity which impacts the ability of particular groups to effectively participate:

- 95% of UK creative industries businesses are micro businesses;
- 68.6% have a turnover of less than £100,000, significantly higher than the national average;
- 35% are self-employed, with freelancers making up a significant portion.

Many practices, (e.g. registration with a collection society), which underpin and support recurring revenue from the use of creative IP, are also a form of signalling or an indicator of professional participation. Informal working relationships can mean these are observed on an *ad hoc* basis or are often ignored.

Over 1,000 UK women registered as songwriters/composers last year, yet the ratio of male-to-female registrants remains disappointingly flat year-on-year. Only 17% of PRS’s writer membership identified as female, signalling slow progress across the music industry to address gender disparity.¹⁹⁹

198 McRobbie 2016, Gill & Pratt 2008, Kretschmer 2005

199 PRS 2019

4.1.6 Music data management – standards and codes

Code	Application	Governance
International Standard Musical Work Code: ISWC	Identifies a musical work as a unique intangible creation. It relates to the result of an intangible creation of one or more people, regardless of copyright status, distributions or agreements that cover this creation.	Confédération Internationale des Sociétés d'Auteurs et Compositeurs [CISAC] Ratified by the ISO in 2001 International Standard Work Code – ISO 15707:2001.
International Standard Text Code: ISTC	Identifies the discrete results of creative / intellectual effort expressed as text, “creative works” such as prose, poetry, lyrics, original screenplays, audio and stage scripts. From a music perspective access to the lyrics of a song are often a distinct request from access to the song itself.	The International ISTC Agency Ltd operates the International Registration Authority for the International Standard Text Code (ISTC) standard ISO21047. The International ISTC Agency Ltd (“IIA”) was registered as a not-for-profit company in 2008.
International Standard Music Number: ISMN	This is the international standard number for editions of music scores. It identifies and accompanies a sheet music product uniquely, from the first phase of planning it at a publishing house over its manufacturing and - in most cases--printing and through all points of the supply chain.	International standard music number (ISMN), was developed by ISO Technical Committee ISO/TC 46, Information and documentation, Subcommittee SC 9, Identification and description. It is available from ISO national member institutes.
International Standard Recording Code: ISRC	An identification system for audio and music video recordings. It is used by IFPI members to assign a unique identifier to every distinct sound recording they release. An ISRC identifies a particular sound recording, not the song itself. Different recordings, edits, remixes and remasters of the same song will each be assigned their own ISRC, however, the same recording should carry the same ISRC in all countries/territories where it is distributed, with the code referencing the territory where it was originally registered.	IFPI Secretariat is the International Registration Authority for ISRC by ISO and functions as the International ISRC Agency. The code was developed by the recording industry in conjunction with the ISO technical committee 46, subcommittee 9 (TC 46/SC 9), which codified the standard as ISO 3901 in 1986, and updated it in 2001.
Interested Party Identifier: IPI	As an evolution of the CAE system, the IPI has sought the global unique identification of a ‘rights holder’ acting across multiple creation classes (i.e. musical work, literary work, work of art etc.). IPI represented metadata assigned to different roles (musical creator, publisher, arranger, etc), which owned any or all rights (performing right, reproduction right, radio broadcast right etc.) relating to the musical work.	Swiss CMO SUISA developed the CAE system and was appointed by CISAC to design and develop the IPI system, which replaced CAE in 2001. IPI is a proprietary system not governed by ISO.

Code	Application	Governance
International Performer Number: IPN	Used to identify individual performers in audio recordings and audio-visual works. The authority to identify each performer comes from the legal mandate the performer has assigned to their collective management organizations (CMOs). The end result is that each performer will have a unique ID stored on the International Performer Database (IPD). The IPN can be used in data exchanges between CMOs, simplifying and improving the matching algorithms for disambiguation.	The Societies' Council for the Collective Management of Performers' Rights [SCAPR] is the international body that coordinates and regulates the IPD and has invested in technical systems to aid governance of information on performers and their performances.
International Standard Name Identifier: ISNI	<p>An International Standards Organisation [ISO] identifier capable of tagging millions of contributors to creative works, ISNI is specified for the identification of the public identities of parties as opposed to their private identities (as represented by IPI or IPN).</p> <p>The stated goal of the ISNI is to be a “bridge identifier”, allowing various industry partners to exchange information relating to a party without the need to disclose confidential information.</p> <p>“ISNI is being established as an interoperable identifier: a core part of its function is to map other standard or proprietary identifiers .”</p>	<p>ISNI is part of the ISO family of international standard identifiers that includes identifiers of works, recordings, products and rights holders in all repertoires. Working on behalf of ISO, the ISNI International Agency is charged with managing and promulgating the ISNI identifier system worldwide.</p> <p>Library partners (e.g. BL BNF) manage the Virtual International Authority File [VIAF] which is the network which underpins ISNI.</p>
International Standard Links Identifier: ISLI	ISLI is used for identifying links between entities in the field of information and documentation. A linked entity can be physical, e.g. a print book or an electronic resource (text, audio, and video); or something abstract, e.g. a physical position within a frame of reference or the time of day.	The ISLI system is administered by the ISLI Registration Authority (ISLI RA). And the International Information Content Industry Association (ICIA), a not-for-profit organisation, acts as the ISLI Registration Authority.
MusicBrainz Identifier: MBID	<p>MBID is a 36 character Universally Unique Identifier that is permanently assigned to each entity in the Musicbrainz database, [i.e. artists, release groups, releases, recordings, works, labels, areas, places and URLs.]</p> <p>This database is available under Creative Commons licenses CC0 and CC3, which places the core data effectively in the public domain while supplementary data can be accessed and shared on a not-for-profit attribution basis.</p>	Robert Kaye founded the MetaBrainz Foundation, as a non-profit corporation dedicated to keeping MusicBrainz free and open source. This was in response to the commercial takeover of an open source database (CDDB) by Gracenote in 2000.

4.1.7 Legislative developments

The twin signature developments in the music industry of 2018 according to Musically²⁰⁰ were the progress made in securing the adoption of the EU's Article 13 and the passing of the Music modernization Act (MMA). Even more striking for this research was the level of unity shown across the various industry sectors to meet a common problem even while their internal divisions over issues like transparency, streaming royalty rates and splits continued. The mood within the music industry changed palpably in this year and Music 2025's focus on improving data integrity and cross-industry collaboration offers we believe an opportunity for a third such win.

Article 17 (Formerly Article 13) EU Directive

By November 2018 the more than a decade-long war of words between YouTube and the music industry reached a fresh crescendo with claims of how much YouTube contributed to the industry between October 2017 and September 2018 (\$1.8 billion)^{201 202} ridiculed especially by the IFPI who argued the true figure was less than half of that amount.^{203 204} This battle centred on the disconnect or 'value gap' between the amount YouTube receives from advertising sold around music videos and what the platform pays to the music rights holders. The value gap according to IFPI is most evident in the difference between the value from the 1.3 billion video streaming users (approximately \$850 billion) versus the \$5.6 billion received for the 272 million users of audio subscription services (paid and ad-supported) which IFPI argue is because they 'misapply' the safe harbour rules.

The relationship between the music industry and the entire tech industry over the past two decades has been dominated by the 'safe harbour' provisions introduced in the 1998 Digital Millennium Copyright Act (DMCA) 17 USC 512(c) which, as its principal architect former head of the US patent Office Bruce Lehman admitted in 2007, have not 'worked out too well' due to its impact on music and entertainment businesses. Leon Trapman states that under safe harbour provisions 'online intermediaries can, under certain circumstances, not be held liable for any User Generated content (UGC) that infringes copyright and is posted on the platform'.²⁰⁵

200 MusicAlly (2018) The Report: Article of Faith issue 418 11th October 2018

201 Google (2018) How Google Fights Piracy https://cdn.mbw.44bytes.net/files/2018/11/GO806_Google_FightsPiracy_eReader_final-1.pdf

202 Ingham T (2018) YouTube: We've paid the music business \$1.8bn in ad money over the past 12 months Music Business Worldwide November 7th 2018 <https://www.musicbusinessworldwide.com/youtube-weve-paid-the-music-industry-1-8bn-over-the-past-12-months/> Page 1 of 4

203 Dredge S. (2018) "IFPI and YouTube at loggerheads over \$1.8bn-payments figure" MusicAlly November 19th 2018 <https://musically.com/2018/11/19/ifpi-and-youtube-at-loggerheads-over-1-8bn-payments-figure/>

204 "Label Group IFPI Says It Can't Account for Half of YouTube's Claimed \$1.8 Billion In Royalty Payments". Digital Music news November 16th 2018 <https://www.digitalmusicnews.com/2018/11/16/ifpi-google-youtube/>

205 Trapman , L. (2016) American and European safe harbours . Kluwer Copyright Blog December 14th 2016 <http://copyrightblog.kluweriplaw.com/2016/12/14/american-european-safe-harbours/>

These same DMCA norms were introduced to the EU in the 2000 European Copyright Directive (more usually referred to as the E-Commerce Directive).²⁰⁶ In describing the similarity of the DMCA and the E-commerce Directive texts Trapman also identifies a crucial difference between how safe harbour operates in the USA and EU principally in relation to the burden of proof of infringement. In the USA this shifts to the applicant rather than the service provider whereas in the EU it is the opposite, meaning the service provider must prove it has ‘no actual knowledge or awareness’ of the infringement.²⁰⁷ This difference along with the proposed changes in the new Directive illustrate how the EU places “emphasis on protection of the rights holders’²⁰⁸ whereas the USA seems to favour the service providers.

The conflict between the two sides over the past decade has seen music industry claims of damage met by counter claims from Google and more recently certain tech linked ‘proxy’ organisations as well as certain legal academics²⁰⁹. The combative tone became even more obvious during the lead up to the EU Parliament’s attempts, following the EC’s 2016 proposal to introduce a European copyright framework suitable for; “Creating a Digital single market: EU copyright rules fit for the digital age”.²¹⁰

The prime objective of the proposed Article 13 of the proposed new rules was to focus on:

*“fair rules of the game for a better functioning copyright marketplace, which stimulates creation of high-quality content”²¹¹ and “to allow content creators and other rights holders to negotiate with online services and content distributors how their work is used and shared online...(to) give creators, authors and rights holders the possibility to better control the use of their work and be fairly remunerated”.*²¹²

The EC proposal met fierce resistance from the tech-sponsored lobby which saw an unprecedented online, email and social media campaign aimed at the European parliamentarians in July 2018 that drew criticism from the MEP’s as well as the music industry. The sheer scale of the campaign was soon shown to be unrepresentative of the digital public as very small crowds attended public protests leading up to the pivotal vote in mid-September 2018. The result of that vote was seen as vindication by many in the music industry of their long-held view of certain technology platforms unwillingness to accept meaningful responsibility for the content on their networks.

206 Directive 2000/31/EC

207 Trapman, L. (2016) American and European safe harbours. Kluwer Copyright Blog December 14th 2016 <http://copyrightblog.kluweriplaw.com/2016/12/14/american-european-safe-harbours/>

208 ibid

209 Vote for a balanced European copyright law/ Statement by EPIP academics | CREATE <https://www.create.ac.uk/blog/2018/09/10/vote-for-a-balanced-european-copyright-law-statement-by-epip-academics/>

210 European Commission (2017) Modernisation of the EU Copyright Rules <https://ec.europa.eu/digital-single-market/en/modernisation-eu-copyright-rules>

211 European Commission (2017) What does the Commission propose in the new Copyright Directive- Frequently asked questions. <https://ec.europa.eu/digital-single-market/en/faq/frequently-asked-questions-copyright-reform>

212 European Commission (2017) How would the new rules tackle the value gap between creators and online platforms - Frequently asked questions. <https://ec.europa.eu/digital-single-market/en/faq/frequently-asked-questions-copyright-reform>

Since the 12th September 2018 vote (438 votes in favour, 226 against, and 39 abstentions)²¹³ YouTube has launched an enormous PR and media online campaign targeting creators and content makers (with claims of dramatic falls in income from streaming) across the music industry to publicise what Lyor Cohen and Suzanne Wojcicki describe as the ‘unintended consequences’ of Article 13. The clear threat articulated by Cohen was that YouTube might have to cease operating in the EU as a direct consequence of Article 13 as the apparent punitive consequences of abiding by the new provisions are unacceptable to the company. The reaction to these claims has not been met with the kind of reaction YouTube may have expected as many of the creators whose livelihoods have been directly impacted by the existing safe harbour rules have shown strong support for reform of the safe harbour provisions.²¹⁴

The YouTube campaign was described as ‘carpet bombing’ by the BPI and has further increased the tensions between the two camps leading up to the next stage in the European legislative process. Closed-door trialogue negotiations between the European Commission, the Council of Ministers and the European Parliament began in October 2018 and a final vote (and formal adoption) took place in the early months of 2019 and even though the new Directive was approved it, including the now renumbered Article 17, will not be implemented until Spring 2021.²¹⁵

213 European Parliament, Amendments adopted by the European Parliament on 12 September 2018 on the proposal for a directive of the European Parliament and of the Council on copyright in the Digital Single Market, P8_TA-PROV(2018)0337, 12 September 2018 <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2018-0337+0+DOC+PDF+V0//EN>

214 BASCA Chair Crispin Hunt quipped “Rules won’t break the Internet they’ll mend it” at the May 2017 Ivor Novello Awards

215 Updates to CREATE’s EU Copyright Reform Timeline | CREATE November 20th 2018

2018 Music Modernization Act (USA)

Challenges to the digital music licensing system in the USA followed those in the EU with significant disruption in the US market in the period from 2012-2018. It seems no coincidence the attempts to remodel the US system took place after profound changes in the EU licensing framework had been achieved to the satisfaction of the key publishers. This period saw efforts to replicate the new way collective licensing of digital rights operated in the EU market to allow for a similar set of SPVs to be created to allow the largest publishers, the oligopoly players, similar control over the licensing of their owned repertoire for the oligopsony of music services such as Spotify and Pandora.

