LEDGERBACK

Blockchain-mediated Licensing

Legal Engineering for Artist Empowerment

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Contents

About The Emerging Technologies Research Group

The Greyscail Blockchain Review is housed in the Emerging Technologies research group at the Ledgerback Digital Commons Research Cooperative (LDCRC). The research group's mission is to increase innovation diffusion of Web3 and other emerging technologies that empower individuals and peer-to-peer interactions so that they become commonplace in our society. This research report is one activity towards achieving that vision. As the Emerging Technologies research group aims to be platform-agnostic, open and inclusive, we have licensed this report under an open access license. Additionally, we aim to make this report available on multiple platforms, regardless of the platform's underlying technology so that even those who are not yet part of the Web3 ecosystem can enjoy this report.

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[1] Name excluded to preserve interviewee privacy

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Charles Adjovu and Ewa Fabian jointly contributed to the International Copyright section of the Legal Frameworks Primer. Ewa Fabian contributed the European Union (EU) section of the Legal Frameworks Primer and the Views on Smart Contracts subsection of the Automation Perspective. Charles Adjovu contributed all other parts of this report.

Release Delay and Quality of the Literature Review

Technical issues prevented us from completing the editing process for this version of the report, in particular for Part I, by the expected release date. We apologize for any ambiguity, awkward phrasing or inaccuracies that may be appear in Part I. Our need to rectify our failure to meet the expected release date led us to release this version of the report, even with some errors, because we wanted to make the report (at least an acceptable version of the report) available to the public as soon as possible. For the above reasons, our Literature Review in Part I is more akin to an annotated bibliography than a traditional literature review. We apologize for the lack of critical analysis and integration of our sources in the Literature Review and for its extensive length. Lastly, we apologize for any inconvenience our delay in releasing this version of the report may have caused.

Alternative Titles

A list of alternative titles for this report:

- Computer-mediated Licensing: Legal Engineering for Artist Empowerment;
- Computer-aided Licensing: Legal Engineering for Artist Empowerment;
- Techno-licensing: Legal Engineering for Artist Empowerment;

- Technology-mediated Licensing: Legal Engineering for Artist Empowerment;
- Internet-mediated Licensing: Legal Engineering for Artist Empowerment;
- Web-mediated Licensing: Legal Engineering for Artist Empowerment;
- Blockchain-augmented Licensing: Legal Engineering for Artist Empowerment;
- Network-mediated Licensing: Legal Engineering for Artist Empowerment;
- Computer-assisted Licensing: Legal Engineering for Artist Empowerment; and
- Can't Stop The Music Licensing: Legal Engineering for Artist Empowerment;
- Ricardian Contracts for Music Licensing: Legal Engineering for Artist Empowerment;
- Web3-mediated Licensing: Legal Engineering for Artist Empowerment; and
- Global Licensing with Web3 Technologies: Legal Engineering for Artist Empowerment.

You may use one of the alternative titles of this report if it better suits your needs.

Peer Review Status

This report has not been peer reviewed. We do invite peer review of this report and any such peer review may be sent to the contact or corresponding author for this report.

Audience

This report is intended for multiple audiences, including legal practitioners[2] wondering how Web3 technologies will affect legal drafting, researchers who want to understand how blockchain technology interacts with legal frameworks, music industry stakeholders who need deeper insights on blockchain's impact on the industry, students at the university level whose interests or focus is on blockchain, law, or music, and participants in the Web3 ecosystem who are interested in this area or intend to disrupt the music industry. Given the audience diversity, we included a reading guide to help readers navigate this report and focus on the areas important to them.

[2] Legal practitioner and legal professional are used synonymously throughout this report.

Reading Guide

This reading guide, further described below, is meant to help readers navigate through this report in an easy-to-read manner.

You may read this report in non-sequential order because each chapter is independent of the other chapters. Though, we do recommend reading each chapter to have a greater understanding of the intersection of music complexity and Web3 technologies.

If you have prior knowledge on any of the perspectives in the Background Research section, we recommend moving on to the other perspectives.

If you are interested in the research literature at the intersection of music complexity and Web3 technologies, please refer to the Background Research section.

If you are interested in a brief introduction to digital music supply chain and work registrations standards, please refer to Music Industry Supply Chain and Work Registration Standards.

If you are interested in the legal frameworks, please refer to the Legal Frameworks Primer in Part I.

If you are interested in music licensing specifically, please refer to the Music Licensing Primer in Part I.

If you are interested in the relevant technologies, please refer to the Technology Primer in Part I.

If you are interested in our development of the Tokenized Music License (TML), a Ricardian Contract standard form for music licensing that interacts with Web3 technologies (RC-Web3 Template), please refer to Part II.

For an essential reading of this report, we recommend reading the Literature Review in Part I and the Methods and Discussion in Part II.

List of Abbreviations and Acronyms

ADR	Alternative Dispute Resolution
AMP	Allocation for Music Producers Act
API	Application Programming Interface
ASCAP	American Society for Composers, Authors and Publishers
AT	Audit Template
BY	Attribution
CBD	Crea-based Dollar
CC	Creative Commons
ccREL	Creative Commons Rights Expression Language
CC BY	Attribution
CC BY-SA	Attribution-ShareAlike
CC BY-ND	Attribution NoDerivs
CC BY-NC	Attribution NonCommercial
CC BY-NC-ND	Attribution-NonCommercial-NoDerivs
CC BY-NC-SA	Attribution-NonCommercial-ShareAlike
CGY	Crea Energy
CID	Content Identifier
CISAC	International Confederation of Societies of Authors and Composers
CLASSICS	Compensating Legacy Artists for their Songs, Service, & Important Contributions to Society
CMO	Collective Management Organization
COALA-IP	Coalition of Automated Legal Application - Intellectual Property
CWR	Common Works Registration
DAO	Decentralized/Distributed Autonomous Organization
DApp	Decentralized Application
DC	Draft Commentary
DDoS	Distributed Denial of Service
DeFi	Decentralized Finance
DID	Decentralzied Identifiers
DHT	Distributed Hash Table
DLP	Drafting Legal Prose
DLT	Distributed Ledger Technology
DMCA	Digital Millennium Copyright Act
DOJ	Department of Justice
DPoS	Delegated Proof-of-Stake
DRM	Digital Rights Management
DSP	Digital Music Service Providers
ERC	Ethereum Request for Comments
E-sign	Electronic Records in Global and National Commerce Act
EM	Entity Model
ETH	Ether
EU	European Union
EUIPO	European Union Intellectual Property Office
EVM	Ethereum Virtual Machine
FAQ	Frequently Asked Questions
GDPR	General Data Protection Regulation
GUI	Graphical User Interface
HTTP	Hypertext Transfer Protocol
ILP	InterLedger Protocol
IP	Intellectual Property
IPFS	InterPlanetary File System
IPLD	InterPlanetary Linked Data

ISNI	International Standard Name Identifier
ISP	Internet Service Provider
ISRC	International Standard Recording Code
ISWC	International Standard Musical Work Code
IT	Information Technology
JSON	JavaScript Object Notation
JSON-LD	JavaScript Object Notation-Linked Data
LBC	LBRY Credits
LCC	Linked Content Coalition
LD	Linked Data
MAR	Minimum Automation Requirements
MCF	Musicoin Foundation
MIT	Massachusetts Institute of Technology
MLC	Mechanical Licensing Collective
MLR	Minimum Legal Requirements
MMA	Music Modernization Act
MME	Music Moves Europe
MRO	Mechanical Rights Organization
MTR	Minimum Technical Requirements
MVD	Minimum Viable Data
NC	NonCommercial
ND	NoDerivs
NFT	Non-fungible Token
NOI	Notice of Intention to Obtain a Compulsory License
OMI	Open Music Initiative
PKI	Public-Key Infrastructure
PNK	Pinakion
PoC	Proof-of-Concept
PoS	Proof-of-Stake
PoW	Proof-of-Work
PPP	Pay-Per-Play
PRO	Performing Rights Organization
PSC	Programming Software Components
PTD	Practical Tokenized Drafting
P2P	Peer-to-Peer
P&S	Prose and Software
RC	Ricardian Contract
RDF	Resource Description Framework
REL	Rights Expression Language
RMI	Rights Management Information
RRM	Rights Reference Model
RL	Release License
SA	ShareAlike
SACEM	Society of Authors, Composers and Publishers of Music
SSID	Self-Sovereign Identity
ToS	Terms of Service
TPS	Transactions-per-second
TRIPS	Trade-Related Aspects of Intellectual Property Rights
TML	Tokenized Music License
TPM	Technological Protection Measures
TT	Test Template
UBI	Universal Basic Income
UCC	Universal Copyright Convention
UCC Art. 2	Uniform Commercial Code Article 2

UETA	Uniform Electronic Transactions Act
UNCITRAL	United Nations Commission on International Trade Law
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
US/USA	United States of America
USD	United States of America Dollar
USPTO	United States Patent and Trademark Office
VARA	Visual Artists Rights Act
WCT	World Intellectual Property Organization Copyright Treaty
WIPO	World Intellectual Property Organization
WTO	World Trade Organization
W3C	WorldWideWeb Consortium
XML	eXtensible Markup Language
ZKP	Zero-Knowledge Proof

Abstract

Licensing is one of the essential means of exploiting the monetary value of a musical work, and yet it is an area fraught with many issues and transactional costs which make it a difficult process for individuals and organizations. Many issues in music licensing arise from the legal complexity (e.g., national and international copyright law), business complexity (authentication, tracking, accounting, etc.), value web complexity (transparency of relationships among stakeholders), and technical complexity (e.g., establishing a global repertoire database for music, sufficient metadata standards) of working with music. Then, in addition to these issues, there are specific transactional costs (identification, negotiation, monitoring, and enforcement) associated with the licensing process. To mitigate the complexity and transactional costs associated with music and the licensing process, researchers and technologists have been investigating how new technologies and design models from the Web3 space, such as blockchain, linked data and Ricardian Contracts, can automate processes to reduce complexity, speed up payments, improve tracking, and provide other benefits in the music industry. In our report, we make our own attempt to reduce the complexity and transactional costs in the licensing process by developing an automated music license. In doing so, we first conducted a literature review synthesizing the intersection of music complexity and Web3 technologies to provide background and context to automating music licensing. Then we developed the Practical Tokenized Drafting (PTD) method, a set of core principles and practices for drafting Ricardian Contracts that interact with Web3 technologies (RC-Web3 Templates), and the Tokenized Music License (TML), an RC-Web3 Template standard form for music licensing on the OpenLaw platform. Both the PTD and TML can be adapted to meet the needs of music industry stakeholders and provide guidance to legal practitioners in drafting RC-Web3 Templates.