In the USA attempts by the major publishers to control the rates set for the digital use of their works led to threats by the 4 largest firms to remove entire repertoires from the established PROs. (Sony-ATV, BMG, WCM, UMPG). This was accompanied by claims from the NMPA that publishers were “*losing the battle over copyright*” and US music publishers began to “*push for deregulation of songwriter royalties*”, blaming “*antiquated laws and decrees that date back to the First and Second World War at the expense of songwriters*” (NMPA’s David Israelite) that benefit digital services like Spotify and Pandora.

The main target for publishers’ complaint were the almost 75 year old consent decrees imposed by the DOJ back in 1941 during the BMI/ASCAP wars over rates and membership²¹⁶ The 2015 DOJ review of the consent decrees for Performing Right Organisations (PROs) would allow “*greater flexibility for rights holders to decide which rights to put into ASCAP and BMI*” and “*put the US on a similar track to where Europe is*”. This is evidence of clear belief among US publishers that for the US digital market they were “*better off when there is no government regulation*” and that they would be “*be better off in markets where publishers are more-free to negotiate private with DSPs, like Europe*”.²¹⁷

The publishers aims to improve their rate setting powers attracted considerable opposition from tech sponsored bodies like Public Knowledge who allege the major publishers want to “*let the collectives continue to gather royalties on their behalf from bars, restaurants, and radio stations, while withholding their songs from digital services*”.

The US tech industry has relied on the original 1941 antitrust /anti-competition arguments for regulation of the PROs, which whilst offering a ‘*convenient place for licensors to go to*’ also brought ‘*would be competitors together on prices*’. They blame recent market consolidation for the situation where any one of the three major publishers can affect the market with little or no need for ASCAP or BMI to license their repertoire and any single major publisher raising its rates could signal the others to do the same. What is clear from this is that current moves to withdraw rights from existing digital licensing structures are driven by the belief in the increasing growth and value of music streaming. All of these issues in the USA became part of the backdrop to the Music Modernisation Act which seems to have finally produced a road map to resolve the frustrations of the rights holders and ameliorate certain dysfunctional aspects of the digital supply chain in the US.

216 Rosen (G) *Unfair to Genius* (2012) Oxford University Press New York Page 205-06

217 *Downtown Music Publishing* Justin Kalifowitz.

The passage of the “Orin G Hatch - Bob Goodlatte Music Modernization Act” (MMA) brought welcome news to the US Music industry, particularly those who had felt neglected in the digital era such as songwriters, record producers and engineers and eminent pre-1972 recordings artists. The Act according to ASCAP includes key provisions to address mechanical licensing and PRO court reform to secure better compensation that better reflects the value of music. It also addresses payments to recording artists on pre-1972 recordings as well as producers.

The MMA was a result of complex negotiations with multiple players - (PROs, publishers, digital services and broadcasters) - over the previous two years. This was about a licensing system adapting to the digital age and some overdue reform including as to who makes decisions about what music users pay music creators. It provides a reform of the mechanical licensing system by introducing blanket licensing, removing the worst aspects of compulsory licensing by allowing a ‘willing seller- willing buyer’ rate standard to be introduced as well as establishing the Mechanical Licensing Collective (MLC).

In truth the MMA is a long overdue legislative response to a number of distinctive and at times troubling features of the US copyright licensing system, notably in relation to digital music distribution where the existing framework for mechanical and performing rights musical works has been shown as ill-suited to the demands of the modern era. The performing rights area has been subject to a more than 70-year regime of government consent decrees and the existing US mechanical rights system has lacked the kind of single point licensing structure usually found in most other developed countries. Such a single national licensing entity structure offers licensing certainty and can resolve the apparent chaos in the digital licensing ecosystem, benefiting both the majority of rights holders as well as significant music copyright users.

This chaos in mechanical licensing has been most evident since Spotify launched in 2011. Spotify’s launches across various markets in Europe were enabled by securing effective blanket licensing deals through the EU CMO network even with its current fragmented SPV dominated structure. It is worth noting also that Spotify’s original home market Sweden operates the Nordic model of extended collective licensing that secures absolute licensing certainty for the music user.

By contrast the apparent lack of legal certainty in the USA is largely a consequence of a 20th Century US antitrust regime that has historically undermined a single point collective licensing structure, as being monopolistic and anti-competitive. This led to a plethora of licensing agencies and options including the market leader Harry Fox Agency (HFA). Crucially none of were able to provide an effective ‘universal’ blanket license to any single DSP in the way the Swedish CMO STIM and NCB were able to in 2008 at the time Spotify first launched.

Apple Music has the benefit of almost a decade more experience in handling mechanical licensing for its downloads offering through iTunes store which suggests that the licensing issues face by Spotify could have been resolved in time ; time however was not on their side as they soon faced enormous lawsuits for copyright infringement (from David

Lowery's 2015 class action for \$43 million to Wixen's 2017 action for \$1.6 billion)²¹⁸ The seeds for the Music Modernisation Act were in fact sown by Maria Pallante, the head of the US Copyright Office in 2013 who called for reform of the US Copyright system.²¹⁹

Evidence of the increased problems in US digital music licensing is available at the website run by The Harry Fox Agency ("HFA"). Formerly owned by the NMPA HFA is now part of SESAC Inc and is arguably the best-known US mechanical licensing agent. The website ²²⁰ highlights the complexity involved in managing mechanical rights with rates and schemes covering physical goods (CDs, LPs cassettes) downloads (known as Permanent digital downloads).

4.2 Architecture of music data

4.2.1 Current Blockchain initiatives

What follows is an outline of some initiatives to integrate Blockchain/DLT into the music industry:

One Click Licensing

OCL is a micro-licensing framework Totem for User-Generated content (UGC) and more.²²¹ It is a model of partnerships between rights owners, rights users, app developers, and platforms. OCL attempts to provide rights owners with remuneration for every use of their media, a sense of control over their creative works, while simultaneously allowing citizens to create works of UGC. Their aim is to stop takedowns, improper use, copyright infringement and orphan works. It is based on Blockchain technology.

The Totem framework helps to facilitate almost any type of agreement between disparate parties in practically any kind of peer-to-peer transaction, backed by Authority and Trust, much like Visa does for facilitating and settling financial transactions. Totem does this through a series of APIs inside of applications on devices, so that devices can make decisions generally relegated to servers and databases. There is no evidence that it has gained any footing in the industry.

218 Levine, R., 2018. David Lowery on Spotify Lawsuits and the Battle For Creators' Rights . Billboard , 26th January 2018 https://www.billboard.com/articles/business/8095336/davidlowery...medium=email&utm_campaign=Digital%20Update&utm_term=biz_digital

219 IPkat / 1709 Blog, 2013. Head of US Copyright Office wants reform. IPkat / 1709 Blog. <http://the1709blog.blogspot.com/2013/03/head-of-us-copyright-office-wants-reform.html>

220 https://www.harryfox.com/find_out/rate_charts.html

221 <https://what.ocl.is/index.html#compatible-copyright>

Mycelia

Founded by Imogen Heap, Mycelia²²² is a collective of creatives, professionals and lovers of music. Their mission is to empower a fair, sustainable and vibrant music industry ecosystem involving all online music interaction services and to unlock the huge potential for creators and their music related metadata so an entirely new commercial marketplace may flourish. They also aim to ensure all involved are paid and acknowledged fully and to see commercial, ethical and technical standards are set to exponentially increase innovation for the music services of the future. Mycelia uses Ethereum, an open-source, public, blockchain-based distributed computing platform featuring smart contract functionality. Like many other initiatives in this space, blockchain is proposed due to the underlying hype but there are many technical issues in rolling out large scale blockchain platforms.

JAAK

JAAKs goal is build a global blockchain network for intellectual property rights registration, management and monetisation, starting with the music industry. This industry-wide Music Sandbox,” allows the company to develop products and the KORD network in collaboration with the music industry. Participants provide product and rights data to JAAK, which are held in a private version of the KORD network. KORD operates as a permissionless, decentralised network of intellectual property information, allowing rights holders to collaborate on an industry-wide view of rights.

Users are connected to a shared data network where they have the sole authority to insert, update and remove their own information, creating a public record of rights and an audit trail. It includes a framework to detect conflicting information in the network, allowing users to resolve conflicts and converge on a global view of intellectual property rights. KORD is an open data network which runs on the Ethereum blockchain, enabling rights holders to record and assign intellectual property rights. The network will represent a global view of intellectual property rights. As a decentralised network, KORD includes a framework for defining programmatic rules which are used to detect conflicting information in the network, allowing users to resolve conflicts and converge on a global, accurate view of intellectual property rights.

The JAAK pilot involved participants contributing music rights information, metadata and audio assets into a private and secure sandbox of the KORD network for testing purposes. Participant data was loaded into a graph database, so queries could be performed to link rights information from multiple sources, with each participant having a namespace in the database containing only their data allowing for complete provenance and authority when viewing data from multiple sources.²²³

222 <http://myceliaformusic.org/>

223 <https://www.musicbusinessworldwide.com/blockchain-firm-jaak-makes-key-hires-ahead-of-first-product-launch-in-2019/>

Musicoin

Musicoin²²⁴ is a music streaming platform built on the blockchain that supports the creation, distribution and consumption of music in a shared economy. They aim to allow listeners to stream songs from independent musicians on their platform absolutely free and without ads, while musicians are compensated more fairly than major music streaming platforms in the industry. Musicoin attempts to use the blockchain to power a decentralised, peer-to-peer, platform. Similar to Bitcoin or Ethereum, their implementation of the blockchain allows them to host music available to everyone and transactions that are transparent and secure. Their business model to keep the platform free for listeners, and at the same time pays is by leveraging the blockchain to remove intermediaries. They are implementing a model called Universal Basic Income (UBI) that supports both listeners and musicians. UBI is an economic model to ensure each contributor to the platform is fairly rewarded in proportion to their contribution.

In Musicoin's context, a UBI pool is created to secure musicians' income from PPP on the platform, at a fixed rate that is fair, uninfluenced by market forces and higher than that of any other competing streaming platforms. This will boost the influx of content from musicians as well as make streaming music free for listeners, thereby ensuring deeper penetration of Musicoin into the streaming market. Unlike other streaming platforms, users on the Musicoin platform will be able to stream songs for free and without ads. They have designed a global currency (MUSIC) to support the global trade surrounding music and music-related businesses. The currency is not issued by a single entity, but by a network of computers through a process known as mining. This system has been tested and proved by cryptocurrencies such as Bitcoin, Ethereum, Dash and others (Kroll et al., 2013). They also have smart contracts so each stream operates on a Per-per-play (PPP) basis. Every time a song is streamed, MUSIC is automatically transferred to the musician or all parties of a group.

SingularDTV

SingularDTV²²⁵ is a blockchain entertainment studio aiming to lay the foundation for a decentralised entertainment industry. By building the future of rights management, project funding, and peer-to-peer distribution, SingularDTV's platform aims to empower artists and creators with powerful tools to manage projects from development to distribution. It seems to be a content portal through which users can crowdfund, own, upload, share, trade, sell, and monetise their work online. SingularDTV intends to grow a whole media ecosystem that spans crowdfunding, rights management, and peer-to-peer distribution and sales for music, film, theatre, even VR. It's something like YouTube, Kickstarter, and Napster rolled into one portal, all built on the Ethereum network. Users can crowdfund a project with the Launch Pad widget, create their own tokens via Tokit, and share and sell their content peer-to-peer through the Ethervision portal. The goal of SingularDTV is a totally decentralised entertainment industry in which content creators retain control and access to profits. There are plans to roll out functions for renting studio equipment and to creating workers' unions, but those are not expected until 2019.

224 <https://musicoin.org/>

225 <https://singulardtv.com>

Consensys

Consensys²²⁶ is a Brooklyn-based Ethereum development incubator with a high-profile conveyor belt of blockchain projects that often interconnect. On Ujo—the centre-piece app of Consensys’ interlocking music platforms—artists can distribute music directly to fans. But even before releasing music, bands or groups can use Weifund, a crowdfunding app upon which users issue value tokens redeemable with band-specific goods and services. The Boardroom app can be used to allocate contracts and set up royalty percentages amongst members, and Balanc3 specialises in doing taxes for musicians. All of these apps are supposed to work seamlessly together to empower musicians to be their own music industry. The Grammy-winning producer RAC just released his album EGO on Ujo, the first album ever released on the blockchain (although Imogen Heap beat him to first single). The ConsenSys ‘hub’ coordinates, incubates, accelerates and spawns “spoke” ventures through development, resource sharing, acquisitions, investments and the formation of joint ventures. These spokes benefit from foundational components built by ConsenSys that enable new services and business models to be built on the blockchain.

dotBlockchain

The mission of dotBlockchain is to eradicate losses from wayward rightsholder information through evolving the file type with which music is transferred. MP3s, WAVs, and AAC audio files—the dominant modes of this era—provide ample data compression, but are woefully inadequate in terms of metadata. dotBlockchain’s .BC format, however, comes loaded with information about rights, licensing details, and terms of use—permanently built into the file’s metadata. They aim to eradicate the nitty gritty details of publishing rights and licensing are immutably tied to the file itself so that even as tracks are chopped up, sampled, and recycled the correct attributions are kept. In 2018, they announced a partnership with Cardstack Syndicate Inc., creator of the Cardstack framework. Cardstack plan to enhance dotBC’s technology and business plans by formally aligning their efforts more closely. Leveraging Cardstack’s technology allows dotBlockchain to integrate a technology and services stack that combines the cloud and blockchain layers for clients. The strategic partnership follows several successful dotBC collaborations with prominent music industry players, including the Society of Composers, Authors and Music Publishers of Canada (SOCAN), contextual advertising network MediaNet, digital distribution technology company FUGA, and online music store CDBaby. DotBC is also a formal partner of technology giant Intel, whose blockchain framework serves as the platform for recording dotBC’s recording rights registry.

226 <https://consensys.net>

Custos

Custos²²⁷ is a South African copyright protection outfit which implements a “tracking technology” that creates a bitcoin watermark on copyrighted media. If that material is found pirated, Custos analyses the file and follows the trail of pirated or unlicensed content back to the source to impose a swift retribution. Custos also intends to incentivise the users of the peer-to-peer networks they are tracking with a monetary reward for identifying the source of pirated material. So, if the content is leaked by the intended recipient, typically a reviewer offered a pre-released version of a movie, there is a small bitcoin reward that can be collected by the first person to find it. When a media downloader, or bounty hunter, claims the bitcoin in a Custos watermark the transaction can be seen on the blockchain in around 10 minutes, and Custos will then be able to notify the media provider.

They claim that as a result, the original source of the content could then be subject to legal penalties or lose their access to any future content. In this manner, authorised media users should be strongly discouraged from actively sharing files or carelessly leaking them, while at the same time, they need not be inconvenienced by cumbersome security measures. Just how Custos intends to turn file-sharing techno-libertarians into copyright informants is yet to be explained. The Custos project is a worthy reminder that the eternally verifiable chain of data transmission that makes up the blockchain can be used to inhibit the very same liberties that it theoretically affords. The Custos solution received a top-five prize from the competition SeedStars World in 2017 as well as funding from rom Innovus, the Technology Transfer Office of Stellenbosch University, where the product was conceptualised. The company recently completed a second-round seed investment of just under US \$265,000, part of which came from the New York based Digital Currency Group (DCG).

The Interplanetary File System (IPFS)^[1] is an interesting project that could provide much of the infrastructure needed for musical content tracking and attribution as it provides a permanent, decentralised Web where links do not die and no single entity controls the data. Musicians can add any data to it and in return receives a unique identifying hash. IPFS is a content-addressed system, in contrast to the Web, which is an IP-addressed system. It has potential but still in early stages.

Blokur

Blokur (<http://www.blokur.com>) is a start-up building a blockchain-based platform for the management and monetisation of creative rights, with a mission to complete the potential of the internet for the creator. The UK based start-up recently raised a \$1.2 million seed round of funding from Digital Currency Group, Ascension Ventures, media entrepreneur Remy Minute and InnovateUK. Blokur’s stated goal is to reduce costs and increase revenue for music publishers and others through automation and better data, enabled by blockchain technology and machine learning. Blokur reconciles different sources of rights data to a single blockchain state. They provide an interface for music publishers and CMOs to explore their catalogue in the cloud and compare their data with the global consensus view. Industry standards such as CWR, DDEX and the OMI API are supported.

227 <https://custostech.com/>

4.2.2 Use case: Blockchain and the music industry

This use case examines the role that blockchain may play within the music industry to track-and-trace an artist's claim to royalty payments on the blockchain – ostensibly to allow for greater transparency in royalty payments and thereby faster resolution of claims for end-users, reduced fraud for CMOs, and an overall reduction in the cost of delivering these services. It is envisaged that a public permissioned ledger could be used in certain use case scenarios. What makes the deployment of a permissioned blockchain most applicable in the music industry is that we have a finite number of trusted parties who must be included in the blockchain for it to work e.g. for artist payments to actually be verified and carried out.

The goal is to remove intermediaries between the artists and royalty collection agencies in the form of handling agencies that usually manage the royalty payments and in particular to provide a solution to the inconsistencies with data flow/registration and working practice from the point of creation through the system of release and distribution. The assets in this case are digitally native – that is, they are created from the beginning in a digital format and relate to the tracks performed/recorded or delivered in some form that need to be paid for. If the performance rights organisations decide to provide the blockchain, they will have full control over the asset and are the ones responsible for managing and maintaining the state of that asset digitally, as well as the historical record.

Organisations operating in this area include artists, groups, record labels, performing rights societies, often on the basis of earlier paper-based systems. Confusion can exist between the artists at the time of creation as to who has done what, who should get what in terms of their contribution, and in what form (e.g. one-off or ongoing). In addition, the ability to make payments related to creation and use of original artefacts is restricted by existing payments channels and practices, unrelated to the work itself. It is unclear as to how a blockchain can solve this particular without agreement on the content IDs.

It is not necessary for millisecond transaction speeds for managing this asset, but instead the time frame of minutes, so a blockchain may offer a good result. Since the solution is only supposed to support information related to the transactions associated with providing music, it is not foreseen that any private data will be directly stored on the blockchain, but only transactions. The solution is about managing payments and is, therefore, a good match for blockchain. Shared write access is required so that all parties are able to have a transparent record of what has occurred and when. This provides irrefutable proof that an artist is associated with a work and payment needs to happen. The writers are also known to one another in this use case. The distributed network needs to be able to control functionality; e.g., for upgrades of the network. The transactions need to be public. As a result of this analysis, the most suitable would be to select a permissioned public shared ledger. Recall that permissioned, public, shared systems are a form of hybrid system that provide for situations where whitelisted access is required but all the transactions should be publicly viewable. It applies here where only key players within the music rights industry can write to the network, but all transactions can be publicly verified. A viable blockchain is Hyperledger Fabric which also has LevelDB which is a key value database allowing storage of data in the blockchain. Of all the existing blockchain implementations, the most

practical route would be through a permissioned public shared ledger. A permissioned, public, shared blockchain is a form of hybrid system that provide for situations where whitelisted access is required but all the transactions are publicly viewable. It applies here where only key players within the music rights industry can write to the network but all transactions can be publicly verified.

Blockchain looks like a partial solution to ease the strictures of the royalty framework, however in practice what would be needed is the bringing together of representatives of all the activities in the music value chain, from individual creators up to multinationals, covering all stages of music making (composition, performance, production, metadata capture, registration, archiving, contracts, distribution, merchandising, accounting and collection of royalties, and legal issues). Basically, the entire existing global music business model would need to be re-envisaged.

Another problem here of course that blockchain transactions are immutable. That is, they cannot be changed therefore we will encounter problems in the case of misidentified artists, contractual changes, dispute resolution outcomes therefore the blockchain with its irreversible chain of information commits can lead to problems not inherent in a traditional data storage technology. It remains unclear as to whether blockchain can work for music publishing due in main to the complexities of modern song writing (especially for hit records and catalogues). Certain blockchain platforms are claiming to be able to completely eliminate the music publishing intermediaries (including CMOs) but there is a myriad of outlier cases such as what happens, if the song within the blockchain infringes another song (e.g. “Blurred Lines”), or regarding samples from another person’s song or a song is simply a cover. Short of abolishing the entire current complex legislative infrastructure around songwriting and music publishing, blockchain simply may not work.

It seems to only be viable for fixed non-dynamic contracts that cannot change. It has some potential for record labels on their artist contracts and has other potential uses in touring. However here again there would be difficult issues such as managing secondary ticketing. Some CMOs (SACEM and PRS) have been trailing the use of blockchain. This will not eliminate their trusted intermediary role but hopefully might improve their systems. There is also the immutability of the blockchain which can be an issue when we later discover that a recording needs amending due to incorrect attributions. Related to the Distributed Ledger Technology are the use of smart contracts for enforcing licences.

A smart contract is a computer protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract. Smart contracts allow the performance of credible transactions without third parties. These transactions are trackable and irreversible. Proponents of smart contracts claim that many kinds of contractual clauses may be made partially or fully self-executing, self-enforcing, or both. The aim of smart contracts is to provide security that is superior to traditional contract law and to reduce other transaction costs associated with contracting.

For instance, if we were to examine if a creative commons approach is viable with smart contracts (e.g. Creative Commons licence such as the Attribution-Non-commercial-ShareAlike 4.0 International version). At the moment one can write such a licence, but there is no automatic enforcement. Indeed, in the current world where licences are only loosely connected to the digital objects, it is possible to use a copy of a work even if the attached licence specifies no copying. It is possible to envisage a world in which a smart licence could only permit copying with attribution possibly only permit copying into locations declared as non-commercial and eventually do some kind of tracking, though whether that could ever enforce “share alike” is an open question.

The identification and protection of individual and joint creativity is an enduring issue, currently addressed by a range of organisational forms and legal approaches. Even with paper contracts which are divorced from the creative medium, claiming royalties can take decades. However, the cases that make the media are far less than the tip of the iceberg, and, worse, we never see the cases that are never pursued because of the lack of documentation and/or lack of knowledge, nor the collaborations that never take place because the potential participants are too worried by the recognition/creative rights jungle to collaborate.

The current systems (e.g. Performing Rights organisations, and record labels) for recording IPR in contributions to collectively created works are cumbersome and can lead to IPR going unrecorded (thus impoverishing the creators or leading to expensive litigation) and to collaborations not being started because of the difficulty of recording the IPR. Existing ways of establishing and enforcing rights have in the past been open to abuse, and the rise of the digital economy has created many new opportunities for them to be subverted, for which there is ample evidence, such as illegal file sharing and streaming services Digital music services do not collate or publish all the metadata related to a creative performance, making acknowledgement and reward more difficult.

Current approaches have a further consequence of making it difficult to work easily in creative cross media environments where trust in collaborators and different working practices may not be easy to achieve. In addition, attribution is difficult to achieve in short term multidisciplinary collaborations involving co-production of product and co-creation of value, where existing systems are too cumbersome to facilitate sharing, where the project is not the product. Potential solutions are being explored, most typically within the music industry, where the history of changes in the way that music is accessed is most visible.

These range from a variety of legalistic approaches, (e.g. DRM, DCMA, EULA) to, at the other extreme a software patent filed by Apple to prevent iPhones from recording live entertainment. These solutions are limited in application, and in many respects preserve what is left of the status quo of copyright and often are relying on existing lengthy and expensive legal practices for compensation rather than prevention. This is occurring at a time when due to digitisation, a more artist centric world is emerging and there are now many more routes to market for artists.

4.2.3 Artificial intelligence, deep learning, big data

An entire start-up ecosystem is emerging around services that give artists automated songwriting recommendations or enable the average internet user to generate customised instrumental tracks at the click of a button. In 2016, Sony's Computer Science Laboratories (CSL) built an AI called Flow Machines²²⁸ that collaborated with songwriter Benoît Carré to write a song in the style of The Beatles, titled "Daddy's Car".

Spotify's Creator Technology Research Lab promoted a new, AI-composed music project on the streaming platform called SKYGGE. One of SKYGGE's hit singles "Hello Shadow," featuring Kiesza appeared on Spotify's flagship New Music Friday playlist in December 2017, as well as on localised NMF playlists in the U.K., Norway and Scandinavia.

Through its in-house Magenta project,²²⁹ Google is also developing deep-learning algorithms for generating songs, drawings and other artworks. One of its most popular music projects, Performance RNN, uses neural networks to give expressive, human-like timing and dynamics to otherwise stagnant, machine-generated MIDI files. All of Magenta's tools are open-source, and real artists are already using these tools to write their own songs.²³⁰

Creative AI still faces financial and legal resistance from many, however, Warner Music Group's recent acquisition of Sodatone, a²³¹ startup using algorithms to streamline and improve the A&R process, is a prime example of a paradigm which could transform artist development.

Start-up companies such as Splice²³² and Amadeus Code²³³ are building similarly AI-facilitated assistants for songwriters and producers. Three of the 21 start-ups in the Techstars Music accelerator roster to date Amper,²³⁴ Popgun^[8] and SecondBrain²³⁵ have built their core product around AI-generated music. Both Amper and Popgun have closed additional funding rounds from the likes of Khosla Ventures, Two Sigma Ventures, Horizons Ventures and Foundry Group since graduating from Techstars.

Tensions around creative automation were evident in July 2017, when media outlets and industry execs accused Spotify of placing "fake artists" in its mood playlists. It was revealed that Swedish production and background-music company Epidemic Sound had developed a robust distribution network for mood music on YouTube and successfully translated that network into majority market share on a handful of Spotify playlists like Peaceful Piano, and Deep Focus and Ambient Chill. The coming wave of creative AI will serve as yet another litmus test for how much the music industry can tolerate and compete with a functional, utilitarian music streaming ecosystem.

228 <http://www.flow-machines.com/>

229 <https://magenta.tensorflow.org/>

230 <https://www.youtube.com/watch?v=Aq3370Prbi4>

231 <http://sodatone.com/>

232 <https://techcrunch.com/2018/04/16/splice-sounds/>

233 <https://amadeuscode.com/coming-soon>

234 <http://ampermusic.com/>

235 <http://secondbrain.ai/>

Importantly, U.S. law does not allow AI to own a copyright. Section 102 of the U.S. Code states that “in no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery.” Musical algorithms fit these criteria almost perfectly: at their heart, they are merely procedures and processes for outputting musical content. The legal complexity lies in figuring out whether human artists using AI tools are truly the “authors” of the end works created, or whether they are simply the programmers behind the AI tools. Until lawmakers iron out these kinks which, if history is any lesson, will take several years if not decades, the industry will see deals orchestrated across the spectrum on a case-by-case basis. For instance, YouTube personality and singer Taryn Southern formally credited Amper Music as a co-writer in all the tracks for her latest album, I AM AI. On the other end, while many artists have use Google Magenta tools to write their own music, most of them have neither the desire nor the infrastructure to pay royalties back to Google.