Introduction

Blockchain technology has been hailed as a revolutionary technology that will change the music industry, especially in regards to aiding musicians gain more autonomy and faster royalty payments.[3] A plethora of projects are trying to utilize blockchain to turn these ideated cost-savings into a reality.[4] However, there are many challenges that must be overcome before the music industry will adopt blockchain technology.[5]

In our first report on blockchain use cases in the music industry, *A Preliminary Review of Blockchain in the Music Industry*, we reviewed why the first wave of disruption from file sharing in the music industry did not lead to musicians having greater autonomy, the major stakeholders and issues in the music industry, blockchain projects and pioneers in the music industry, blockchain use cases and challenges ahead for blockchain projects and pioneers to overcome before the music industry will adopt blockchain.[6]

In this report, we attempted to tackle some of the issues we identified in our first report.[7] Specifically, we sought to tackle issues regarding musician attribution and autonomy, accuracy and speed of royalty payments, the complex web of the music industry, and the international legal frameworks governing copyright in musical works.[8] In tackling these issues, we honed in on practical applications for automating, wholly or partially, the music licensing process with Web3 technologies.

Our contributions in this report are four-fold. Firstly, we developed the Practical Tokenized Drafting (PTD) method, a set of core principles and practices for developing Ricardian Contracts that interact with Web3 Technologies (RC-Web3 Templates). Secondly, we developed the Tokenized Music License (TML), an RC-Web3 Template standard form for music licensing in a Web3 technologies context on the OpenLaw platform. Thirdly, we scoped literature from various areas and disciplines to understand the intersection of music complexity and Web3 technologies, and how it would affect efforts to develop an automated music license. Lastly, we reviewed the licensing options available to musicians and other creatives on decentralized media platforms and determined that there is a need for greater licensing options.

The remainder of this report is as follows: Part I provides a literature review that scopes academic and gray literature (which is heavily present in the blockchain literature) at the intersection of music complexity and Web3 technologies, a brief introduction to relevant supply chain and work registration standards, the legal frameworks applicable to music licenses, and the business of the music industry, a legal frameworks primer, a music licensing primer, and a technology primer. Part 2 provides a review of decentralized media platforms, the methods for developing the PTD and TML, and a discussion on how we designed the TML to address issues identified in Part I. Lastly, a short conclusion.

[3] Ledgerback Co-operative. "A Preliminary Review of Blockchain in the Music Industry". en. In: *SSRN Electronic Journal* (2018). ISSN: 1556-5068. DOI: 10.2139/ssrn.3280838. URL: https://www.ssrn.com/abstract=3280838 (visited on 12/17/2019).
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.
[8] Ibid.

Part I

Background Research

1 Literature Review

1.1 Scoping Review

We conducted a literature review, specifically a scoping review, covering the interdisciplinary field of research at the heart of music complexity and Web3 technologies (emphasis on blockchain and smart contracts), with a specific emphasis on the licensing process.[9] The body of knowledge in this field is spread among multiple disciplines in the academic and gray[10] literature, thus we felt it was imperative to use a scoping review to identify the extent of this body of knowledge, any knowledge gaps concerning licensing, and to guide our future efforts in developing the Practical Tokenized Drafting (PTD) method and the Tokenized Music License (TML).[11] Additionally, the complexity of music and the licensing process requires extensive background knowledge before considering automation approaches. This need for extensive background knowledge also influenced our research methodology.[12]

1.2 Research Questions

Our research was framed by the following questions:

1. What are the transactional costs of music licensing?
2. What are the perceived benefits of automating music licensing via smart contracts?
3. What are the legal and technical implications of automating music licensing?
4. How are current decentralized streaming and multimedia content handling licensing?
5. What are the current barriers to automating music licensing?
6. What are the gaps in knowledge or know-how for automating music licensing?
7. What web protocols exist, if any, for licensing intellectual property?
8. What are the licensing models available for musical works?
9. What are the legal boundaries affecting music licensing in an international context?
10. Can we conceptualize an automated music licensing framework(s)?
11. What are the consideration in translating legal prose into programmable software?
12. What is the state of literature in this area?
13. Should rights under copyright, if tokenized on a blockchain, be tokenized as fungible or non-fungible tokens?

[9] Guy Paré and Spyros Kitsiou. *Chapter 9 Methods for Literature Reviews*. en. University of Victoria, Feb. 2017. URL: https://www.ncbi.nlm.nih.gov/books/NBK481583/ (visited on 09/15/2019); Heidi Sucharew and Heidi Sucharew. "Methods for Research Evidence Synthesis: The Scoping Review Approach". en. In: *Journal of Hospital Medicine* 14.7 (July 2019). DOI: 10.12788/jhm.3248. URL: https://www.journalofhospitalmedicine.com/jhospmed/article/202729/hospital-medicine/methods-research-evidence-synthesis-scoping-review (visited on 05/12/2020).

[10] Norah DeBellis. *Research Guides: Gray Literature: Gray Literature*. en. URL: //csulb.libguides.com/c.php?g=39129&p=249422 (visited on 09/14/2019).

[11] Paré and Kitsiou, *Chapter 9 Methods for Literature Reviews*; Sucharew and Sucharew, "Methods for Research Evidence Synthesis".

[12] Infra Section 1.4.

1.3 Report Structure

The structure of this report is a combination of a law review article, whitepaper, and an academic research paper. We chose this structure because this is an interdisciplinary field of research at the intersection of legal, music, computer science and engineering disciplines. The structure also grew out of the needs of our contributors and our desire to include certain features of Horst Treiblmaier's blockchain case study structure.[13] Specifically, the Introduction, Research Methodology, and Discussion sections were added to our report to better conform with Treiblmaier's blockchain case study structure.[14]

1.4 Research Methodology

1.4.1 Search

We conducted an exploratory search of academic and gray literature related to our research topic. The primary keywords we used to search for literature are listed below:

- blockchain
- music
- industry
- smart contract
- intellectual property
- multimedia
- copyright
- law
- prototype
- proof of concept
- streaming
- business
- automate
- data
- decentralized
- metadata
- contract
- dispute
- issue
- electronic
- signature

[13] Horst Treiblmaier. "Toward More Rigorous Blockchain Research: Recommendations for Writing Blockchain Case Studies". In: *Frontiers in Blockchain* 2 (May 2019), p. 3. ISSN: 2624-7852. DOI: 10.3389/fbloc.2019.00003. URL: https://www.frontiersin.org/article/10.3389/fbloc.2019.00003/full (visited on 12/13/2019).

[14] Ibid.

- transaction
- record
- licensing
- music file
- music business

We selected the terms above to narrow our results to literature directly related to our research topic. The research databases we utilized for conducting our search were:

- ResearchGate,
- Social Science Research Network (SSRN),
- Google Scholar,
- ProQuest, and
- Semantic Scholar.

1.4.2 Screening

We searched for papers relevant to our research topic and our research questions. Our selection criteria were based on the paper's:

1. relevance to music licensing, and
2. analysis covering a broad range of subtopics[15].

Considering the extent to which our selected literature expounded on subtopics, our literature review is more akin to annotated bibliography than a traditional literature review. We decided that to obtain a more comprehensive overview of the research topic, we needed to utilize research from multiple disciplines. Utilizing our keywords in our searches, we would scan the abstract and titles of papers to see if they initially fit our criteria. If the paper seemed to fit our criteria, we would then read the papers to verify our assumption.

We did not include any papers that met our exclusion criteria:

- The full text was unavailable;
- Access to the paper became unavailable before we finished this final print;
- The paper did not discuss a perspective with enough depth or particularity;
- Time constraints preventing us from evaluating the paper; or
- There was an issue identifying the author(s).

We categorized the papers we found into the following categories:

- Music Business Perspective
- Legal Perspective
- Automation Perspective
- Value Web Perspective

[15] Relevant topics were organized as perspectives

The categories are summarized in the table below and are used as headings for the remainder of Part I.

Perspective	**Subarea**
Legal Perspective	Contract Law Intellectual Property Law Electronic Signatures Evidence
Music Business Perspective	Supply Chain Transformation Benefits and Drawbacks
Automation Perspective	Smart Contracts Metadata Semantic Web Ricardian Contract
Value Web Perspective	Music Industry Value Web

The music business perspective focuses on how Web3 technologies (with a specific emphasis on blockchain and smart contracts) will impact the business of the music industry. The legal perspective focuses on how Web3 technologies interacts (concerns, considerations, impacts, etc.) with legal frameworks applicable to music licensing. The automation perspective focuses on understanding Web3 technologies (with an emphasis on blockchain and smart contracts) and approaches for automating music licensing with Web3 technologies. The value web perspective focuses on understanding the interconnected web of stakeholders in the music industry and how value is created, distributed, and at times impeded by the very workings of the industry.

1.4.3 Review Results

We gathered approximately thirty-two (32) papers in total (as of March 2020) for the literature review and selected twenty-four (24) papers.[16] We included most of the papers we gathered for three reasons. First, most of the papers we gathered fit our criteria, and we did not intend to exclude any paper based on their discipline because this is an interdisciplinary field of research. Second, we wanted to highlight papers with great breadth and depth at the intersection of music complexity and Web3 technologies. Third, since Web3 technologies are a very recent phenomena[17], the body of literature is sparse regarding papers that have great depth and breadth.[18] Thus, we focused on papers that had great depth and/or breadth. Given our time constraints and technical issues, the literature review is more akin to an annotated bibliography in this version of the report.[19]

1.5 Music Business Perspective

1.5.1 Blockchain Impacts & Policy Concerns

Ignacio De Leon and Ravi Gupta in *The Impact of Digital Innovation and Blockchain on the Music Industry* analyzed the potential impacts and policy concerns of applying blockchain in the music industry.[20] De Leon and Gupta identified eight (8) discrete impacts blockchain could have on the music industry, summarized in the list below:

1. "flexible pricing and revenue optimization;

2. speedier payments;

[16] We gathered approximately fifty (50) sources (articles and papers) in total and included forty-one (41) sources.

[17] The Bitcoin blockchain was released in 2009 and smart contracts did not become viable until the Ethereum blockchain was released in 2015.

[18] Especially concerning emergent issues that arise from the interaction of all these fields and practical projects that apply Web3 technologies to music-related applications.

[19] Though, we hope we can improve the Literature Review in a future version of this report.

[20] Ignacio L. De León and Ravi Gupta. *The Impact of Digital Innovation and Blockchain on the Music Industry*. Tech. rep. IDB-DP-5 49. Inter-American Development Bank (IDB), Nov. 2017. URL: https://publications.iadb.org/publications/english/document/The-Impact-of-Digital-Innovation-and-Blockchain-on-the-Music-Industry.pdf (visited on 12/17/2019).