AEG Presents²³⁶ is a large provider of live music in the USA producing or supporting over 40 music festivals and managing and booking more than 80 clubs and theatres. They are using big data when working with bookers, artists and managers to learn what people are listening to, what they are buying, and which shows they are attending. That information helps their team create even more streamlined and personalised event experiences for today’s tech savvy music fan. One example of this improvement can be seen in the modern proliferation of festival experiences based on music types, customer segments, or even geography. Using big data showcases the future of the industry which lies in the connection between fans and artists. Streaming music and other technologies help give power back to the fans, reversing a decades-long trend of top down music. This symbiotic relationship between technology empowering fans and the industry mining data to meet fan expectations has helped democratise music access.

Spotify,²³⁷ a leader of big data in the music industry, owns over 28 petabytes of data. One petabyte is enough to store the DNA of the entire population of the US—and then clone them, twice. Spotify are using big data to learn more about who their customers are and how people engage with, purchase, and consume music. By mining data like listener behaviour, social media mentions, ticket sales, and music sales, Spotify is able to push content and curate listening experiences.

The listening habits of 120 million active Shazam²³⁸ users can be viewed in real time, by geographic location. The music industry now can learn how many people, when they heard a particular song, wanted to know the name of the singer and artist. It gives real-time data that can shape decisions about how - and to whom - songs are marketed, using the preferences of the listeners. Again, Shazam can be seen to be shifting the power of deciding hits from the industry to the wisdom of a crowd. The idea of converting a recording sound into data has also led to a different way of interpreting this information. If we know the “sound” of past hits - the interaction between melody, rhythm, harmony, timbre and lyrics some are attempting to see if it possible to predict what the next big hit will be. Companies like Music Intelligence Solutions, Inc,²³⁹ with its software Uplaya,

236 <https://www.aegpresents.co.uk/>

237 <https://www.spotify.com/uk/>

238 <https://www.shazam.com/charts>

239 <https://www.linkedin.com/company/music-intelligence-solutions/>

compare a new recording to older recordings in an attempt to predict success. The University of Antwerp in Belgium conducted a study on dance songs to create a model that had a 70 percent likelihood of predicting a hit.²⁴⁰

Streaming music services are increasingly focused upon how social media is intertwined with the listening experience. The Social 50 chart is derived from information gathered by the company Next Big Sound,²⁴¹ which is now owned by Pandora. In 2015, Spotify acquired the music analytics firm The Echo Nest,²⁴² while Apple Music acquired Semetric. Semetric²⁴³ is known for its service Musicmetric, which record labels, artist managers and others turn to for data about how music is consumed online. This information has become coveted as more listeners turn from CDs and downloads to streaming outlets like Spotify and YouTube. Musicmetric, along with rivals like Next Big Sound tracks streaming services and social media chatter and sells that information to clients like record companies and talent agents. Content distributors now know how people listen to music and which sounds they seem to prefer.

Appendix 4.3.1 Key quotes from interviews

The following pages contain themed quotes from semi-structured interviews with key music industry stakeholders which have been carefully anonymised. Full transcriptions of the interviews from which these quotes are taken are archived confidentially and securely with the research team.

The quotes used are presented in alignment with the chapters to which they relate.

3.3 Research findings from interviews

3.3.1 Critical juncture for change

3.3.1.1 Unparalleled growth of data

“There’s a massive amount of blockage...and the network operators and the potential that the misunderstanding if you could just get a dollar from you that’s always been the path to scale in the music industry.. It is unquestionable. You cannot argue that today’s music marketplace is anything close to being efficient for anybody.”

240 https://motherboard.vice.com/en_us/article/a-machine-successfully-predicted-the-hit-dance-songs-of-2015

241 <https://www.nextbigsound.com/>

242 <http://the.echonest.com/>

243 <https://www.crunchbase.com/organization/semetric#section-overview>

3.3.1.2 Existential threat

“It’s like that cartoon where you have the little fish and the big fish behind and they all think they’re a big fish. But then there is Google behind all of them. We’ve got to get our act together, because we will be eaten up. Because if the problems relate to data. Then you’ve got the biggest companies that have ever existed in history of human civilisation are data companies. So spot the problem!”

3.3.1.3 Economic imperatives

“It’s a massive strategic shift; we wouldn’t sell a million CDs anymore. So we sell a hundred million streams instead. We’ve got a bunch of discovery tools and monitoring and Soundcloud, Bandcamp. YouTube, Deezer. Radio. And to monitor all of these underground bubbling things so we can go in and go. That’s where we believe our size, our ability to gather data through music. That requires really good meta-data to get the usage, you’ve got to capture it in an engine and slice and dice it and turn it around.”

3.3.2 Issues with ISRC and ISWC

3.3.2.1 ISRC

“We have many documents published on the website explaining different facets of the ISRC system generally and in pretty simple terms...We have a network of 65 national ISRC agencies whose job it is to interact with the industry stakeholders across the industry in their territories to provide access to ISRC and education about it.”

“That’s one of the reasons we took ISRC to ISO when we first invented it with Philips back in 1988, or so. Establishing a formal set of rules and a detailed picture of the granularity at which you can assign it is really important, and we have that. But does it mean that everybody will be satisfied? No it doesn’t. Because establishing that granularity of identification is something that’s come out of a consensus process and it doesn’t solve necessarily everybody’s permutations of different business questions.”

“We postulate that there is a role for PPL or CMOs like PPL to play in bringing that, what I call, collectively authoritative data – I call it collectively authoritative because you could argue that the most authoritative stuff comes from the actual owner of the content.”

1) ISRC misuse

“There is not a magic bullet. So it is lots of incremental steps. So, going back to the source and trying to get more information that would be helpful. And it’s something that we’re currently working on as to how we might do that. But there were going to be limits to that. So the fact that you knew someone was in a recording studio is one thing, the fact they might have played something is another thing. But is there actually whether that recording is used? What’s the working title of that recording and how do you match it up to the final version of the recording that was it? It’s just there are a number of complications in this process.”

“We had a very big number one hit last year where there were three performers that did a recording for that recording. The producers never told them that they didn’t use them in the actual recording they re-recorded their work because they didn’t think it was good enough. So the next thing is we get these three performers going mad with us as to why they’re not getting paid on the recording because often you’re not going to bother going back to tell them, you’ve already paid them.”

“The way that ISRC was formed originally was developed through ISO; it was for a very different world to where we live right now, its strengths are also its weaknesses, because if you were to have a super robust centralised ISRC database where everybody had to really rigorously make sure that every single ISRC that was ever issued had some sort of liability attached to it by the person that was attempting to take that code out of the system and apply it to their business. It would probably cost more to run that system than any of the problems that are caused by the current system.”

“There’s a big problem about people not understanding the purpose and context. So if you have an identifier you can specify its format but that is absolutely no use unless you have a really good set of rules to specify what would cause it to be used on a different level.”

“The ISRC code is a great idea. It started off really well but just the fact that the rules of operation weren’t properly policed properly or understood...There’s a big problem about people not understanding the purpose and context. So if you have an identifier you can specify its format but that is absolutely no use unless you have a really good set of rules to specify what would cause it to be used on a different level.”

2) Examples of ISRC Misuse

“There’s a period of time where people would issue their own ISRC if they were licensing a track for a compilation Now, even though that’s not right. So if I license a track to [a record label], they put their ISRC code on its compilation album. That’s not correct but it doesn’t break the system. It just means there’s more than one ISRC codes for a recording.”

“It depends on how many people’s hands the data flows through both on the way out and way back. For a smaller indie label, they’re probably working with the distributor or an aggregator of some kind....Who knows how they do it? Maybe they do it on spreadsheet, maybe they email it to the distributor or they maybe fill out a form, there’s all sorts of ways to do that...So the more people in that chain, the more likely it is that something is being corrupted along the way.”

“A smaller company will just say ‘well, I might as well just chuck my thing in the hat and see what comes out.’ But whether or not these people are actually that expert is a moot point... I’m a small independent label, I have to give my distributor 50 fields over here and I have to give PPL 30 fields over here but about 20 of them are common. Why am I doing it separately? And how do I know where the overlaps are?”

“It’s up to you to self police how you then put a year code onto that and then all the subsequent elements of the code to make it work. That makes it very democratic. It’s very easy to access. And you know in the olden days maybe when you had to be like a dedicated record company. What happened subsequently, particularly with the digital explosion is you’ve got players coming in...there was a sort of subversive attempt to try and sort of take over a chunk of ISRC codes...There can be efficiencies made in ISRC but there are some inaccuracies in codes that are in use.”

3.3.2.2 ISWC

1) Complex nature of music publishing

“Let’s say..a song is written by five people which is the average of the songs these days with an average of six publishers altogether because sometime they have a sub-publisher. A lot of the biggest ones are a lot more than that...[a CMO] in general get a clean registration about 18 months down the line.”

“It’s crazy... the multiplication of admin- what a waste of money. And secondly how could that possibly work out to like 100 percent exactly, because usually what happens is there might be another PRO or a publisher that is claiming something that should be claimed by the one where the writer is based or whatever. So it usually becomes more than 100 per cent.”

“There are obviously issues, for instance, by and large, publishing data I think is worse than recording data. Several reasons...It’s a lot older. And it’s miles more complicated. And there is a smaller margin. It’s unsurprising that the publishing industry have been unable to maintain or unwilling even to maintain as high quality levels of data as recording data.”

2) Competing time pressures

“You cannot get ISWC before a track’s released. It’s not possible. It seems clear at the moment that they’re not providing that role in a timely manner...Being able to get the publishing metadata or data earlier so that before a piece of music is released so it’s identified. If there’s one thing that anyone can do is working on that.”

“There’s a different sense of urgency there. Their shift to digital was slower than the master shift. Clearly the bulk of their revenues were still coming from non-digital sources and still are...”

3) Open standard; closed data

“ISWC is a closed standard, it’s not accessible. You cannot access a registry, you cannot get an ISWC code without a collection society. It very messy, a lot of duplicates, more error correction, correction mechanism. Very strict rules to get one; the IPI is mandatory so it makes it difficult to operate in ISWC.”

“Where do we get ISWC from? If we want to put a new release into marketplace we can go to publishers and say can we have an ISWC? Most the time, they’ll say no we haven’t got it yet. So there’s nothing that we can do.”

3.3.2.3. Issues with linking ISRC and ISWC

“The problem is that you have numerous ISWCs linked to many, many ISRCs because both datasets are a mess.”

1) ISRC Duplication

“The biggest challenge that they both face is to go – here’s all of my data sets and here’s all of yours. When they miss...neither party want their customers to know that they’ve missed. And it was missed so badly.”

“So PPL sort out ISRCs for the labels. And if they are all true, how could they have more ISRCs. So they didn’t want that surfaced. But then when they did the crossover, they had about three to four million ISRCs that neither of them could identify. They were being used as part of the payment mechanism for the musical works rights. So it’s coming across... and I think that’s the wrong approach because what I would prefer if they came along and said ‘we think we’ve got a bit of a problem here. Because then you can fix it.’”

2) Delay in ISWC assignment

“With the work identifier ISWC...the rules around that are for very good reasons to preserve very high levels of data quality...but it does mean that that identifier isn’t available in time to go out on a new recording. So there’s a huge discussion about how we can improve that.”

“In Europe the societies complain that the data they get from the DSP has no writer information. So, they’re having to do lots of matching; fuzzy matching stuff, which is a pain. And with the volumes that they are dealing with...”

3) Royalty inconsistencies

“Different DSPs deal with this problem in different ways. Some of them will revert to market share after a certain amount of time to be income. Yes that’s exactly the unattributed income. Hence why I always say that major publishers have no problem with it at all because market share is always going to favour them. But it is an issue for the writers because it’s a lack of data. If you don’t have that, then it becomes a very kind of random way of paying people and secondly for smaller publishers because when it comes to market share that they easily fall behind.”

“After three years if they don’t have or can’t find the correct rights holder then they will be distributed according to the market share.”

3.3.3 Embedded industry practices

3.3.3.1 Legacy data

“During the late 90s, most of the noughties, the only way to get the business was unlicensed, because the collecting societies were so shit at doing deals. You either die or you operated unlicensed. The only way to do it was to ask for forgiveness and not permission. It’s worked brilliantly. If the tech entrepreneurs hadn’t done that, we wouldn’t have and then we wouldn’t have the digital business.”

“One of our big problems is ...it is in the digital age, because once it got recorded on a hard disk with sequence array and Yamaha keyboard or it might be Roland, they all have an obsolescence. So when you try and go back to two track masters and nobody has the equipment to be able go and plug all the electronics back in, and along with that, is lots of the linear information, about who played; which was just kept on the computer or that computer just became obsolete, nobody thought it was important.”

3.3.3.2 Archaic systems and manual processes

“One of the world’s biggest music companies that we work with is their royalty system and their rights was created before desktop computers existed. You have to go in and write code to access it. So the idea of changing all of that over for people is just terrifying and it’s expensive. So it’s not something they really want to do.”

“Nothing will happen to it unless either, let’s say identifiers were matched which might not happen at all. But if it is identified as a match with the old one, it will only be updated if it is flagged as having received a certain amount of play of that song, if there is a decent amount of money or if the publisher specifically requests that one is updated because of the fact that it’s so slow and so manual, just basically that the vast majority just are not done basically.”

“This is difficult, especially on the older recordings; there was no data about who performed what, so actually what you find on a lot of those ones was the contributor detail would be very vague...The volume thing just can’t be underestimated; there’s just so much of this stuff, especially in the old stuff, that is a real area, it’s not like there is anywhere you can go to find that data; we work very closely with the Musicians Union around all the boxes around the session forms. We are actually working on a project the minute to digitise a lot of the older material so that we can access it more easily.”

3.3.3.3 NDAs

“Of course the other problem you’ve got with a full audit is that there will be so many things that are blacked out because of NDAs, which is where the record company can easily say: ‘we’d love to be able to tell you but we’re not allowed to, our hands are tied.’ Another problem is that there are NDAs in play between the platforms and the labels and the publishers, so that you can never get access to what licence fees are actually being paid. So an artist can’t possibly work out if what they’re getting is a reasonable amount.”

3.3.3.4 Unattributed income

“On the recorded music side, we know it’s possible to point to errors and find glitches but we pretty much have that in place and that’s what’s behind the growth curve that you you’re seeing on the charts so far. You know just to say record companies don’t have blackbox money. They’re able to pay through to their artists.”

“Our understanding is that, when the platforms were licensed originally. There were golden handshakes that took place. There were payments made to unlock the catalogue that was being licensed. I don’t know of any artist who has seen any money from that.”

“And equally, let’s say for instance my own situation; the little band I was in, in the 70’s earned very little money, but our catalogue has moved from Warner’s across to BMG, Warner’s had significant shares in Spotify, they have cashed those shares in; because my catalogue has moved across to BMG. I’ve not seen a penny from Warner’s in terms of a dividend from the sale of those shares. So, how come?”

“There’s been a shift from the sale of products to a streaming delivery and that’s met with a significant displacement in royalties.”

3.3.4 CMOs' roles and responsibilities

3.3.4.1 Roles and responsibilities

"PRS for music offer us a web service it's quite old quite clunky and quite difficult to integrate with because it's a soap interface which means that you need slightly more complex software to read it"

"While we are onto the politically sensitive stuff here, but if you look at what is the basic reason for the inefficiency of the processes is...it is inside PRS and ICE."

"When you move in to online streaming of Spotify or Apple Music, that's done directly by record companies outside of what we do. But actually in reality the question still is relevant for music data management because we've been managing more traditional side of the business which has been – PPL's nearly 85 years old."

"Because it licenses public performance broadcaster, it has its own very clear commercial remit which is a public performance of broadcast. PPL have done an amazing job of enhancing what they do. I mean they're an incredible organisation, but they still have some barriers in terms of where it's not really their job under the current remit to be developing full blown systems for the entire music industry; because they are still a collecting society for public performance and broadcast."

"When Spotify tells PRS that a recording was played, PRS then compares that to their database of musical works and they then make claims if they need to. Back to Spotify... for the writer/publisher that they represent and what that fact in that list is saying, is that at some point these ISRCs have been reported to PRS and they have linked them to this musical work. It's not about the recording, it's about the data that is reported to PRS."

3.3.4.2 Data control

"I think the instinctive desire of protecting their repertoire and data will have to go away, and to a significant extent has gone away. I think the people now recognise that data is not proprietary... collections societies are very zealous about their data. And they are still the worst competition."

"It's just there is an assumption that if I do these things, I will lose control....We don't want to give you this information because if we give it to you we won't have a job. I mean that was underlying that was effectively what was being said....We don't want you to have a data anyway because it is ours and if you give it to you you'll be able to do our job. That's quite possible. But if you do it properly reinvent the wheel."

3.3.5 Recent industry initiatives

3.3.5.1 GRD

“If you go back to the Global Repertoire Database which I supported, I thought was a good initiative, I thought it was risky and I thought it might fail but I thought it was a really good try. And it was the best try anybody’s had so far. But it failed...it wasn’t all about money. It was about turf, envy, job protection, all sorts of stuff goes on human behaviour.”

“GRD failed because of vested interest literally because people were certain quite senior people saw it as a threat to their job. So they took almost personal reasons they actually scuppered it rather than any logical or industry... There will never be a GRD. There will never be a central entity.”

3.3.5.2 DDEX

“I think one of the things which is very important about DDEX is that it is about allowing different players in an ecosystem which is driven by experimentation, innovation, ferocious competition between different parties to collaborate where they need to and swap data in a standardised way so that the key information can flow through the different systems...It’s a phenomenally valuable piece of work that makes the industry happen which isn’t very widely recognised.”

“We have an industry standards organisation, DDEX that everybody buys into. We’re trying to get away from a proprietary industry led umbrella organisations with massive levels distrust. And just turn it into a DDEX because then it’s apolitical. So I think the idea of making sure that all of the standards are within a body that is across the industry and has a level of respect and independence the way forward.”

“In those DDEX conversations, the music industry and the labels are trying to get a sense of what the outside world needs. But there’s a three or four companies that got very loud voices. And for them this is a complex monopoly right. There’s not a lot of incentive for them to do anything that opens up the market. They’re quite happy with just having three or four players sharing the market between them. That works.”

3.3.5.3 Internal systems/silos/duplication

“I think that that’s where the money gets spent and who should be paying for things industry wise...If one company decides to invest in its own competitive edge and it’s a data related competitive edge, it’s a problem for everybody else that one person has an advantage when that advantage comes out just a better awareness of the marketplace.”

3.3.6 Further barriers to progress

3.3.6.1. Lack of understanding of data

“I know that historically there’s huge gaps in the data. I’ve had a whole thing some years ago trying to work out who was the drummer on Delilah by Tom Jones. No one knows who was the drummer on Delilah by Tom Jones. There are huge problems with data and I’m quite sure that those problems continue to this day because we dealing with...drunken musicians running around doing things, so they don’t fill up forms, stuff doesn’t happen.”

“Before metadata was publicly visible, it was a chore. They were told it’s very important it was legally important that they did it but it was still a chore. So their heart was never in it. Even now the bits that they care about most are the bits the public see. And the rest of it, they don’t care. A lot of them don’t really understand the nature of the objects that you’re dealing with.”

“Many people are not even bothering to stake a claim to a share until they know where their sound recording has been a success. And as soon as you get a hit, you have all of this army of people saying they want this or that. So how then do you pay the right people when they haven’t worked out who’s who. That is a real problem.”

“One of the problems has been described is that the artist goes into the recording studio, and at that point that kind of information is often recorded significantly after the event. So, you’re never quite sure exactly who really is playing in that studio, who the engineers were etc. So, lots of misinformation can happen between the recording when it is actually recorded.”

“There is an education role, it’s quite a simple one, which is, if you don’t give us this information you can’t get paid.”

“It depends on what you want, and what your priorities are. But if you are better informed about what you have to give for what you will get, and be more discerning about who you do those deals with, then not only will artists have the option of how much admin they have to do, and how much they don’t, but also what a good deal looks like. And by return we hope that if we have better informed artists then those who are offering deals will hopefully need to do so in a better way.”

“When you get to a specialist music the people who have the most knowledge and know about it has the least interest in putting in any system because they know it so they don’t then ever have to look it up or anything.”

“There is a learning curve to that...There are people who are not really serious about a career in music, but they want to get some songs up somewhere, and then there’s developing emerging markets where it’s probably hard to get a computer with spreadsheets on it. ...There’s this huge sort of innovation and creativity coming out of these artists and they need to be supported. But here’s the problem once you start letting people who are not the rights owner assign ISRCs to records or people who don’t really understand the system very well, then you get problems.”

“I think songwriters and creators and artists have always been very sort of laissez faire with data, which is fundamentally core to their businesses. If they are small businesses, all they have is the IP in relation to the music they create. And yet there’s always been this line that somebody else’s job the manager will register things for the publisher register things and I’m going to be fully creative and just not do anything on this.”

3.3.6.2 Politics and asymmetrical power relations

“Computers can do whatever people tell them to do, but it’s who gets to tell computer what to do. That’s what most of this is actually boils down to. Machines can do whatever you want them to. But who agrees on who is telling them to do what is the political aspect of this and who’s going to pay for the machine to do this particular task is the other aspect to it.”

“The entire industry has no trust. So from creator, to owner, to user, to sales platform, to the tech...There is the complete lack of trust because there are too many middlemen. You democratise the data then there has to be a level of trust...Within this industry. It tends to be led by lawyers. It tends to be led by wanting to protect their own interests.”

3.3.6.3 Fragmentation and insufficient collaboration

“I think the problem is that again you’re into silos of data. This is an international industry where consumption is happening across borders. There are international identifiers. And yet for me the problem is not all of this is joining up.”

“The industry revolves around rights that exist in particular silos; so there are publishing rights, there are performer rights, there are sound recording rights. The rights exist as separate entities and they must remain separate entities from a legal point of view. But what’s happened historically is that management entities have grown up in silos with the rights. So the interoperability piece is quite tricky, because you’ve got entire industries based around single rights types.”

“You can find that move in the opposite direction and then that’s driving things up unnecessarily. It’s very difficult to go to the publishers and say please follow the following standards.”

3.3.6.4 Lack of governance

“The cause is the lack of understanding of the new models of distribution, and therefore poor governance in those who manage rights. The majority of the friction in the marketplace is to do with a misunderstanding and bad decision making...the music industry is still this big tiny opposed the potential... I think that’s more to do with a lack of governance a lack of understanding...The industry did very little to progress those conversations with potential new entrants...there was no governance from a record...it was about cost management, it was about downsizing ahead of the decline in the music industry.”

“It’s a complex monopoly combined with a lack of governance. At the top levels of those businesses...they’re still clinging onto what they’ve got, they’re worried about undervaluing their rights, they’re worried about losing control. They don’t recognise that if they create a marketplace actually well, then the value of music in an expansive marketplace, the value of music is only going to go one way which is up.”

“The link between the work and the sound recording...They are completely disconnected. It’s the governance rules. So, even if they tell us this is the truth, if somebody else tells me no, it is not true. What do I do? Who is the ultimate decision maker?”

3.3.7 Creators in music data value networks

3.3.7.1 Music data and creators’ earnings

“First if you’re an artist or a songwriter and you’re trying to make ends meet, you need to know what works and what doesn’t work...If someone consumes the music something that I’ve produced, I need to know about it, the second that happens. That’s where you focus the effort and the initiatives, so you can map the market in terms of who might distribute music licenses and how that gets supplied from the existing entities.”

“A big publisher for the record company has a [large number of] catalogue[s]. So the money that they get has increased. The deal that would have been done on that site between the songwriter and the publisher or the label and the artist will have been very much in favour of the corporation. So they get extra money that wasn’t there before... [whereas] songwriters that are active now don’t have that tunnel that the long term long-tail have.”

3.3.7.2 Data as an asset

“Data has always been the promise and the Achilles’ heel of this industry. And the more data that is created, the more prospect for ownership there is. And we’ve never had a problem with technology. We’ve always had a problem with ownership and politics, part of which I think comes down to the fact that off tradition and also that the law and cultures change much more slowly than creativity and technology. If there is a value in user base and network ability, that should translate into a financial fact which is behind artists’ right now, but equally is a huge opportunity for music if we can get that right.”

“The artist is the center of a larger business as well as being a business, in their own right. And part of the reason we support that is perhaps the business has looked at the other way up and seen it as the industry which works with artists, as opposed to looking at the engine of the industry.”

3.3.7.3 Creators’ earnings and attribution

“It actually comes back to attribution. If you can’t recognise the numbers that George Harrison in The Beatles is the same George Harrison The Traveling Wilburys or whatever it is...then how are you going to show to consumers. This is George Harrison doing something different from what you’re used to and maybe you’d like this.”

3.3.7.4 Debates on the legal definition of streaming

“We have a right to license that exclusively performers right to deal with their right in the manner in which they wish, which tends to be by way transfer in return for a contractual agreement for royalties when the right is exploited which is through streaming platforms. Now we need to be very very careful. I think as an industry that we do not fall into the trap that is being set by broadcasters and by certain internet services, whereby a stream is treated as a broadcast, a linear communication or a public performance, because the fact is that that would suit very well certain players and users of the recordings, of the rights to pay less.”

“Streaming is a form of communication to the public and should be treated like radio which we’ve always felt is a very strong argument, and it is becoming stronger every day because people are now using these smart speakers in their home that link to Spotify and all they are doing is saying ‘play me stuff by Elton John and maybe play me a song or give me a summer playlist...This is no different to listening to one of a proliferation of radio stations that you could tune into; there’s no difference at all. People are not selecting tracks on streaming services in the way they used to, they are being fed. So there’s the smart speakers use playlists all the time... Now all that is being pushed to you. You’re not pulling that stuff out; it’s being pushed to you. So the argument, that should come under equitable remuneration becomes even stronger.”

“I think the problem there is the separation of interactivity with streaming from non-interactive streaming. I don’t think really there’s that much difference between the two the way in which streaming is developing. People are getting more and more used to leaning back than leaning forward streaming.”

“Unfortunately the way things are developing is evolving as if all streaming is interactive. I think that’s a significant problem because I think there’s quite a lot of evidence...[which is] people were offered too much choice. When you’re offered too much choice, you tend not to choose anything. And therefore you know people find things for you. And now music is being offered in such a huge volume, it’s much much easier for people to lean back in and be provided with something, rather than them to lean forward even though the capability is there for interactivity, the reality is that people are using it much less interactively.”