3. superior valuation;
4. transparency and negotiating power;
5. piracy;
6. sharing revenue;
7. news business models (fans, micropayments); and
8. reordering of the music industry."[21]

For our research purposes, we decided to focus on De Leon and Gupta's discussion of impacts (1), (4), (6), and (8).[22] De Leon and Gupta's analysis of impact (1) led to them conclude that blockchain can optimize revenue and enable flexible pricing by:

1. having consumers pay for specific songs, rather than a Collective Management Organization's (CMO) entire catalogue, and
2. dynamic pricing of musical works based on usage, popularity, and other real-time metrics (can embed in a smart contract).[23]

De Leon and Gupta's analysis of impact (4) led to them concluding that blockchain can lead to greater transparency for stakeholders but is unlikely to lead to musicians and consumers becoming better negotiators solely based on more transparency.[24] De Leon and Gupta's analysis of impact (6) led to them concluding that musicians would not receive a substantially greater share of the music industry revenue because intermediaries provide vital services such as monitoring intellectual property infringement and developing and promoting sound recordings.[25] De Leon and Gupta's analysis of impact (8) led them to conclude that new business models would develop that empower consumers to promote musicians in exchange for micropayments.[26]

De Leon and Gupta discussed that blockchain could lead to new business models in the music industry that empower consumers to promote musicians in exchange for micropayments.[27] Despite these impacts, De Leon and Gupta do not expect blockchain to cause a decentralized transformation of the music industry because it makes more economic sense to rely on large consolidation to share risk among stakeholders, but they do believe that blockchain could reorder the industry supply chain like file sharing platforms did in the late 1990s and early 2000s.[28]

De Leon and Gupta then transitioned to discuss policy issues that may arise from blockchain use cases in the music industry.[29] De Leon and Gupta identified four policy issues regarding smart contracts, intellectual property, incumbency and monopolies, and governance structures.[30] For our research purposes, we focused on De Leon and Gupta's analysis of smart contracts, intellectual property, incumbency, and monopolies.[31]

De Leon and Gupta's analysis of the smart contract policy issue led them to conclude that there is a need for clarifying how smart contracts comport with traditional legal frameworks and principles before stakeholders utilize smart contracts in the music industry.[32] Despite these concerns, De Leon and Gupta believe that smart contracts will eventually lead to greater compensation prospects for musicians.[33]

[21] De León and Gupta, *The Impact of Digital Innovation and Blockchain on the Music Industry*.
[22] Ibid.
[23] Ibid.
[24] Ibid.
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.
[30] Ibid.
[31] Ibid.
[32] Ibid.
[33] Ibid.

De Leon and Gupta's analysis of the copyright law policy issue regarding assignment and piracy led them to conclude that musicians could self-certify their ownership of musical works, but that this is not a cure-all because the self-certifying musicians may not actually own the copyright to the work.[34] However, De Leon and Gupta do believe there are benefits for musicians unaware of copyright law, especially small time musicians, because generally registering the musical work on or with the blockchain is coupled with monetization of the musical work.[35]

De Leon and Gupta's analysis of the incumbency and monopolies policy issue led them to conclude that incumbents are unlikely to be replaced because they can acquire blockchain startups to harness their innovations, and incumbents are likely to repurpose themselves through innovations.[36]

De Leon and Gupta's analysis of the governance structures policy issue led them to conclude that blockchain may lead to policy changes in the governance structure of the law and society overall.[37] In the music industry, blockchain may help modernize PROs consent decrees with the Department of Justice (DOJ).[38]

1.5.2 Blockchain Supply Chain

Camila Sitonio and Alberto Nucciarelli in *The Impact of Blockchain on the Music Industry*, continued in the same vein as De Leon and Gupta by analyzing blockchain's impact on the recorded music supply chain.[39] In particular, Sitonio and Nucciarelli see blockchain having the potential to affect the recorded music supply chain by removing intermediaries, ending monopolization of distribution channels, inhibiting information asymmetry among stakeholders, and speeding up royalty payments.[40]

Sitonio and Nucciarelli examined three recorded music supply chains:

1. before digital media ("traditional supply chain"),
2. after digital media ("digital supply chain"), and
3. with blockchain technology ("blockchain supply chain").[41]

Sitonio and Nucciarelli, in analyzing the recorded music supply chain before digital media, discussed how the supply chain was vertically integrated to eventually produce physical goods or promotional items for the end consumer.[42] Record labels were the primary intermediary and retained "approximately thirty-percent (30%) [of the value, larger than any other actor] in the recorded music supply chain before the era of digital media.".[43] Record labels were responsible for financing and resourcing musicians needed to record their music, and collecting "royalty payments for artists, thus leading to information asymmetry among artists, distributors, and consumers.".[44] This led to "extreme information asymmetry among artists, intermediates, and final consumers."[45] However, the value retained by record labels dramatically fell in the recorded music supply chain after digital media.[46]

In the recorded music supply chain after digital media, Sitonio and Nucciarelli discussed how record labels lost their substantial influence to a new actor, the Aggregator.[47] Aggregators were a new actor in the supply chain

[34] De León and Gupta, *The Impact of Digital Innovation and Blockchain on the Music Industry*.
[35] Ibid.
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] Camila Sitonio and Alberto Nucciarelli. "The Impact of Blockchain on the Music Industry". In: July 2018.
[40] Ibid.
[41] Ibid.
[42] Ibid.
[43] Ibid.
[44] Ibid.
[45] Ibid.
[46] Ibid.
[47] Ibid.

that collected usage information about how and where people are streaming music, listening to digital radio, and downloading digital music files.[48] With the introduction of digital media, musicians could distribute their music physically in the traditional supply chain, or digitally through the digital supply chain.[49] Especially for smaller musicians, they could now record their music anywhere and digitally distribute their music online through Aggregators without first needing to sign with a record label.[50] Aggregators led to the Record Labels losing their losing their monopolistic control over the supply chain because transaction costs shifted music distribution to digital media rather than physical goods.[51] However, the value captured by Aggregators and the Record Label' monopolistic loss of control over distribution did not lead to greater value capture for Artists, and rather reinforced the "information asymmetry in the industry."[52] Stunningly, Record Labels still retain about fifty percent of the value in the digital supply chain.[53] Especially regarding the flow and totality of royalty payments, musicians are receiving fewer royalty payments from the Aggregators' business models, and for smaller musicians, "royalties are commonly unpaid."[54] Thus, some believe the blockchain supply chain will make up for the lack of value added for Artists by eliminating intermediaries inhibiting direct interactions between musicians and consumers.[55]

The blockchain supply chain is expected to allow musicians to directly publish their music on a blockchain, then have their music reached by consumers on blockchain-based platforms, "reducing transactional costs, allowing artists to access data generated by the transactions, and creating a more efficient system for royalty payments."[56] However, Sitonio and Nucciarelli the rise of the blockchain supply chain to be inhibited because for major artists under contract with record labels, choosing to self-publish may raise contractual liability or cause them to violate their contractual relationship.[57] Alternatively, intermediaries may not be completely eliminated from the supply chain, rather, the role of intermediaries such as record labels may change to usage information collectors and providers of technical, marketing and sales support for musicians, while the blockchain would handle royalty payments and information transparency.[58]

Sitonio and Nucciarelli believe blockchain can solve two of the main issues they identified in the music industry:

1. "the lack of access to transactional information," and
2. "the inefficiencies associated to royalty payments."[59]

Sitonio and Nucciarelli identified four blockchain use cases in the music industry:

1. record keeping;
2. smart contracts;
3. data analysis and business model innovation; and
4. revenue management.[60]

1.5.3 Blockchain-based Music Platforms

Alexandra Cecilie Gjøl Torbensen and Raffaele Ciriello investigated how the music industry can create value with blockchain technology in *Tuning into Blockchain: Challenges and Opportunities of Blockchain-based Music*

[48] Sitonio and Nucciarelli, "The Impact of Blockchain on the Music Industry".
[49] Ibid.
[50] Ibid.
[51] Ibid.
[52] Ibid.
[53] Ibid.
[54] Ibid.
[55] Ibid.
[56] Ibid.
[57] Ibid.
[58] Ibid.
[59] Ibid.
[60] Ibid.

Platforms.[61] For our research purposes, we focused specifically on Torbensen and Ciriello's analysis of challenges and opportunities of blockchain-based music platforms.[62]

Torbensen and Ciriello identified two categories of blockchain use cases:

1. Musician-centered music supply chain; and
2. Process optimization.[63]

Furthermore, Torbensen and Ciriello identified four blockchain use cases that fall under the two above categories:

1. "ticket sales,
2. cryptocurrency enabled music platforms,
3. blockchain powered streaming startups, and
4. providing an infrastructure for decentralized music business."[64]

In Torbensen and Ciriello's analysis, the first category of blockchain use cases, musician-centered music supply chain, is unlikely to take root because even though this is the most musician-friendly outcome, most musicians are not interested in dealing "with the work that comes after the recording of the music."[65] Torbensen and Ciriello then discussed three specific areas under process optimization where blockchain could aid the music industry.[66] The first area Torbensen and Ciriello envision blockchain aiding the music industry is providing a common resource for metadata via smart contracts.[67] However, a major issue Torbensen and Ciriello believe may arise is obtaining metadata from "different organizations in different databases, [and] integrating all these datasets into one platform."[68] Such a strategy would be extremely costly for a blockchain-based music platform, and thus Torbensen and Ciriello note that some blockchain-based music startups are aiming instead towards "creating interfaces to aggregate metadata and make the complex licensing structures more transparent via smart contracts."[69]

The second area Torbensen and Ciriello envision blockchain optimizing processes is automated royalty payments.[70] Through smart contracts and relevant metadata, Torbensen and Ciriello believe "payout processes could simply be automated via smart contracts with transparent business logic."[71] The third area Torbensen and Ciriello see ripe for process optimization by blockchain-based music startups is achieving in transparency in licensing structures.[72] However, Torbensen and Ciriello, based on their interviews, found that there was an apprehensive mindset from industry members about transparency in licensing structures because they want their contractual agreements to remain confidential from competitors.[73]

Additionally, we also focused on Torbensen and Ciriello's discussion of matching the interests of stakeholders in the music industry and the need to align incentives embedded in the blockchain.[74] Torbensen and Ciriello's analysis identified a major disconnect among music industry stakeholders because stakeholders all want "a better

[61] Alexandra Cecilie Gjøl Torbensen and Raffaele Ciriello. "TUNING INTO BLOCKCHAIN: CHALLENGES AND OPPORTUNITIES OF BLOCKCHAIN-BASED MUSIC PLATFORMS". in: *Research Papers* (May 2019). URL: https://aisel.aisnet.org/ecis2019_rp/62.
[62] Ibid.
[63] Ibid.
[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Ibid.
[68] Ibid.
[69] Ibid.
[70] Ibid.
[71] Ibid.
[72] Ibid.
[73] Ibid.
[74] Ibid.

way to handle metadata and licenses," but there is a mismatch of incentives for stakeholders.[75] For example, Torbensen and Ciriello mentioned that record labels and publishers have a disincentive to make their deals with musicians public, and thus, Torbensen and Ciriello suggest a private blockchain solution.[76] However, will this private blockchain solution meet the goals of record labels and publishers?[77]

For a blockchain-based music platform to succeed, Torbensen and Ciriello believe it will need to align incentives for all stakeholders that will lead to data sharing and effective governance.[78] Torbensen and Ciriello conclude their thoughts with the opinion that current blockchains do not "[have the] appropriate incentives at the music industry level."[79] To reach the appropriate level of incentives, Torbensen and Ciriello see a need to embed these incentives in the blockchain because music industry stakeholders are worried about "mak[ing] the risky first step towards an integrated solution without knowing whether others will follow."[80] To get stakeholders to make the first step, the incentives for a blockchain-based music platform needs to be aligned towards an integrated solution for all stakeholders.[81]