“Actually what was interesting here is that...the decision was to give performers a stronger right in making available on demand an exclusive right. The irony of this though is that actually the remuneration rights ended up possibly being a bit more valuable for performers because on informants and broadcast revenue has grown enormously in terms of our efforts to do that. So 15 years ago we collected about 60 million pounds a year just 218 last year.”

“I just think it’s funny that actually the intention was to give performers a stronger exclusive rights where I think a lot of performers now are reflecting on actually in reality...‘I’ve given away on terms. Am I really benefiting from the upside in streaming and what’s going on’”.

Appendix 4.3.2 List of interviewees

No	Organisation	Type
1	PRS for Music	CMO
2	PPL	CMO
3	County Analytics	Tech
4	Universal Music Publishing Group	Major Publisher
5	Blokur	Blockchain
6	JAAK	Blockchain
7	Mycelia	Blockchain
8	British Library	Tech
9	PRS for Music	CMO
10	Queen Mary University	Tech
11	British Lebrary/Editeur	Tech
12	Universal Music Group	Major Label and Publisher
13	Apple Music	DSP
14	Hearofm	Blockchain
15	BBC	Broadcaster
16	Digital Catapult	Trade Body
17	Sensore	Tech
18	Clintons Solicitors	Law Firm
19	MCPS/MPA Group	CMO/Trade Body
20	MMF	Trade Body
21	YouTube	DSP
22	UK Music	Trade Body
23	Beggars Music	Indie Publisher
24	AIM	Trade Body
25	Cooking Vinyl	Indie Label
26	Digital Data Exchange	Tech Trade Body
27	7 Digital	DSP
28	BPI	Trade Body
29	FAC	Trade Body
30	PPL	CMO
31	ICE	CMO
32	BMG Rights Management	Major Publisher
33	Beggars Group	Indie Label
34	PRS for Music	CMO
35	7 Digital	DSP
36	BASCA/Ivors Academy	Trade Body
37	PRS/Peer Music	CMO / Indie Publisher
38	IFPI	Trade Body
39	Independent Music Researcher	Trade Body
40	The Orchard	Intermediary

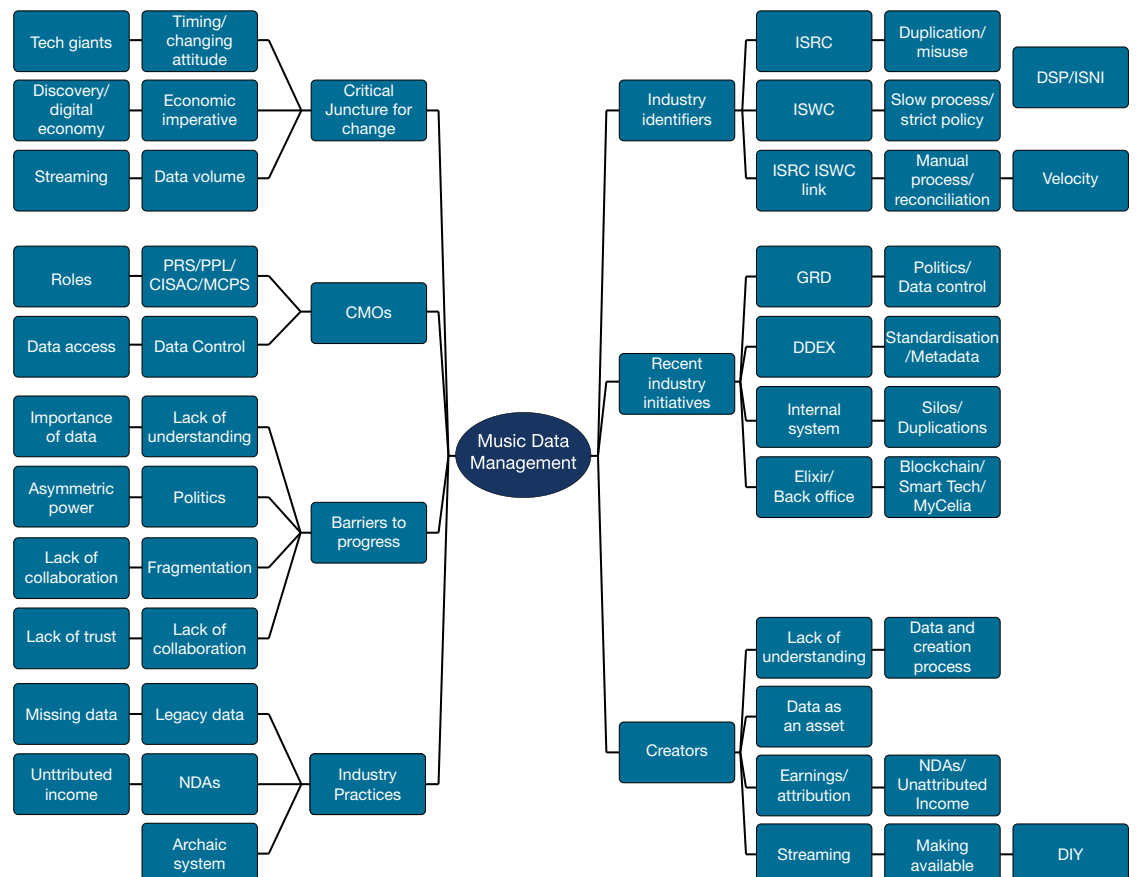
No	Organisation	Type
41	MPG	Trade Body
42	PRS Foundation	CMO
43	Warner Chappell	Major Publisher
44	WIN	Trade Body
45	Musicians Union	Trade Body
46	SCAPR	CMO
47	CISAC	CMO
48	Music Biz	Trade Body
49	Warner Music Group	Major Label and Publisher
50	Ivors Academy	Trade Body

Appendix 4.4 NVivo analysis

The diagram below illustrates the coding schemes used to analyse the content of over 50 interviews (see interviewee list at 4.3.2). Each interview typically lasted around one hour. In the first stage of analysis, we transcribed the interviews as they were being conducted. The transcribed data, as well as the interview notes were coded under 100 initial nodes. At this stage, the imperative was to code interviews as tightly as possible to ensure we did not lose any important insights shared by interviewees. As a result, many of the passages were coded to two or more codes.

Towards completion of the interviews, key themes were emerging, identified through the initial data analysis as well as through numerous team discussions. On 17th October 2018, we shared these key themes in a workshop held at PRS for Music where key stakeholders further expressed their views on the key findings we presented.

In the second phase, we incorporated these stakeholder views and blended them with key points of focus from the detailed review of literature and practice carried out by the research team. From this stage of analysis, we extrapolated 7 top-level codes: Critical juncture for change, CMOs, Barriers to progress, Industry practices, Industry identifiers, Recent industry initiatives and Creators. The initial 100 nodes were merged to 23 sub-codes and 24 sub-sub-codes, which were then grouped together under appropriate top-level codes.



Appendix 4.5 Bibliography

1709 Blog., 2013. Head of US Copyright Office wants reform. *IPKat*. <http://the1709blog.blogspot.com/2013/03/head-of-us-copyright-office-wants-reform.html>

Aguiar, L. and Waldfogel, J., 2018. As streaming reaches flood stage, does it stimulate or depress music sales?. *International Journal of Industrial Organization*, 57, pp.278-307.

Aguilar, A., 2018. We Want Artists to Be Fully and Fairly Paid for Their Work: Discourses on Fairness in the Neoliberal European Copyright Reform. *J. Intell. Prop. Info. Tech. & Elec. Com. L.*, 9, p.160.

Angjeli, A., MacEwan A. & Boulet V. 2014 ISNI and VIAF -Transforming ways of trustfully consolidating identities, *IFLA Lyon 2014*. <http://library.ifla.org/985/1/086-angjeli-en.pdf>

Arditi, D., 2014. iTunes: Breaking barriers and building walls. *Popular Music and Society*, 37(4), pp.408-424.

Arthur, C., 2012. The history of smartphones: Timeline. *The Guardian*, 24.

Bakker, G. 2012. Adopting the Rights-Based Model: Music Multinationals and Local Music Industries Since 1945. *Popular Music History* 6 (3): 307–343.

Baldwin, P., 2014. *The copyright wars: three centuries of trans-atlantic battle*. Princeton University Press.

BASCA Chair Crispin Hunt quipped “Rules won’t break the Internet they’ll mend it” at the May 2017 *Ivor Novello Awards*

Bazalgette, P. 2017. Independent Review of the Creative Industries, September 2017 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/649980/Independent_Review_of_the_Creative_Industries.pdf

Beam, M. and Salmon, P., 2013. Functional specifications: Common Works Registration version 2.1. - Rev.7, CISAC CWR11-1991R1

Besen, S.M., Kirby, S.N. and Salop, S.C., 1992. An economic analysis of copyright collectives. *Virginia Law Review*, pp.383-411.

Bronson, Po., 1998. Rebootlegger. *Wired*. <http://archive.wired.com/wired/archive/6.07/newmedia.html>.

Bodo, B., Gervais, D. and Quintais, J.P., 2018. Blockchain and smart contracts: the missing link in copyright licensing? *International Journal of Law and Information Technology*, 26, 311–336 DOI: 10.1093/ijlit/eay014

Borghini, M., 2011. Chasing copyright infringement in the streaming landscape. *International Review of Intellectual Property and Competition Law*, 42(3).; McGugan, F., 2015. Making Available, Communication to the Public & User Interactivity. <https://www.musictank.co.uk/resources/reports/making-available-communication-to-the-public-user-interactivity> accessed, 24, pp.04-16.

Boucher, F. C. 1987. Blanket music licensing and local television: An historical accident in need of reform. *Washington and Lee Law Review* 1157, 44. Retrieved from <http://scholarlycommons.law.wlu.edu/wlulr/vol44/iss4/3>

Bray, E. 2018. Streaming could save the music industry from slaughter - and here's the proof. *I news*, April 13th 2018 <https://inews.co.uk/culture/music/streaming-services-saving-music/>

Breindl, Y., Briatte, F. 2010 Digital Network Repertoires and the Contentious Politics of Digital Copyright in France and the European Union. Internet, Politics, Policy 2010: An Impact Assessment, Sep 2010, Oxford, United Kingdom. <http://ipp.oii.ox.ac.uk>

Brooke, T. 2014. Descriptive Metadata In The Music Industry: Why It Is Broken And How To Fix It - *Journal of Digital Media Management*

Burnett, R. 1996. *The Global Jukebox: The International Music Industry*. London: Routledge.

Camras, M. and Martin, D.W., 1989. Magnetic recording handbook. Van Nostrand Reinhold.

Carlisle, S. 2016. 'Making available' right: What is it and why should we care? *NSU report*, 2 Mar 2016 <http://copyright.nova.edu/making-available-right/>

Caves, R.E., 2000. *Creative industries: Contracts between art and commerce*. Harvard University Press.

Coleman, M. 2004. *Playback: From the Victrola to MP3, 100 Years of Music, Machines, and Money*. New York: Da Capo Press.

Collopy, D., 2008. Barriers to Harmony: Divergent approaches to copyright law and collective copyright management." in: *Music and Intellectual Property*. BNA

Conley, N., 2007. The Future of Licensing Music Online: The Role of Collective Rights Organizations and the Effect of Territoriality. *J. Marshall J. Computer & Info. L.*, 25, p.409.

Cooke, C., 2015. Dissecting the digital dollar part one. In *The Music Managers Forum, London*.

Cox I. J., 2008. *Digital watermarking and steganography*. Morgan Kaufmann, Burlington, MA, USA,

Csikszentmihalyi, M., 1996 *Flow and the psychology of discovery and invention*, HarperPerennial, New York, 1997

Cummings, A.S., 2010. From monopoly to intellectual property: Music piracy and the remaking of American copyright, 1909–1971. *The Journal of American History*, 97(3), pp.659-681.

Day, B.R., 2011. In defense of copyright: Creativity, record labels, and the future of music. *Seton Hall Journal of Sports and Entertainment Law*, 21(1).

De Voldere, I., Romainville, J.F., Knotter, S., Durinck, E., Engin, E., Le Gail, A., Kern, P., Airaghi, E., Pletosu, T., Ranaivoson, H. and Hoelck, K., 2017. Mapping the Creative Value Chains: a Study on the Economy of Culture in the Digital Age. *Publications Office of the European Union, Luxembourg*. p.32

DDEX 2016 Candidate Standard, Recording Information Notification (RIN) (Version 1.0)

DDEX 2019 Implementing the DDEX MLC Message Suite Standard <https://kb.ddex.net/plugins/servlet/mobile?contentId=9112838#content/view/9112838>

Digital Music News., 2018. “Label Group IFPI Says It Can’t Account for Half of YouTube’s Claimed \$1.8 Billion In Royalty Payments”. <https://www.digitalmusicnews.com/2018/11/16/ifpi-google-youtube/>

Dredge. S., 2018. “IFPI and YouTube at loggerheads over \$1.8bn-payments figure”

Drahos, P., 2016. *A Philosophy of Intellectual Property*, Taylor & Francis

MusicAlly November 19th 2018 <https://musically.com/2018/11/19/ifpi-andyoutube-at-loggerheads-over-1-8bn-payments-figure/>

Doeden, M., 2015 *SpaceX and Tesla Motors Engineer Elon Musk*. Lerner Publications.

Drummond J. (2003) The Structure Of Intentionality from Don Welton (2003), *The New Husserl: A Critical Reader*, Indiana University Press, p 66

Edwards D.E. 2018 Circulation Gatekeepers: Unbundling the Platform Politics of YouTube’s Content ID, *Computers and Composition* 47 , pp:61–74 Science Direct

Erickson K. 2014 Decrypting the Metadata Landscape, Future of Music Coalition, <https://www.futureofmusic.org/blog/2014/09/30/decrypting-metadata-landscape-0>

European Commission., 2017. How would the new rules tackle the value gap between creators and online platforms - Frequently asked questions. <https://ec.europa.eu/digital-single-market/en/faq/frequently-asked-questions-copyright-reform>

European Commission., 2017. Modernisation of the EU Copyright Rules. <https://ec.europa.eu/digital-single-market/en/modernisation-eu-copyright-rules>

European Commission., 2017. What does the Commission propose in the new Copyright Directive-Frequently asked questions. <https://ec.europa.eu/digital-single-market/en/faq/frequently-asked-questions-copyright-reform>

European Parliament., 2018. Amendments adopted by the European Parliament on 12 September 2018 on the proposal for a directive of the European Parliament and of the Council on copyright in the Digital Single Market, P8_TA-PROV(2018)0337, 12 September 2018 <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+TA+P8-TA-2018-0337+0+DOC+PDF+V0//EN>

EY 2014. Big Data - changing the way businesses compete and operate. Insights on governance, *risk and compliance report*, April 2014 https://www.ey.com/Publication/vwLUAssets/EY - Big_data: changing the way businesses operate/%24FILE/EY-Insights-on-GRC-Big-data.pdf

Feenberg A. 1999. *Questioning Technology*, Routledge; 1 edition

Forrest, C., 2014. How the ‘PayPal Mafia’ redefined success in Silicon Valley. *TechRepublic*. <https://www.techrepublic.com/article/how-the-paypal-mafia-redefined-success-in-silicon-valley/>

Foucault M. 1970. *The Order of Things, (Les Mots et les Choses)* first published 1966 by Editions Gallimard, Paris English edition first published in the United Kingdom 1970 by Tavistock Publications, Routledge 2002

Fletcher, G., 2017. Interview with former PRS Chair Guy Fletcher, *Music Week*, <http://www.musicweek.com/interviews/read/the-big-interview-prs-for-music-s-guy-fletcher/067154>

Frith, S., 1987. The industrialization of popular music. *Popular music and communication*, pp.53-77.

Garofalo, R. 1999. From Music Publishing to MP3: Music and Industry in the Twentieth Century. *American Music: A Quarterly Journal Devoted to All Aspects of American Music and Music in America* 17 (3): 318–353.

Gervais, D. and Maurushat, A., 2003. Fragmented Copyright, Fragmented Management: Proposals to Defrag Copyright Management. *Canadian Journal of Law and Technology*, 2(1).

Gervais, D.J. ed., 2006. *Collective management of copyright and related rights* (pp. 264-265). Kluwer Law International.

Green, B. and Bide, M., 1999. Unique Identifiers: a brief introduction, *Book Industry Communication / EDItEUR*

- Ghafele, R. & Gibert, B., 2011. Counting the Costs of Collective Rights Management of Music Copyright in Europe. *IDEAS Working Paper Series from RePEc*
- Goldstein, P. 1994. *Copyright's Highway: From Gutenberg to the Celestial Jukebox*. Stanford, CA: Stanford University Press.
- Google., 2018. How Google Fights Piracy
https://cdn.mbw.44bytes.net/files/2018/11/GO806_Google_FightsPiracy_eReader_final-1.pdf
- GOV-UK, 2018, Creative industries: Sector Deal Policy paper, March 2018 <https://www.gov.uk/government/publications/creative-industries-sector-deal/creative-industries-sector-deal-html>
- Griffin, J., 2010, Tarzan Economics': If Music Is Free, How Do Artists Get Paid?, *Wharton Knowledge*, <http://knowledge.wharton.upenn.edu/article/tarzan-economics-if-music-is-free-how-do-artists-get-paid/>
- Guibault, L. & Van Gompel, S. 2015, Collective Management in the European Union, Collective Management of Copyright and Related Rights Third Edition Edited by Daniel Gervais, *Kluwer Law International BV*, The Netherlands, Ch 5 p139 – 174
- Gürdür D., Asplund F. (2018) A systematic review to merge discourses: Interoperability, integration and cyber-physical systems, *Journal of Industrial Information Integration* 9, p14-23
- Hardin, G., 1968. The tragedy of the commons. *science*, 162(3859), pp.1243-1248.
- Hardy, P., 2013. *Music Publishing and how it works*. Omnibus Press
- Hargreaves, I., 2011. Digital opportunity: a review of intellectual property and growth: an independent report.
- Haunss, S. and Kohlmorgen L., 2010. Conflicts about intellectual property claims: The role and function of collective action networks, *Journal of European Public Policy*, 17, 242–262
- Herlihy, D. & Zhang, Y. 2016 Music industry and copyright protection in the United States and China. *Global Media and China*, 1(4), 390–400. <https://doi.org/10.1177/2059436417698061>
- Hesmondhalgh, D. and Meier, L.M., 2018. What the digitalisation of music tells us about capitalism, culture and the power of the information technology sector. *Information, Communication & Society*, 21(11), pp.1555-1570.
- Hill, K., 1999. A perspective: The role of identifiers in managing and protecting intellectual property in the digital age. *Proceedings of the IEEE*, 87(7), pp.1228-1238.
- Hirschhorn, J., 2015. Less money, mo'music & lots of problems: A look at the music biz. *LinkedIn Pulse*.

Rethink Music., 2015. Fair music: Transparency and payment flows in the music industry. *Berklee Institute of Creative Entrepreneurship*. Accessed, 23, p.5.

Holdsworth, M., 2010, The International Standard Text Code (ISTC): A Work in Progress A Supply Chain Perspective, Book Industry Communication and the Book Industry Study Group.

Hoy. M.B., 2018, Alexa, Siri, Cortana, and More: An Introduction to Voice Assistants, *Medical Reference Services Quarterly*, 37:1, 81-88, DOI:10.1080/02763869.2018.1404391

Hypebot, 2015, The Failure of The Global Repertoire Database.

Hyysalo, S. 2010. *Health Technology Development and Use: From Practice-Bound Imagination to Evolving Impacts*, London: Routledge.

Ingham, T., 2018. YouTube: We've paid the music business \$1.8bn in ad money over the past 12 months, *Music Business Worldwide*, November 7th 2018 <https://www.musicbusinessworldwide.com/youtube-weve-paid-the-music-industry-1-8bn-over-the-past-12-months/> Page 1 of 4

IPkat / 1709 Blog, 2013. Head of US Copyright Office wants reform. *IPkat / 1709 Blog*. <http://the1709blog.blogspot.com/2013/03/head-of-us-copyright-office-wants-reform.html>

IFPI 2009. International Standard Recording Code (ISRC) Handbook 3rd Edition, IFPI Secretariat.

IFPI 2019. Global music report 2019, *IFPI* <https://www.ifpi.org/downloads/GMR2019.pdf>

Jessop P., 2018. Documenting Music Links - "Who Says It's So?", *County Analytics Technical Paper* No.1.

KEA European Affairs 2006, The collective management of rights in Europe. <http://www.keanet.eu/report/collectivemanpdffinal.pdf?4f4eb7>.

Kefalas, A., 2017. *The relevance of traditional Collective Management Organisations in the digital age: Current challenges and future possibilities*. Master's thesis, University of Agder. p.24.

Klein, B., Meier, L.M. and Powers, D., 2017. Selling out: Musicians, autonomy, and compromise in the digital age. *Popular Music and Society*, 40(2), pp.222-238.

Kohn, A. and Kohn, B., 2002. *Kohn on music licensing*. Bob Kohn.

Kretschmer, M. and Erickson, K., 2018. How much do we know about notice-and-takedown? New study tracks YouTube removals. *Kluwer Copyright Blog*. <http://copyrightblog.kluweriplaw.com/2018/06/12/much-know-notice-takedown-new-study-tracks-youtube-removals/>

Kretschmer, M., 2000. Intellectual property in music: a historical analysis of rhetoric and institutional practices. *Studies in Cultures, Organizations and Societies*, 6(2), pp.197-223.

Kretschmer, M., 2005. Artists' earnings and copyright: A review of British and German music industry data in the context of digital technologies. *First Monday*, 10(1).

Kretschmer, M., 2005. The aims of European competition policy towards copyright collecting societies. *Serciac. Montreal*, pp.7-8.

Kretschmer, M., 2018. Vote for a balanced European copyright law/ Statement by EPIP academics. *CREATE*. <https://www.create.ac.uk/blog/2018/09/10/vote-for-a-balanced-european-copyright-law-statement-by-epip-academics/>

Levine, R., 2018. David Lowery on Spotify Lawsuits and the Battle For Creators' Rights. *Billboard*, 26th January 2018 https://www.billboard.com/articles/business/8095336/davidlowery...medium=email&utm_campaign=Digital%20Update&utm_term=biz_digital

Laing, D., 2004. Copyright, Politics and the International Music Industry. In *Music and Copyright*, ed. S. Frith and L. Marshall. Edinburgh: Edinburgh.

Lalonde, P.É., 2014. Study concerning fair compensation for music creators in the digital age. *CIAM, International Council of Creators of Music. Nashville, USA*, 22(10), pp.2014-23.

Levin, R., 2011. *Free Ride How Digital Parasites Are Destroying the Culture Business, and How the Culture Business Can Fight Back*. New York: Anchor Books.

Lee, S., 2016. Architecture of Intermodal Complex, Complexity & Simplicity - Proceedings of the 34th eCAADe Conference - Volume 2, University of Oulu, Oulu, Finland, 22-26 August 2016, pp. 297-303.

Lee, S., 2016 *Techné and Dispositif of Architecture. Worldmaking as Techné: Participatory Art, Music, and Architecture*, Publisher: Riverside Architectural Press, Editors: Mark-David Hosale, Sana Murrani, Alberto De Campo, pp.3-25.

Levine R., 2011. *Free ride: how digital parasites are destroying the culture business, and how the culture business can fight back*. New York. Doubleday. (15-16)

Leyshon, A., 2003. Scary monsters? Software formats, peer-to-peer networks, and the spectre of the gift. *Environment and Planning D: Society and Space*, 21(5), pp.533-558.

Littoz-Monnet, A., 2006 Copyright in the EU: droit d'auteur or right to copy? *Journal of European Public Policy*, 13, 438-455.

Ludovico, L.A., 2009. IEEE 1599: A Multi-layer Approach to Music Description, *Journal Of Multimedia*, Vol. 4, No. 1.

MacEwan, A., Angjeli A. & Gatenby J., 2013. The International Standard Name Identifier (ISNI): The Evolving Future of Name Authority Control, *Cataloging & Classification Quarterly*, 51:1-3, 55-71, DOI: 10.1080/01639374.2012.730601.

MusicBrainz 2018. <https://musicbrainz.org/doc/About>

MacKenzie, D.A., and J. Wajcman. 1985. *The Social Shaping of Technology: How the Refrigerator Got Its Hum*. Milton Keynes: Open University Press.

Marshall, L. 2004. Infringers. In *Music and Copyright*, ed. S. Frith and L. Marshall. Edinburgh: Edinburgh University Press.

McGugan, F., 2015. An analysis of the application of communication and performing rights to licensed music streaming services and the subsequent impact on performers, *Musictank Insight paper*, October 2015 http://www.musictank.co.uk/wp-content/uploads/wocommerce_uploads/2016/04/MUSICTANK-PAPER-Making-Available-Communication-To-The-Public-User-Interactivity-by-Fiona-McGugan-20.10.15.pdf

Miles, M.B. and Huberman, A.M., 1984. Drawing valid meaning from qualitative data: Toward a shared craft. *Educational researcher*, 13(5), pp.20-30.

Miller, E. and Feigenbaum, J., 2001, November. Taking the copy out of copyright. In *ACM Workshop on Digital Rights Management*, pp. 233-244. Springer, Berlin, Heidelberg.

Molinder, N. (2018) Why building more rights databases won't solve the music industry metadata problem. *Hypebot.com*, January 2018 <https://www.hypebot.com/hypebot/2018/01/why-building-more-rights-databases-wont-solve-the-music-industry-metadata-problem.html>

Morris J.W. & Powers D., 2015. Control, curation and musical experience in streaming music services, *Creative Industries Journal*, 8:2, 106-122, DOI: 10.1080/17510694.2015.1090222.

Mulligan, M., 2014. Tyranny of Choice. *Music Industry Blog*.

Muikku J., 2017. Metadata of Digital Music Files: Summary, *Digital Media Finland*

MusicAlly., 2018. The Report: Article of Faith issue 418 11th October 2018.

Nathan, J., 2001. Sony. Houghton Mifflin Harcourt.

Negus, K., 2018. From creator to data: the post-record music industry and the digital conglomerates. *Media, Culture & Society*. <https://doi.org/10.1177/0163443718799395>.

Nicholas, N., Ward, N. & Blinco, K., 2009 A Policy Checklist for Enabling Persistence of Identifiers, *D-Lib Magazine*, January/February 2009 Volume 15 Number 1/2.

Nicholas, N., Ward, N. & Blinco, K., 2012. Abstract Modelling of Digital Identifiers <http://www.ariadne.ac.uk/issue62/nicholas-et-al/>

Negus, K., 1992. *Producing pop: Culture and conflict in the popular music industry*. London: E. Arnold.