Juri Mattila continues in the same vein as the preceding authors in *The Blockchain Phenomenon – The Disruptive Potential of Distributed Consensus Architectures* by discussing one of the first blockchain-based music platforms, Ujo Music.[82] Ujo Music was one of the first blockchain-based music platforms to issue royalty payments to musicians on the Ethereum blockchain to address the long-standing issue of artists collecting royalties not in a matter of days or months—but often years.[83] Ian Dunham in *Music Information: The Need for a Central Music Licensing Database* emphasized that blockchain may provide the appropriate infrastructure to develop a centralized music licensing database, although "more work must go into parsing the details of its operation, including who would organize it, the exact details of protocol, and how all parties can cooperate in order to achieve a higher efficiency."[84] These problems are not overcome by international standards such as the International Standard Recording Code (ISRC) and the International Standard Musical Work Code (ISWC).[85] These questions are particularly important now while the global music industry is noticeably turning to streaming services, with the existence of the above mentioned Aggregators in Sitonio and Nucciarelli's work.[86] An additional point of contention are intermediaries in royalty distribution such as CMOs, who usually charge a substantial fee for their distribution services.[87]

1.6 Legal Perspective

1.6.1 Electronic Signatures & Evidence

Sadia Sharmin in *Music Copyright Management on Blockchain: Is it legally viable?*, investigated whether blockchain can mitigate issues in the music industry, and the challenges of managing copyright on a blockchain.[88] For our research topic and for the sake of brevity, we excluded Sharmin's discussion of blockchain use cases for copyright management because Balazs Bodo, Daniel Gervais and Joao Pedro Quintais, and Michèle Finck and Valentina Moscon discuss that perspective in greater detail. Sharmin's research questions in the thesis were:

[75] Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN".
[76] Ibid.
[77] Ibid.
[78] Ibid.
[79] Ibid.
[80] Ibid.
[81] Ibid.
[82] Juri Mattila. "The Blockchain Phenomenon – The Disruptive Potential of Distributed Consensus Architectures". In: 2016.
[83] Ibid.
[84] I. Dunham. "Music information: the need for a central music licensing database". In: 2016.
[85] Andreas Gabl and Stephan Krehl. "Application of blockchain technology and crowdfunding to solve structural inefficiencies in digital rights and patents : a comparative analysis". PhD thesis. Jan. 2017.
[86] Gabl and Krehl, "Application of blockchain technology and crowdfunding to solve structural inefficiencies in digital rights and patents : a comparative analysis"; Sitonio and Nucciarelli, "The Impact of Blockchain on the Music Industry".
[87] Gabl and Krehl, "Application of blockchain technology and crowdfunding to solve structural inefficiencies in digital rights and patents : a comparative analysis".
[88] Sadia Sharmin. "Music Copyright Management on Blockchain: Is it legally viable?" PhD thesis. 2018. URL: http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-353704.

1. "What is the legal framework of music copyright and how blockchain technology is relevant to this field?
2. What are the problems of today's copyright system in the music industry and can blockchain help to alleviate the problems?
3. How could blockchain-based technologies be used in the music copyright management?
4. What legal aspects need to be considered?
5. What are the risks and challenges of using block[]chain technology based applications in the music copyright management?"[89]

Sharmin's motivation for her thesis was tackling the inefficiency in the music industry, the lack of transparency and remuneration for musicians in the supply chain, as exemplified in *Wixen Music Publishing, Inc. v Spotify USA Inc.*, and the possibility for blockchain to remedy these issues subject to new blockchain-specific legislation.[90] Sharmin chose a qualitative method for her thesis to provide clarity in this uncertain area and selected primary and secondary sources from a combination of national and international legislation, journal articles, reports, official websites of international and national organizations, statutes and case law.[91]

Sharmin discussed recent government intellectual property agency efforts to understand how blockchain technology can comport existing copyright frameworks.[92] For example, Sharmin noted that both the European Union Intellectual Property Office (EUIPO) and the United States Patent and Trademark Office (USPTO) have hosted events to elicit responses from individuals and organizations involved in blockchain and copyright management on the basics of blockchain and how it can comport with intellectual property law.[93] Additionally, the U.S. Department of Commerce's Internet Policy Task Force held a meeting to discuss the future of blockchain and copyright management with individuals and groups spanning multiple industries, including Ascribe and Dot Blockchain (rebranded as Verifi Media) who were both invited.[94]

Sharmin focused her analysis on how blockchain can conform with the following existing legal frameworks:

1. electronic signatures,
2. evidence, and
3. contract law.[95]

First, Sharmin questioned whether electronic signatures and timestamps recorded on the blockchain are valid signatures under existing European Union electronic signatures law.[96] From Sharmin's analysis of how blockchain data could be interpreted under the current EU legislation for electronic signatures regulatory framework (910/2014/EU), electronic signatures and time stamps on a blockchain may be valid, but may require an expert to qualify the electronic signatures and time stamps as evidence in a court of law.[97] Second, Sharmin ascertained that blockchain data could qualify as admissible evidence in most jurisdictions as long as an expert can "explain[] the fundamentals of the technology and assert[] its trustworthiness." Lastly, Sharmin discussed general issues associated with smart contracts such as when a smart contract is considered a traditional legal contract and how can traditional contract principles apply to smart contracts.[98]

[89] Sharmin, "Music Copyright Management on Blockchain: Is it legally viable?"
[90] Ibid.
[91] Ibid.
[92] Ibid.
[93] Ibid.
[94] Ibid.
[95] Ibid.
[96] Ibid.
[97] Ibid.
[98] Ibid.

1.6.2 Contract Law

Mark Giancaspro in *Is a 'smart contract' really a smart idea? Insights from a legal perspective* analyzed contractual issues and uncertainties that may arise with the advent of smart contracts under Australian, French, American and English law.[99] Giancaspro discussed the following contract law principles in his comparative analysis:

- "Capacity,
- Mistake,
- Formation (Offer and Acceptance)
- Legal intent in follow-on contracts,
- Certainty of Terms,
- Interpreting smart contract code, and
- Remedial issues."[100]

Contractual capacity and mistake are contractual issues that concern the real-world identity of parties on a blockchain.[101] On the blockchain, users are identified by a public address,[102] a long hexadecimal string of alphanumeric characters, that is disconnected from any real-world identifiers such as a name or physical address.[103] For example, all public addresses on the Ethereum blockchain are identified by a forty-two (42) alphanumeric character combination that starts with "0x."[104]

"Contractual capacity refers to a party's ability to enter into a contract."[105] Giancaspro analyzed contractual capacity in the context of minors entering into contracts.[106] Under Australian, English, American and French law, a minor (a person under the age of majority) generally does not have contractual capacity to enter into a contract.[107] Australian, English and American law provide for limited exceptions to the general rule (e.g., a contract for necessaries such as a car or furniture), and in those circumstances, the contract is voidable, i.e., the minor may elect to terminate the contract, at the minor's discretion.[108] Given that public addresses on a blockchain are not linked to real -world personal identifiers, a party may inadvertently enter into a contract with a minor via smart contract.[109] Thus, a pre-screening procedure may be needed to deter minors from entering into contracts via smart contracts.[110]

The application of Mistake to smart contracts faces the same issue as contractual capacity.[111] Mistake is a legal defense to contract formation, wherein a party may void a contract because a party was mistaken about the identity of the counterparty or the terms of the contract.[112] In Giancaspro's analysis, Mistake can easily occur with smart contracts because smart contracts are susceptible to identity theft.[113] For example, in the case of identity theft, a hacker can steal another person's private key , thereby obtaining the person's public key, and

[99] Mark Giancaspro. "Is a 'smart contract' really a smart idea? Insights from a legal perspective". In: *Computer Law & Security Review* 33 (June 2017). DOI: 10.1016/j.clsr.2017.05.007.
[100] Ibid.
[101] Ibid.
[102] Jake Frankenfield. *Public Key*. en. URL: https://www.investopedia.com/terms/p/public-key.asp (visited on 10/06/2019).
[103] Tanya. *Public and private keys*. en-US. URL: http://support.blockchain.com/hc/en-us/articles/360000951966-Public-and-private-keys (visited on 10/06/2019); Frankenfield, *Public Key*.
[104] Zane Witherspoon. *How is an Ethereum address generated?* en. Feb. 2017. URL: https://medium.com/@zanewithspoon/how-is-an-ethereum-address-generated-9f08e6f83f77 (visited on 10/06/2019).
[105] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[106] Ibid.
[107] Ibid.
[108] Ibid.
[109] Ibid.
[110] Ibid.
[111] Ibid.
[112] Ibid.
[113] Ibid.

then using the public key to facilitate fraudulent transactions as if it was the proper account holder.[114] Under this scenario, the account holder may allege Mistake to void any contracts entered into with counterparties via smart contracts.[115] Unfortunately, this scenario exemplifies the possible lack of trust and predictability counterparties may have assumed would be associated with smart contracts.[116] The major problem that arises from Mistake is the want of legal enforceability since mistake is a defense to contract formation.[117]

Formation, Certainty of Terms, and Contractual Interpretation are issues that concern the smart contract source code.[118] Formation is the offer and acceptance elements that are required for the creation of a valid contract.[119] "Under Australian and English law, an offer is characterised by a party's indication of willingness to be bound by the terms of a promise he or she has made to another party, with the latter being provided with the opportunity to elect between acceptance and rejection of the proposal."[120] An offer via smart contract is relatively easy to discern when compared with traditional contracting because the smart contract source code is stored and accessible on the blockchain, and the terms of the smart contract bind the user deploying the smart contract.[121] In Giancaspro's analysis, the major issue with Formation in a smart contract context is acceptance because of the instantaneous nature of blockchain technology.[122]

In this area, the "postal acceptance rule" may decide when acceptance has occurred.[123] The postal acceptance rule applies when there is an expected time lapse between the offer and acceptance, and that acceptance may occur when the acceptance is dispatched or upon receipt of acceptance.[124] Concerning the postal acceptance rule and public-key infrastructure (PKI), Giancaspro proposed three ways acceptance could be effectuated in a purchase of goods situation:

1. "once the party seeking to purchase the goods transmits their offer,
2. once it is received and authenticated through consensus of network users, or
3. once it is coded and added to the [b]lockchain."[125]

Follow-on intent is the issue that most impacts the intent of the counterparty.[126] Giancaspro describes follow-on intent as a scenario where the parties "voluntarily enter[] into a smart contract (the primary contract) [, and] that contract can itself enter the parties into an additional contract (the secondary contract)."[127]

Giancaspro identified two issues with follow-on smart contracts:

1. "can an intention to create legal relations be established in this circumstance, and
2. can a smart contract or related electronic agents or 'bots' autonomously enter parties into legally enforceable follow-on contracts?"[128]

For our research purposes, we focused only on Giancaspro's analysis of the first follow-on intent issue. Intent is a major aspect of each jurisdiction's contract law, with Australian, English and American law (common law nations)[129] determining intent based on the objective circumstances of the parties, while French law tests intent

[114] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[115] Ibid.
[116] Ibid.
[117] Ibid.
[118] Ibid.
[119] Ibid.
[120] Ibid.
[121] Ibid.
[122] Ibid.
[123] Ibid.
[124] Ibid.
[125] Ibid.
[126] Ibid.
[127] Ibid.
[128] Ibid.
[129] England and Australia see intent as a discrete element of contract law, while United States contract law includes intent as part of offer and acceptance.

based on the subjective circumstances of the parties.[130] Regardless of the jurisdiction, Giancaspro concluded that follow-on intent is unlikely to be found because the parties would not have had a chance to consider the effects of additional smart contracts.[131]