Nordgård, D., 2018. *The Music Business and Digital Impacts: Innovations and Disruptions in the Music Industries*. Springer.

Nuttall F.X. & Oh S.G. 2011 Party Identifiers, *Cataloging & Classification Quarterly*, 49:6, 528-537, DOI: 10.1080/01639374.2011.603075

Oberholzer-Gee, F. and Strumpf K., 2009. File-sharing and copyright, Working Paper 09-132, *Harvard Business School*.

Ohlhorst, F.J., 2012. *Big Data Analytics : Turning Big Data into Big Money.*, Hoboken: Wiley.

Osborne, R., 2017. Is Equitable Remuneration Equitable? Performers' Rights in the UK. *Popular Music and Society*, 40(5), pp.573-591.

Ostrom E., 2015. *Governing the Commons*, Cambridge University Press.

Ovum, 2018. Music & Copyright Newsletter 9 May 2018.

Page, W., and Safir. D., 2017. The Causes and Consequences of allocating revenue between Mechanical and Performing Rights. *Ovum*.

Paine, A., Feb 2019, CISAC to upgrade global music identifier system, *Music Week*, <http://www.musicweek.com/publishing/read/cisac-to-upgrade-global-music-identifier-system/075189>

Paskin, N., 2006. Identifier Interoperability A Report on Two Recent ISO Activities, *D-Lib Magazine*, Volume 12 Number 4.

Paskin, N., 2009. Digital Object Identifier DOI® System Encyclopaedia of Library and Information Sciences, Third Edition DOI: 10.1081/E-ELIS3-120044418.

Paskin, N. & Rust, G., 2014 Principles of Identification V1.1 *Linked Content Coalition* <http://www.linkedcontentcoalition.org/index.php/downloads/category/4-principles-of-identification?download=11:lcc-principles-of-identification-v1-1>

Patel, H., Pettitt, M. & Wilson J.R., 2012. Factors of collaborative working: A framework for a collaboration model *Applied Ergonomics* 43, p1-26.

Parker, N., 2004. *Music business: Infrastructure, practice, and law*. Sweet & Maxwell.

- Peacock, A.T. and Weir, R., 1975. *The composer in the market place*. Faber.
- Perry D.E. & Wolf A.L., 1992. Foundations for the study of software architecture, ACM SIGSOFT Software Engineering Notes Homepage Archive, 17(4) pp:40-52 ACM New York, NY, USA DOI>10.1145/141874.141884.
- Pollock, N., and Williams, R. 2009. *Software and Organisations: The Biography of the Enterprise-Wide System—Or How SAP Conquered the World*, London: Routledge.
- Prior, N., 2010. The rise of the new amateurs. *Handbook of cultural sociology*, pp.398-407.
- Read, M., 2000. *From Major to Minor – the Rise and Fall of the Songwriter*. Sanctuary Publishing.
- Resnikoff P. 2019. Welcome to the ‘Royalty Black Box,’ the Music Industry’s \$2.5 Billion Underground Economy, *Digital Music News*.
- Resnikoff P. 2019. Non-Profit’ SoundExchange Refuses to Disclose Top Executive Salaries, ‘Black Box’ Holding Balances from 2018, *Digital Music News*.
- Rethink Music. 2015. Fair Music: Transparency and Payment Flows in the Music Industry. *Rethink Music*. <http://www.rethink-music.com/research/fair-musictransparency-and-payment-flows-inthe-music-industry>.
- Ricketson, S. and Ginsburg, J.C., 2005. *International Copyright and Neighbouring Rights : The Berne Convention and Beyond*. 2nd Edition. Oxford University Press. New York.
- Santoroa G., Bresciana S. & Papab A., 2018. Collaborative modes with Cultural and Creative Industries and innovation performance: The moderating role of heterogeneous sources of knowledge and absorptive capacity, *Technovation*, <https://doi.org/10.1016/j.technovation.2018.06.003>
- Santos, I., 2016. *Music Industry’s business models in the digital era focused on indie artists*. MSc thesis, Tampere University of Applied Sciences, November 2016 https://www.theseus.fi/bitstream/handle/10024/117050/Dias_Dos_Santos_lara.pdf?sequence=2
- Scherer, F.M., 2004. *Quarter notes and bank notes : the economics of music composition in the eighteenth and nineteenth centuries*, Oxford: Princeton University Press.
- Sehgal, K. 2018. Spotify and Apple Music should become record labels so musicians can make a fair living. *CNBC*, 26 Jan 2018 <https://www.cnbc.com/2018/01/26/how-spotify-apple-music-can-pay-musicians-more-commentary.html>
- Sellin & Seppala (2017) Digital Music Industry-Background Synthesis, *ETLA Music Industry Research Association Conference*, UCLA Friday, August 11, 2017.
- Seville, C., 2006. *The Internationalisation of Copyright Law: Books, Buccaneers and the*

Black Flag in the Nineteenth Century. New York: Cambridge University Press

Silver, J.M., 2014. *Digital Medieval: The first twenty years of music on the web and the next twenty...*

Xstorial Publications Media.

Simon, H.A., 1969. Designing organizations for an information-rich world. *Brookings Institute Lecture, September*.

Singleton, M., 2015. This was Sony Music's contract with Spotify. *The Verge*, 19.

<https://www.theverge.com/2015/5/19/8621581/sony-music-spotify-contract>.

Street J., Negus K. & Behr A., 2018 Copy Rights, The Politics of Copying and Creativity, *Political Studies*, Vol. 66(1) 63-80, Sage DOI: 10.1177/0032321717706012.

Sun H., 2019. *The Digital Revolution: Tamed: The Case of the Recording Industry*, Palgrave MacMillan.

Sweeting P., 2017. Why Rights Organizations Want to Make Music Together, *Rights Tech Project*, <https://rightstech.com/2017/04/why-collection-societies-want-to-make-music-together/>

Towse, R. and Handke, C., 2007. Regulating copyright collecting societies: current policy in Europe. In *Society for Economic Research on Copyright Issues (SERCI) annual congress, Humboldt-Universität zu Berlin/Centre for British Studies* (pp. 12-13).

Towse, R., 1999. Copyright and economic incentives: an application to performers' rights in the music industry. *Kyklos*, 52(3), pp.369-390;

Towse, R., 2001. *Creativity, incentive and reward. An economic analysis of copyright and culture in the information age*. Cheltenham, U.K. ; Northampton, Mass.: Edward Elgar.

Trapman, L., 2016. American and European safe harbours. *Kluwer Copyright Blog*. December 14th <http://copyrightblog.kluweriplaw.com/2016/12/14/american-european-safe-harbours/>

Tschmuck, P., 2015. Music Streaming Revisited—The Problem of Income Distribution. *Music Business Research*. United States Copyright Office., 2015. Copyright and the Music Marketplace. <https://www.copyright.gov/policy/musiclicensingstudy/copyright-and-the-music-marketplace.pdf>.

US Copyright Office 2015. Copyright and the Music Marketplace, <https://copyright.gov/docs/musiclicensingstudy/copyright-and-the-music-marketplace.pdf>

Vanheusen, E., 2007. Performers Rights in European Legislation: Situation and Elements

for Improvement A Study Prepared for AEPO-ARTIS, http://www.aepoartis.org/usr/AEPO-ARTIS%20Studies/Study%20Performers%20Rights%20in%20Acquis_AEPOARTIS.pdf

Williams, R. and Edge, D., 1996. The social shaping of technology. *Research policy*, 25(6), pp.865-899.

Williams, R. and Pollock, N., 2012. Research commentary—moving beyond the single site implementation study: how (and why) we should study the biography of packaged enterprise solutions. *Information Systems Research*, 23(1), pp.1-22.

WIPO Paris Act 1971. Guide to the Berne convention for the protection of literary and artistic works, preface. *Geneva, Switzerland: World Intellectual Property Organisation*. Retrieved from http://www.wipo.int/edocs/pubdocs/en/copyright/615/wipo_pub_615.pdf

WIPO 2011. Online music licensing - a way out of the maze. *World Intellectual Property Magazine*, February 2011 Retrieved from https://www.wipo.int/wipo_magazine/en/2011/01/article_0004.html

WIPO 2016. Understanding Copyright and Related Rights, *World Intellectual Property - Switzerland* ISBN: 978-92-805-2799-5.

Wlömert & Papiés, 2016. On-demand streaming services and music industry revenues — Insights from Spotify's market entry. *International Journal of Research in Marketing*, 33(2), pp.314–327.

Williamson, J. and Cloonan, M., 2016. Players' work time: A history of the British Musicians' Union, pp.1893–2013.

Witt, S., 2015. *How music got free: The end of an industry, the turn of the century, and the patient zero of piracy*. Penguin.

Woolgar S., 1988. *Knowledge and Reflexivity - New Frontiers in the Sociology of Knowledge*, London Sage.

Young C., 2017. DDEX Rolls Out RIN Metadata to Capture Credits, *Sound Business Pro Sound News*, *NewBay Media*.

Zibold, F., 2013. Collective rights of online music. Library of the European Parliament Briefing, [http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2013/120351/LDM_BRI\(2013\)120351_REV1_EN.pdf](http://www.europarl.europa.eu/RegData/bibliotheque/briefing/2013/120351/LDM_BRI(2013)120351_REV1_EN.pdf)

Glossary of acronyms:

General organisations

ASCAP – American Society of Composers, Authors & Publishers

AMRA – American Music Rights Association

AURA – Association of United Recording Artists

BIEM - Bureau International des Sociétés Gérant les Droits d'Enregistrement et de Reproduction Mécanique (International Office for Mechanical Rights Societies)

BL - British Library

BMI – Broadcast Music Inc.

BNF - Bibliothèque Nationale de France

CISAC - Confédération Internationale des Sociétés d'Auteurs et Compositeurs

CMO – Collective Management Organisation

DDEX – Digital Data Exchange

DSP - Digital Service Provider

EC – European Commission

EU – European Union

GEMA -Gesellschaft für musikalische Aufführungs-und mechanische Vervielfältigungsrechte (German PRO)

GVL - Gesellschaft zur Verwertung von Leistungsschutzrechten mbH (German CMO)

HFA - Harry Fox Agency (US Mechanical Licenses)

ICE – International Copyright Enterprise

IFPI – International Federation of the Phonographic Industry

IPO - UK Intellectual Property Office

IMRO - Irish Music Rights Organisation (Irish PRO)

ISO - International Organisation for Standardization

MCPS – Mechanical Copyright Protection Society

NMPA - National Music Publishers Association (US)

PAMRA – Performing Artists Media Rights Association

PPL – Phonographic Performance Limited

PRO – Performance Rights Organisation

PRS – Performing Rights Society

RAAP – Recorded Artists, Actors & Performers (Irish CMO)

SACEM - Société des auteurs, compositeurs et éditeurs de musique (French PRO)

SCAPR – Society of Collection Agencies for Performers Rights

SESAC - Society of European Stage Authors & Composers²⁴⁴ (US PRO)

STIM - Svenska Tonsättares Internationella Musikbyrå (Swedish PRO)

SUISA - SUISe Auteurs (Swiss PRO)

WIPO – World Intellectual Property Organisation

244 full name no longer used

Identifiers

CAE - Compositeur /Auteur /Éditeur (Composer/Author/Publisher)

CWR - Common Works Registration

EAN - European Article Number

EDI - Electronic Data Interchange

GRD - Global Repertoire Database

IPD - International Performers Directory

IPI - Interested Party Identifier

IPN - International Performer Number

ISBN - International Standard Book Number

ISNI - International Standard Name Identifier

ISMN - International Standard Music Number

ISTC - International Standard Text Code

ISRC - International Standard Recording Code

ISWC - International Standard Musical Work Code

MBID - MusicBrainz Identifier

RIN - Recording Information Notification

UPC - Universal Product Code

VIAF - Virtual International Authority File

VRDB - Virtual Recording Database

WID - Works Information Database

Legislation

DMCA – Digital Millennium Copyright Act

DEA – Digital Economy Act

ER – Equitable Remuneration

GDPR - General Data Protection Regulation

MLC - Music Licensing Company - Mechanical License Collective (under MMA)

MMA – Music Modernization Act

Representative bodies

AIM – Association of Independent Music

BASCA – British Academy of Songwriters, Composers & Authors (Ivors Academy)

BPI – British Phonographic Industry

FAC – Featured Artist Coalition

IMPEL - Independent Music Publishers e-Licensing

IMPALA - Independent Music Producers & Labels Association

MERLIN - Independent Labels Digital Licensing Association

MMF – Music Managers Forum

MPA – Music Publishers Association

MPG – Music Producers Guild

MU – Musicians Union

UK Music

WIN – Worldwide Independent Network

Other

MIDEM - Marché International du Disque et de l'Édition Musicale (Annual Music Industry Summit - Cannes Fr.)

SXSW - South By Southwest (Music & Tech Summit - Austin Texas, USA)

Intellectual Property Office
Concept House
Cardiff Road
Newport
NP10 8QQ

Tel: 0300 300 2000
Fax: 01633 817 777
Email: information@ipo.gov.uk
Web: www.gov.uk/ipo

Facebook: TheIPO.UK
Twitter: @The-IPO
YouTube: ipogovuk
LinkedIn: uk-ipo

For copies in alternative formats please contact
our Information Centre.

**When you no longer need this booklet,
please recycle it.**

@ crown copyright, 2019

This document is free for re-use under the terms
of the Open Government Licence.

Images within this document are licensed by
Ing Image.

Revised: June 2019
DPS-006417