Certainty of Terms and Contractual Interpretation are two concepts in contract law about how the terms of contract should be interpreted.[132] Certainty of Terms concerns whether the essential terms of the contract were particularly described in terms of "inherent clarity and completeness." Contractual interpretation concerns giving meaning to the terms and purpose of the contract, and is generally a matter for the courts.[133] In Giancaspro's analysis, Certainty of Terms is an issue with smart contracts because of whether the smart contract source code provides reasonable certainty to the essential terms of the contract.[134] As Giancaspro discusses, in the process of developing a smart contract, "terms drafted in natural language by the parties must then be coded into programming language in order to generate the actual smart contract comprising the agreement of the parties."[135] Furthermore, the natural language drafts of the agreement may not be legally relevant in analyzing whether the smart contract itself is reasonably certain because of the parol evidence rule.[136][137]

Giancaspro identified two additional issues that may arise with Certainty of Terms:

1. how would a smart contract interpret normative terms in a contract such as "reasonableness," and
2. when interpretation is necessary such as a violation of the "duty of 'good faith and fair dealing.'"[138]

In Giancaspro's analysis, Contractual Interpretation is an issue with smart contracts because smart contract source code is difficult for most programmers to understand, and more so for anyone is not trained as a programmer.[139] Interpreting smart contract source code will likely require expert witnesses, and maybe even references to past natural language drafts, if not prohibited by the parol evidence rule.[140] Additionally, there are certain terms that cannot easily be translated into smart contract source code, such as terms that are in subjective language.[141]

Lastly, Giancaspro analyzed contractual interpretation of smart contracts dependent on data oracles, i.e., external data feeds.[142] Giancaspro considered a hypothetical scenario where a data oracle for an insurance smart contract created to indemnify "created to indemnify a homeowner against inclement weather" that is dependent on data oracles for "information relating to rainfall, temperature or other factors from a meteorological agency's website in order to determine if the policy is activated" may "commit errors or even fail altogether" if the data oracles "malfunction or become inactive."[143] Giancaspro suggested a possible legal remedy for smart contracts connected to data oracles that malfunction is the doctrine of frustration.[144][145]

Remedial Issues concern the contractual remedies available to the parties if a dispute arises because of a technical malfunction of the smart contract.[146] When smart contracts are deployed to a blockchain, they are

[130] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[131] Ibid.
[132] Ibid.
[133] Ibid.
[134] Ibid.
[135] Ibid.
[136] Ibid.
[137] The parol evidence rule prohibits reference to prior materials where the express terms have been reduced to a final written agreement.
[138] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[139] Ibid.
[140] Ibid.
[141] Ibid.
[142] Ibid.
[143] Ibid.
[144] Ibid.
[145] The doctrine of frustration is a rule of contractual interpretation wherein a contract is rescinded and the parties are not bound to perform future obligations because it is impossible for either party to perform as originally envisaged through no fault of their own, given that the parties could not foresee the event "as a serious possibility."
[146] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".

extremely difficult to update[147], and once a smart contract has executed, the effects are nearly irreversible.[148] There have been many cases of smart contracts malfunctioning on the Ethereum blockchain, either by coding errors (developer-side) or hacks, that have led to millions of dollars worth of Ether (ETH) and tokens stuck in a smart contract or sent to the wrong public address.[149] This is a major reason why smart contracts are at a high risk for disputes concerning liability for technical errors.[150]

Giancaspro identified two remedial issues with smart contracts:

1. reformation[151] , and
2. injunctive relief[152]..[153]

Giancaspro determined that reformation is likely unavailable because once a smart contract is deployed on the blockchain, it is extremely difficult to update because of the blockchain's inherent immutability.[154] Giancaspro determined that injunctive relief is also likely to be unavailable because smart contracts are "autonomous and self-executing."[155] Once a smart contract is deployed on a blockchain, it cannot be stopped simply by sending cease and desist notifications, nor even when a party provides an injunctive relief order to the counterparty.[156]

1.6.3 Copyright Law

Licensing

Balazs Bodo, Daniel Gervais and Joao Pedro Quintais in *Blockchain and smart contracts: the missing link in copyright licensing?* investigated how a blockchain-based copyright licensing regime would comport with existing copyright frameworks.[157] Bodo et al.'s initially focused on the inherent attributes of blockchain they believe would be compatible with copyright licensing:

- "distributed ledgers;
- tokenization and digital scarcity; and
- smart contracts and decentralization."[158]

In Bodo et al.'s analysis of distributed ledgers (used synonymously with blockchain), they concluded that because distributed ledgers are a general-purpose technology, it can correspond to the fundamentals of copyright law through many different implementations.[159] In Bodo et al.'s analysis of tokenization and digital scarcity, Bodo et al. remarked about the interesting ability to turn any kind of information into a token, i.e., tokeniz[ed/ation], on a blockchain, with four applicable tokenizations in the copyright domain:

1. "a protected work,"
2. "a record of rights management information for protected content,"
3. "terms of use of protected content," and

[147] An updatable smart contract is possible depending on the smart contract standard used, however, for most intents and purposes, a smart contract cannot be updated when it is deployed on a blockchain.
[148] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[149] Ibid.
[150] Ibid.
[151] Reforming the contract because of an error or misstatement in the terms of the contract that was not agreed upon by the parties.
[152] Restraining the other party from taking a course of action, such as violating a term or terms of the contract.
[153] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[154] Ibid.
[155] Ibid.
[156] Ibid.
[157] Balázs Bodó, Daniel Gervais, and João Pedro Quintais. "Blockchain and smart contracts: the missing link in copyright licensing?" en. In: *International Journal of Law and Information Technology* 26.4 (Dec. 2018), pp. 311–336. ISSN: 0967-0769, 1464-3693. DOI: 10.1093/ijlit/eay014. URL: https://academic.oup.com/ijlit/article/26/4/311/5106727 (visited on 12/13/2019).
[158] Ibid.
[159] Ibid.

4. "remuneration of a work" .[160]

Bodo et al. believe tokens and blockchain's elimination of the double spending problem present a possible avenue for reintroducing scarcity into copyrighted works.[161]

In Bodo et al.'s analysis of smart contracts, they concluded that smart contracts can automate transactions (transactions that can easily be described by if-then loops) such as revenue payments, lower transaction costs, and even standardize licensing terms across different uses and jurisdictions.[162] However, Bodo et al. cautioned using smart contracts because of the uncertainty of how smart contracts conform with contract law.[163]

Specifically, contract law issues regarding:

- identification of the parties;
- remedies for breach of contract;
- jurisdictional conflicts; and
- dispute resolution procedure.[164]

Bodo et al. then examined one of the most profound powers of blockchain, its ability to disintermediate and decentralize industries through trustless (i.e., low trust) transactions.[165] Bodo et al. see blockchain's ability to disintermediate possibly upsetting intermediaries at every level:

- "publishers and music labels,
- CMOs, and
- online platforms, including those that host user-uploaded content."[166]

However, Bodo et al. do not envision blockchain completely decentralizing (removal of all intermediaries) the music industry, rather, they see a trend towards decentralizing by upsetting the power of incumbents through new stakeholders.[167] Furthermore, Bodo et al. do not imagine complete disintermediation because "current intermediaries control critical assets for disintermediation, such as the type of comprehensive RMI datasets for musical works and sound recordings held by CMOs."[168] Moreover, Bodo et al. even see the possibility of Collective Management Organizations (CMOs) utilizing blockchain themselves to further entrench their status in the value chain through a private blockchain (read-only).[169]

Bodo et al. identified four copyright domains where blockchain implementations are promising and challenging:

1. Private ordering,
2. Copyright registries,
3. Right Management Information, and
4. Fair remuneration.[170]

First, in Bodo et al.'s analysis of private ordering, their major concerns were fragmentation and licensing coordination.[171] Fragmentation refers to the ability for an author to separately, and divisibly, transfer or license any rights granted under copyright law to a third party.[172] Fragmentation issues would impact blockchain's

[160] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[161] Ibid.
[162] Ibid.
[163] Ibid.
[164] Ibid.
[165] Ibid.
[166] Ibid.
[167] Ibid.
[168] Ibid.
[169] Ibid.
[170] Ibid.
[171] Ibid.
[172] Ibid.

applicability as a licensing tool for an international copyright regime because "there is no such thing as international copyright right[s]."[173] Rather, a blockchain-based licensing framework would have to be based on international treaties, such as the Berne Convention and World Intellectual Property Organization (WIPO) treaties.[174] However, Bodo et al. determined that this would also lead to fragmentation issues.[175] For example, the Berne Convention would provide copyright protection for a work made in a member nation in all other 175 member nations (total 176 nations), but only under each member nation's domestic copyright laws.[176] This could lead to fragmentation issues because it is possible for an author to obtain 176 different rights under copyright, of which each right under copyright may be separately, and divisibly, transferred or licensed to a third party (i.e., fragmentation).[177] The issue of fragmentation also extends to copyright exhaustion because copyright exhaustion is based on each nation's domestic copyright laws.[178] Copyright exhaustion can be categorized into three different schemes:

1. National;
2. Regional; or
3. International.[179]

In a national exhaustion scheme, the authorized sale of a work within a nation exhausts the rights holders' right to control further disposition of the work within that nation.[180] In a regional exhaustion scheme, the authorized sale of a work within a region exhausts the rights holder's right to control further disposition of the work within that region, as is the case in the European Union (EU).[181] In an international exhaustion scheme, the rights holder's right to control further disposition of the work is exhausted when an authorized sale of the work occurs in any market in the world, as is the case in the United States of America (USA).[182]

Bodo et. al. analogized rights fragmentation to the common law concept of title, i.e., "the legal link between a person who owns property and the property itself," as a possible means of understanding how each right fragment may be exploited and possibly licensed to third parties.[183] In understanding rights fragmentation and transferring rights through smart contracts, Bodo et al.'s major concern was the issue of smart contract conformance under existing law, especially regarding the need for a "written instrument" to effectuate transfer of copyright under certain nation's domestic copyright law.[184]

Licensing coordination refers to the complexity of coordinating between on- and off-chain transactions for copyright licensing.[185] Licensing coordination leads to three major issues:

1. off-chain transactions,
2. inconsistent domestic laws, and
3. desynchronization.[186]

First, off-chain transactions may lead to certain issues arising, such as conflict resolution and information asymmetry between the blockchain and traditional institutions.[187] Bodo et al. suggested that a possible solution to the off-chain coordination issues would be to have the "author retain all of their copyright rights," with

[173] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[174] Ibid.
[175] Ibid.
[176] Ibid.
[177] Ibid.
[178] Ibid.
[179] Ibid.
[180] Ibid.
[181] Ibid.
[182] Ibid.
[183] Ibid.
[184] Ibid.
[185] Ibid.
[186] Ibid.
[187] Ibid.

non-exclusive licenses preferred for mass uses while exclusive licenses are used sparingly or when best appropriate through the blockchain ("author ownership solution").[188] However, this solution does not avoid all potential conflicts, such as a conflict between a non-exclusive licensee and an exclusive licensee in a given territory.[189] An alternative solution Bodo et al. suggested is for authors to transfer some of their rights to a third party, such as a CMO, but conflicts may still arise "within a given territory ... or among territories... Thus, the need for some form of coordination emerges" ("CMO transfer solution").[190] Importantly, Bodo et al. noted an unaddressed issue, whether an author who owns all the titles in their work may be able to internationally exploit markets and formats.[191] In the CMO transfer solution, global coordination would still be an issue internationally.[192] Furthermore, antitrust and other unfair competition law concerns may arise.[193] Second, inconsistent domestic laws raise concerns when a smart contract contains restrictions that conflict with the domestic law of a user's territory, which may see a court "impose an appropriate remedy, such as allowing circumvention of DRM or the reduction of any payment due."[194] Third, desynchronization issues may arise between on-chain smart contracts and off-chain traditional contracts.[195] Desynchronization occurs when off-chain transactions are not recorded on-chain.[196] This is unfortunately an issue that cannot be resolved through blockchain alone, and thus will need heightened off-chain coordination.[197]

For rights registries, Bodo et al.'s major concerns were the types of distributed ledger registries and conformance with international copyright registration frameworks.[198] Bodo et al. define copyright registries as "the range of DLT applications that create a registration of information regarding works," which may be voluntary or mandatory.[199] Bodo et al. describe two types of copyright registries (hereinafter "DLT based registries"):

1. passive, and
2. active.[200]

Passive DLT based registries are "used to record RMI information as a time-stamped entry into a public ledger that anyone can consult.[201] Given that such information is only useful if it is authoritative, RMI is most likely to be maintained by trusted intermediaries (such as CMOs)."[202] In active DLT based registries, "rights are tokenized, rights holders are account holders, so DLTs not just record, but facilitate the transactions of rights."[203]

In determining conformance with international copyright registration frameworks, Bodo et al. further analyzed active DLT based registries conformance with the Berne Convention.[204] Bodo et al. assumed that if active DLT based registries are scalable and reach critical mass, eventually "exploitation of works (at least of a certain type, such as sound recordings) in the digital realm [would be] dependent on registration in a digital ledger.[205] In this system, works can be easily licensed, uses and remuneration tracked, and enforced by an accompanying smart contract(s).[206] This ledger would eventually become the de facto means for exploiting a work, raising legal concerns about "whether such a registry would constitute a prohibited formality under international law."[207]

[188] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[189] Ibid.
[190] Ibid.
[191] Ibid.
[192] Ibid.
[193] Ibid.
[194] Ibid.
[195] Ibid.
[196] Ibid.
[197] Ibid.
[198] Ibid.
[199] Ibid.
[200] Ibid.
[201] Ibid.
[202] Ibid.
[203] Ibid.
[204] Ibid.
[205] Ibid.
[206] Ibid.
[207] Ibid.

"Article 5(2) of the Berne Convention prohibits formalities that affect the 'enjoyment' or 'exercise' of protected rights in relation to non-domestic works."[208] Formalities include "registration, recordal of transfers of ownership, notice requirements, and deposit."[209] Enjoyment of rights "relates to author's rights coming into existence and being recognized absent any formality.[210] In essence, the prohibition rules out constitutive and maintenance formalities in respect of works of non-domestic origin, as well as those that function as 'conditions to sue for infringement'. Conversely, certain declaratory formalities are allowed."[211] In Bodo et al.'s opinion, voluntary registration of works on DLT based registries should not violate the Berne Convention because "[o]nly copyright-specific, government imposed formalities are prohibited."[212]

Third, in Bodo et al.'s analysis, blockchain can provide benefits for rights management information through cooperation, but the issue of unverified data needs to be addressed.[213] Bodo et al. believe blockchain's main benefit for rights management information is blockchain's ability to encourage cooperation among multiple stakeholders, such as "songwriters, performers, publishers and record companies," who may own certain rights to a musical work.[214] However, one major issue Bodo et al. noted is the blockchain's inherent inability (based on current technology) for pre-filtering works before adding such works to the blockchain.[215] Even though blockchain may safeguard against data tampering, it cannot guard against inaccurate or unverified data.[216] This issue raises the need for a dispute resolution measure to handle conflicting claims to a musical work.[217]

Fourth, in Bodo et al.'s analysis, they see blockchain serving three types of roles for fair remuneration:

1. enabling payments,
2. opening "statutory or compulsory licenses and collective rights management schemes to smart contract licensing," and
3. providing greater transparency for authors and performers.[218]

Bodo et al. see blockchain's role in enabling payments to have a de minimis effect on the "status quo in copyright law" because it merely adds a new method payment.[219] Rather, Bodo et al. see blockchain's role in opening up compulsory licensing as the most relevant.[220] Such an application may help reduce or eliminate the traditional reasons that led to the creation of the compulsory licensing scheme.[221] In particular, the transaction costs associated with licensing copyrighted works.[222] Transaction costs become prohibitively high when a work has "a relatively small value, but ha[s] a relatively large number of users and right holders."[223] Transaction costs include:

- "identifying and matching rights holders and users,
- the high costs of monitoring use,
- the costs of enforcement, and
- the complexities of setting the price and negotiating the terms of use."[224]

[208] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[209] Ibid.
[210] Ibid.
[211] Ibid.
[212] Ibid.
[213] Ibid.
[214] Ibid.
[215] Ibid.
[216] Ibid.
[217] Ibid.
[218] Ibid.
[219] Ibid.
[220] Ibid.
[221] Ibid.
[222] Ibid.
[223] Ibid.
[224] Ibid.

"Collective management has been successful because it offers substantial economies of scale, making collectively managed licenses preferable to individual licensing."[225] Bodo et al. propose that blockchain may lower individual licensing transactions costs to nearly the same as collective licensing by:

1. reducing the transaction costs associated with finding a rights holder through a publicly available, blockchain-based RMI registry (which make up the bulk of transaction costs), and
2. automating individual licensing through smart contracts based on publicly available usage information (through digital content intermediaries and digital fingerprinting technologies).[226]

Additionally, Bodo et al. also considered the potential for automated licensing via smart contracts to create new global licensing standards, based on the early success of Creative Commons licenses.[227] If possible, it may cause an economic shift in the industry, "making collective rights management and compulsory licensing comparatively costlier."[228]

Bodo et al. also see blockchain playing a role in minimizing information asymmetry between creators and other stakeholders.[229] Bodo et al. discussed that the ties between the music industry oligarchy (three major record labels) and online streaming platforms (e.g., Spotify), is causing creators to feel that they have no platform to discuss their issues nor the chance to share in the spoils of their success.[230] Ultimately, Bodo et al. determined that blockchain's role here will be to shed light on the industry and "on a situation that many see as both unfair and unsustainable."[231]

Rights Management

Michèle Finck & Valentina Moscon further elaborated on Bodo et al.'s analysis of blockchain and copyright in *Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0* by investigating possible blockchain applications in copyright law for digital rights management (DRM).[232] Finck and Moscon's research motivation was to investigate possible blockchain-based DRM applications for enforcing copyright law in a more efficient and balanced manner than current DRM systems.[233] Finck and Moscon frame their investigation of DRM's impact through the lens of international copyright treaties.[234]

Finck and Moscon begin their analysis of DRM systems by providing:

1. a short summary of DRM systems,
2. how DRM systems have impacted public and private ordering, and
3. how international copyright treaties have impacted DRM systems.[235]

First, in general, a DRM system is a code-based enforcement mechanism of the rights of a copyright holder in a copyrighted work.[236] DRM systems started to gain prominence in response to the increased digitization of copyrighted materials and the advent of computers.[237] DRM is generally comprised of technological protection

[225] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[226] Ibid.
[227] Ibid.
[228] Ibid.
[229] Ibid.
[230] Ibid.
[231] Ibid.
[232] Michèle Finck and Valentina Moscon. "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0". In: *IIC - International Review of Intellectual Property and Competition Law* 50 (Dec. 2018). DOI: 10.1007/s40319-018-00776-8.
[233] Ibid.
[234] Ibid.
[235] Ibid.
[236] Ibid.
[237] Ibid.

measures (TPM) and rights management information (RMI).[238] "TPMs include hardware and software to protect the rules and identify the content, the user's IT system and the user him/herself."[239] "RMI is information that identifies content protected by copyright or neighboring rights, the rights owners in such content and the terms and conditions of use associated with it."[240] DRMs may also include rights expression languages (REL).[241] DRM systems are generally incompatible with other DRM systems.[242] The lack of interoperability among DRM systems has likely arisen from a lack of standardization for DRM architecture and the unwillingness of companies to license their technology.[243] Furthermore, interoperability is unlikely to arise because it is more advantageous for proprietary DRM systems to be incompatible for two reasons:

1. developing a monopoly or niche in the market surrounding the DRM; and
2. the diversity of digital content needing to be protected, in conjunction with different levels of protection needed for each type of content.[244]

However, Finck and Moscon discussed that a possible benefit from the lack of interoperability is to restrict copyright owners' control over their content regarding legitimate access and uses by users.[245]

Second, DRM plays a role in public ordering by enforcing existing copyright frameworks, and a role in private ordering by protecting the rights of private sector entities and individuals.[246] Though, DRM's use in private ordering sometimes contravenes existing copyright frameworks by going beyond the protections guaranteed therein, and even protecting works ineligible for copyright protection.[247] DRM's misuse is in private ordering is very prevalent in mass-contract situations, where the terms offered by the licensor to the licensee are often drafted in favor of the licensor while overly restrictive to the licensee because the parties cannot directly negotiate with each other.[248] An example Finck and Moscon mention is the usage of DRM for private ordering in the academic publishing sector has ran afoul of the intentions of copyright law by restricting access (restricting the number of copies or prints) and use (copying file).[249] Finck and Moscon provide an example of this situation in the academic publishing sector, where DRM has led to restricted access (restricting the number of copies or prints) and use (copying the research paper) of research papers by users.[250] This type of activity, as poignantly mentioned by Finck and Moscon, tests the strength of the first sale doctrine[251] in copyright law and highlights the need for copyright law to catch up with digitization.[252]

Third, Finck and Moscon discussed how international copyright treaties have led to a rise in private ordering.[253] In formally adopting the World Intellectual Property Organization (WIPO) Copyright Treaty (WCT) at the national level, the United States of America (USA) passed the Digital Millennium Copyright Act (DMCA), and the European Union (EU) passed the InfoSoc Directive.[254] The WCT imposed obligations for adequate legal protections and remedies against circumvention of TPMs and removal or alteration of RMI. Both the USA and EU legislation exceeded the WCT's requirements and effectively extended the "protection of technical measures even beyond the boundaries of exclusive rights."[255] Thus, both legislations allowed private ordering-based

[238] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[239] Ibid.
[240] Ibid.
[241] Ibid.
[242] Ibid.
[243] Ibid.
[244] Ibid.
[245] Ibid.
[246] Ibid.
[247] Ibid.
[248] Ibid.
[249] Ibid.
[250] Ibid.
[251] The first sale of a copyrighted work exhausts the copyright holder's right to prevent further distribution of that copy.
[252] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[253] Ibid.
[254] Ibid.
[255] Ibid.

contracts and technical measures to exceed the bounds of copyright law by restricting copyright-permitted uses such as fair use through TPMs.[256] These acts have essentially shifted "copyright from public to private ordering enabled by both contracts and technological measures."[257] Additionally, this raises the possibility of rightsholders using DRM to influence the market (i.e., a use beyond protecting the rights of the copyright holder) via a "strategic barrier to entry in addition to a contract and the rules protecting the technology that facilitate its use, to erect strategic barriers even in secondary markets."[258]

Finck and Moscon transitioned to discuss blockchain and smart contract use cases in the copyright domain, and if they can provide an alternative to the current DRM systems.[259] Finck and Moscon identified three main drivers for blockchain use cases in the copyright domain:

1. blockchain's potential capacity to precisely identify a digital asset,
2. blockchain's potential to "foster transparent and disintermediated transactions," and
3. blockchain's potential to be developed as a DRM system.[260]

Since Bodo et al. discussed the first main driver in greater detail in their paper, for our purposes, we shall only discuss Finck and Moscon's analysis of the second and third main drivers.[261]

In Finck and Moscon's analysis, the second driver can provide much needed transparency and cost savings by automating transactions via smart contracts.[262] With the advent of smart contracts, Finck and Moscon see micropayments becoming economically viable because smart contracts can execute payments for smaller fees than previous payment methods while automatically splitting payments among multiple parties.[263] Thus, this model lets musicians engage in direct peer-to-peer (p2p) transactions with consumers, and control the pricing and licensing terms of their works.[264] However, these blockchain-based models are unlikely to lead to a truly decentralized music industry, rather, these blockchain-based models and associated stakeholders will replace current industry incumbents, and take their place as new intermediaries.[265] This outcome is more likely when taking into account that it would be impractical to expect most musicians to learn the legal, marketing, and coding tools to make effective smart contracts.[266] Finck and Moscon suggest that for the "direct-to-fan" model to flourish, there is a need for "user-friendly form[s] of smart contract management, which do[] not require the user to personally code the smart contract."[267] Relevant to our research topic, Finck and Moscon discuss how smart contracts may lead to the standardization of licensing terms and conditions for multi-jurisdictional uses of copyrighted works.[268] Standardized smart contracts will provide "transparency and reduce barriers to using contracts for transactions," and even customizable licenses.[269]

In Finck and Moscon's analysis of the third main driver, blockchain has the potential to disrupt DRM systems.[270] In this use case, smart contracts (with embedded contractual elements) would automate and standardize transactions "in relation to blockchain-based tokenized elements."[271] The smart contract would "self-enforce copyright agreements such as licenses, and provide information about rights in copyrighted

[256] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[257] Ibid.
[258] Ibid.
[259] Ibid.
[260] Ibid.
[261] Ibid.
[262] Ibid.
[263] Ibid.
[264] Ibid.
[265] Ibid.
[266] Ibid.
[267] Ibid.
[268] Ibid.
[269] Ibid.
[270] Ibid.
[271] Ibid.

materials."[272] Additionally, the smart contracts could be used to automate access to digital assets.[273] Additionally, blockchain's characteristics of immutability and replication make it appealing as a cybersecurity measure in comparison with traditional DRM systems which "rely on single points of failure, are expensive, can be overcome by a single hacker and interfere negatively with consumer expectations."[274] Finck and Moscon also highlight that automated licensing via smart contracts can offer rightsholders "greater security and stronger protections against possible attackers including copyright infringers that seek to access the digital asset."[275] An interesting note mentioned by Finck and Moscon is the difference between automated licensing and traditional DRM systems regarding DRM systems specific focus on "control of access and use of digital subject matter."[276] In automated licensing via smart contracts, user rights can be encoded in access-control smart contracts, thereby giving users more rights than in traditional DRM systems.[277] Finck and Moscon expect the DRM system to coordinate with a trusted timeserver (alternatively, a separate blockchain or distributed data storage solution could be used) and "compare the time with the contract terms coded on the blockchain and take away access once the user's license has expired."[278] However, even though smart contracts can provide more user-friendly benefits, "smart contracts do not necessarily encode legally permitted copyright uses."[279]

An additional use case Finck and Moscon considered was blockchain as a public copyright registry.[280] Finck and Moscon believe that blockchain could help reconcile issues regarding trust with RMI databases. RMI databases are plagued by faulty or non-existent data and lack of sharing relevant data, and lack of interoperability.[281] Furthermore, for the parties that rely on RMI such as CMOs, it is very tough getting clean data and reconciling data sources.[282] As Finck and Moscon mentioned earlier, this may also come from groups with an interest in a natural monopoly on data.[283] Additionally, and a very important note regarding storing files on the blockchain, Finck and Moscon mention that the blockchain would only be used for automating transactions (rights and permissions) via smart contracts, rather than storing the digital asset itself.[284]

Finck and Moscon identified five structural challenges of blockchain systems.[285] The first structural challenge that needs to be addressed is that the volatility of cryptocurrencies make them unappealing as a method for royalty payments.[286] The second structural challenge that needs to be addressed is whether a blockchain-based copyright management system can generate enough network effects, i.e., the system needs to be used by many copyright owners or manage many copyrighted works to be successful.[287] The third structural issue is on-chain and off-chain coordination of copyrighted works ("off-chain double spending problem").[288] The off-chain double spending problem can arise because blockchains cannot control off-chain actions, such that a person could double spend their copyright by transferring their rights on-chain, and then transferring their rights again off-chain.[289] The fourth structural issue is the use of blockchain for copyright infringement.[290] It is possible for copyright infringers to store infringing content on the blockchain, and then have the infringing content

[272] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[273] Ibid.
[274] Ibid.
[275] Ibid.
[276] Ibid.
[277] Ibid.
[278] Ibid.
[279] Ibid.
[280] Ibid.
[281] Ibid.
[282] Ibid.
[283] Ibid.
[284] Ibid.
[285] Ibid.
[286] Ibid.
[287] ibid. (We also refer to this structural challenge as the network-industry cost in Part II).
[288] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[289] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[290] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".

replicated among the peers on the blockchain network.[291] The fifth structural issue is inaccurate data being stored on the blockchain, i.e., the garbage-in garbage-out problem.[292] The garbage-in garbage-out problem is an issue for copyrighted information because there is nearly no way of authenticating that such information is accurate when it is registered on the blockchain.[293]

Finck and Moscon assessed from their investigation that blockchain in the copyright domain raises concerns about private ordering and code-is-law paradigm, but can enable innovation in the industry for a fairer copyright regime.[294] Blockchain could be used as a "means of private ordering to the detriment of legally-protected public policy goals such as access to knowledge."[295] Thus, and as fervently acknowledged by Finck and Moscon, we should keep a careful eye on how blockchain is being utilized.[296] Finck and Moscon discussed how blockchain enforces the "code-is-law" paradigm in two ways.[297] "First, the protocols of distributed ledgers enforce their creators' normative choices," and second, smart contracts self-enforce and execute compliance with " a pre-determined rule-set."[298] From there, Finck and Moscon discussed that at the end of the day, technological infrastructure is driven by private interests and without appropriate legislation, will "disregard users' interests."[299] Thus, this has led to suggestions outlined by Finck and Moscon to pass new legislation that by default, makes certain uses mandatory and irrevocable by contract and technology, or even making new technology with "fair use by design."[300] This is very much needed because a major differences between code and law is the ex ante fashion of code, such that "save for the technologically skilled, those exposed to it have no option other than compliance."[301]

Lastly, Finck and Moscon espouse that blockchain may "enable a more disintermediated and fair era of copyright management."[302] The innovative ecosystem of pioneers in this intersection are trying to develop tools to push decentralization into the copyright domain that empowers musicians.[303] Though, user-friendly tools still need to be made, there is progress being made to make it easier for musicians to code smart contracts that comply with applicable law.[304]

General

Birgit Clark and R. Burstall in *Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law* described a typology of blockchain applications in the intellectual property (IP) sector (copyright, trademarks, patents, and trade secrets).[305] For our research purposes, we shall discuss Clark and Burstall's typology of blockchain applications in copyright, namely, smart IP rights and registries, evidence of creatorship, and smart contracts and IP.[306]

[291] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[292] Ibid.
[293] Ibid.
[294] Ibid.
[295] Ibid.
[296] Ibid.
[297] Ibid.
[298] Ibid.
[299] Ibid.
[300] Ibid.
[301] Ibid.
[302] Ibid.
[303] Ibid.
[304] Ibid.
[305] Lead Knowledge Lawyer for Baker McKenzie's IP Birgit Clark, Dr. Technology Practice, and Ruth Burstall Senior Legal Counsel at Johnson & Johnson Innovation EMEA. "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law". In: *Stanford Journal of Blockchain Law & Policy* (June 28, 2019). https://stanford-jblp.pubpub.org/pub/blockchain-and-ip-law. URL: https://stanford-jblp.pubpub.org/pub/blockchain-and-ip-law ("In the context of IP-heavy industries, blockchain and related distributed ledger technology offer obvious possibilities for evidencing IP protection and registration, either at the registry stage or in court during infringement proceedings. It could also offer a cost-effective way to speed up such processes. Potential use cases include: evidencing creatorship and provenance authentication, registering and clearing IP rights; controlling and tracking the distribution of (un)registered IP; providing evidence of genuine and/or first use in trade and/or commerce; digital rights management (e.g. online music sites); establishing and enforcing IP agreements, licenses or exclusive distribution networks through smart contracts; and transmitting payments in real-time to IP owners").
[306] Ibid.

In Clark and Burstall's discussion of smart IP rights and registries, they see such registries recording the whole lifecycle of IP rights, thereby making IP transactions and audits seamless.[307]
In Clark and Burstall's discussion of evidence of creatorship, Clark and Burstall contemplate digital certificates implemented in conjunction with blockchain to record creatorship in an unregistered creative work, and how this may be used as "evidence of their conception, use, qualification requirements and whether the right is still in the period of protection."[308] In particular, this can provide a major benefit for music licensing because creators can exhibit both their statement of creatorship and engage in individual licensing.[309]

In Clark and Burstall's discussion of smart contracts and IP, Clark and Burstall considered two divergent views on smart contracts[310], and how smart contracts can impact IP licensing agreements.[311] Clark and Burstall see smart contracts having a positive impact on IP licensing.[312] Clark and Burstall contemplate that smart contracts "could be used to establish and enforce IP agreements, such as licences, and allow the transmission of payments in real time to IP owners," with such smart contracts including "rights management information, such as ownership, use permissions and payment terms."[313] Though, Clark and Burstall think it is too early "to determine whether smart contracts are the future of digital rights management," they do envision smart contracts "redefin[ing] how creators are remunerated—often instantly via micropayments—by acting as a platform for creators and distributors of IP."[314] Clark and Burstall also discussed global standards and concerns surrounding smart contracts.[315] Clark and Burstall noted that there are global standards being developed for self-executing contracts, and hope these standards can lead to a "more reliable definition of [smart contracts]."[316] Lastly, Clark and Burstall discussed concerns that may arise with the increased usage of smart contracts, such as:

- whether smart contracts can "accurately execute more complex contractual terms or legal concepts, such as public domain and multi-territorial licensing information";
- how "consumer protection laws and public interest considerations" will shape the "concept of smart contracts"; and
- the availability of reliable and safe data oracles.[317]

1.7 Automation Perspective

1.7.1 Smart Contracts

Views on Smart Contracts

Merit Kolvart, Margus Poola and Addi Rull define a smart contract as an autonomous agent, a programmed functionality.[318] These authors noticed that information technology (IT) professionals view smart contracts differently than lawyers, treating them as free of any jurisdiction–while lawyers note that the grounds for putting contracts outside of any jurisdiction are simply not there.[319] Another definition, from Andreas Sherborne, provides that smart contracts automatically execute coded contractual terms without requiring a lawyer, a central

[307] Birgit Clark, Technology Practice, and Burstall, "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law".
[308] Ibid.
[309] Ibid.
[310] Infra Section 1.7.1.
[311] Birgit Clark, Technology Practice, and Burstall, "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law".
[312] Ibid.
[313] Ibid.
[314] Ibid.
[315] Ibid.
[316] Ibid.
[317] Ibid.
[318] Dariusz Szostek and Wydawnictwo C.H. Beck. *Blockchain a prawo*. Polish. OCLC: 1080930761. Warszawa: Wydawnictwo C. H. Beck, 2018 *quoting* Merit Kõlvart, Margus Poola, and Addi Rull. "Smart Contracts". In: Feb. 2016, pp. 133–147. ISBN: 978-3-319-26894-1. DOI: 10.1007/978-3-319-26896-5_7
[319] Szostek and Wydawnictwo C.H. Beck, *Blockchain a prawo quoting* Kõlvart, Poola, and Rull, "Smart Contracts"

entity, a legal system or an outside authority, thus providing clarity, predictability, control mechanism and enabling easy enforcement.[320] Some authors make distinction between smart contract code and smart legal contract, the latter depending on "legal, political and business institutions."[321] Jacek Czarnecki defines smart contract "as a legal bond that can function independently in the digital space, without the need to refer to the real world."[322] Jake Goldenfein and Andrea Leiter define automated transactions (rather than smart contracts) "as a means of exchanging value in which some dimension of the actual exchange is processed by a machine, without human intervention."[323] Goldenfein and Leiter point out that we are yet to see how legal systems react to the fact that transactions on the blockchain cannot be edited or deleted and how they address the need of having some kind of dispute resolution in place.[324] Goldenfein and Leiter also note that "[i]n many ways, [the] engineers are building the legal standards for engaging and transacting on these systems, and like many systems of standardization, their authorizing force is market dominance" and several blockchain initiatives are already "competing over the authority to shape the legal rules" - while jurisdictions, as Werbach (quoted therein) noted, are competing for the title of the leading jurisdiction for the crypto economy.[325]

Clark and Burstall see two divergent views of smart contracts:

1. A replacement of legal agreements and practitioners with self-enforcing code; or
2. A supplement to legal agreements and practitioners with self-enforcing code.[326]

Clark and Burstall believe the first view is overly simplistic because it "does not reflect real-life human and business interaction, where contractual disputes often cent[er] on the quality of contractual performance."[327] Furthermore, and discussed in more detail by Giancaspro, smart contracts work well for easily computable and objective terms (such as a small dispute or micropayments), but should not be solely relied upon in situations "where there is [a] need for a subjective judgment and evidence of facts."[328] Rather, Clark and Burstall believe the second view is more appropriate because it conceptualizes "smart contracts as computerised transaction protocols that execute contract terms ... without human involvement once the underlying binding contract has been coded."[329]

Technical Issues

Alharby Maher and Aad van Moorsel in *Blockchain Based Smart Contracts: A Systematic Mapping Study* conducted a systematic mapping study of twenty-four (24) studies related to smart contracts in multiple domains to "identify current research topics and open challenges for future studies in smart contract research."[330] Maher and van Moorsel's study focused on three research questions:

1. "What are the current research topics on smart contracts?";

[320] Szostek and Wydawnictwo C.H. Beck, *Blockchain a prawo quoting* Andreas Sherborne. *BLOCKCHAIN, SMART CONTRACTS AND LAWYERS*. tech. rep. original-date: 2017. International Bar Association, 2017, pp. 1–8. URL: https://www.ibanet.org/Document/Default.aspx?DocumentUid=17badeaa-072a-403b-b63c-8fbd985d198b

[321] Maher Alharby and Aad van Moorsel. "Blockchain Based Smart Contracts : A Systematic Mapping Study". In: Aug. 2017, pp. 125–140. DOI: 10.5121/csit.2017.71011.

[322] Szostek and Wydawnictwo C.H. Beck, *Blockchain a prawo quoting* Jacek Czarnecki. "Czym są inteligentne kontrakty i DAO". Polish. In: *Blockchain, inteligentne kontrakty i DAO*. original-date: 10-27-2016. Wardynski+Wspolncy; Koalicja Na Rzecz Polskich Innowacji. URL: https://www.wardynski.com.pl/w_publication/blockchain-inteligentne-kontrakty-i-dao/; Jacek Czarnecki. *Czym są inteligentne kontrakty i DAO*. pl-PL. Oct. 2016. URL: http://blockchain.prawo.io/z-archiwum-4-czym-sa-inteligentne-kontrakty-i-dao/ (visited on 12/20/2019)

[323] Jake Goldenfein and Andrea Leiter. "Legal Engineering on the Blockchain: 'Smart Contracts' as Legal Conduct". In: *Law and Critique* 29 (May 2018). DOI: 10.1007/s10978-018-9224-0.

[324] ibid. (Arbitration courts are an already tested and internationally regulated alternative to national courts, as suggested by the Mattereum White Paper.).

[325] Ibid.

[326] Birgit Clark, Technology Practice, and Burstall, "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law".

[327] Ibid.

[328] Birgit Clark, Technology Practice, and Burstall, "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law"; Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".

[329] Birgit Clark, Technology Practice, and Burstall, "Crypto-Pie in the Sky? How Blockchain Technology is Impacting Intellectual Property Law".

[330] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".

2. "What are the current smart contract applications?"; and
3. "What are the research gaps that need to be addressed in future studies?"[331]

Maher and van Moorsel categorized the issues into four categories:

1. codifying issues,
2. security issues,
3. privacy issues, and
4. performance issues.[332]

For our research purposes, we discussed all four categories because these issues can affect any automated licensing approach that utilizes smart contracts.
Maher and Van Moorsel identified the following as codifying issues:

- Difficulty of writing smart contracts,
- Inability to modify or terminate smart contracts,
- Lack of support to identify under-optimized smart contracts, and
- Complexity of programming languages.[333]

The first issue, difficulty of writing smart contracts, primarily affects whether developers can develop a smart contract that executes as intended.[334] If a smart contract is difficult to write, even for those well-versed in smart contract development, the likelihood of errors and mishaps is high.[335] Maher and Van Moorsel identified three potential solutions to this issue:

- Semi-automate the creation of smart contracts by "translat[ing] ... human-readable contract representations to smart contract rules";
- Creating smart contract guidelines for developers; and
- "[F]ormal verification techniques to detect unintended behaviours of smart contracts."[336]

The second issue, inability to modify or terminate smart contracts, concerns the immutability of data stored on a blockchain.[337] Once a smart contract is deployed on the blockchain, its terms, i.e., the source code, cannot be modified or terminated without a massive undertaking such as a hard fork.[338] Maher and van Moorsel identified the creation of standards for modifying or terminating smart contracts taken from traditional contract law as a potential solution to this issue.[339]

The third issue, lack of support to identify under-optimized smart contracts, concerns under-optimized smart contracts, which are smart contracts "that contain[] unnecessary or expensive operations," (e.g., paying more in Gas fees than necessary).[340] Maher and van Moorsel identified that programming optimization patterns and tools thereto could be a potential solution to this issue.[341]

[331] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".
[332] Ibid.
[333] Ibid.
[334] Ibid.
[335] Ibid.
[336] Ibid.
[337] Ibid.
[338] Ibid.
[339] Ibid.
[340] Ibid.
[341] Ibid.

The fourth issue, complexity of programming languages, concerns the type of programming language utilized for writing smart contracts.[342] Maher and van Moorsel discussed the difference between procedural- and logic-based programming languages.[343] In procedural-based programming languages such as Solidity (smart contract language for Ethereum Virtual Machine), programmers must specify what and how things should be done because code is executed in steps.[344] "This makes the task of writing smart contracts in those languages cumbersome and error prone."[345] Contrastingly, in logic-based programming languages, programmers need not specify the sequence of steps in the code. "However, algorithms for logic-based languages are expensive and inefficient."[346]

Maher and van Moorsel identified the following as privacy issues:

- lack of transactional privacy, and
- lack of data feeds privacy.[347]

Lack of transactional privacy is an issue for smart contracts because all data is publicly accessible on a blockchain.[348] This may deter the adoption of smart contracts in financial transactions and transactions involving confidential or private information.[349] Lack of data feeds privacy is an issue because smart contracts that rely on external data need to "send[] a request to the party that provides those feeds."[350] Because data stored on blockchains are publicly accessible, "th[ese] request[s] [are] exposed to the public . . ."[351]

Maher and van Moorsel identified the lack of trustworthy data oracles as a security issue.[352] Lack of trustworthy data oracles is an issue for smart contracts that rely on external data because "there is no guarantee that the information provided by an external source is trustworthy."[353]

Maher and van Moorsel identified sequential execution of smart contracts as a performance issue.[354] Sequential execution is a performance issue because most blockchains do not have the scalability capacity (i.e., low transactions-per-second (TPS)) to process a high volume of transactions executed via smart contracts.[355] Thus, the more smart contracts that are executed, the slower it will take for the transactions executed via smart contract to be processed and added to the blockchain.[356] Additionally, a high volume of transactions will lead to network fees (i.e., miner's fees) rising, thereby making each transaction more costly.[357]

Music Licensing Proof of Concepts

The first smart contract automation approach for music was performed by Ujo Music, in partnership with Imogen Heap, to release Imogen Heap's song Tiny Human as a digital music file that worked in conjunction with a smart contract on the Ethereum blockchain.[358] This release showed the promise of blockchain for automating music licensing because you could interact with the music file through a smart contract, and the web application showed transparent metadata because it displayed the following information to prospective purchasers:

[342] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".
[343] Ibid.
[344] Ibid.
[345] Ibid.
[346] Ibid.
[347] Ibid.
[348] Ibid.
[349] Ibid.
[350] Ibid.
[351] Ibid.
[352] Ibid.
[353] Ibid.
[354] Ibid.
[355] Ibid.
[356] Ibid.
[357] Ibid.
[358] *Imogen Heap releases a single on the Ethereum blockchain*. en. URL: https://futurism.com/imogen-heap-releases-on-the-ethereum-blockchain (visited on 10/18/2019); *Imogen Heap's Tiny Human*. URL: https://imogen2.surge.sh/#/imogen_heap/tiny_human/tiny_human (visited on 10/18/2019).

- credits (the team behind the song),
- stems (individual segments of the song) can be individually purchased,
- lyrics,
- inspiration for the song, and
- licensing information (policies, distributions, and transactions).[359]

This first example has led to the rise of more Proof-of-Concepts (PoC) trying to automate music licensing via smart contracts, and an example PoC is discussed in the following paragraphs.

Andreas Fougner Engebretsen and Hallvard Kristoffer Boland Haugen in their thesis, *The Music Industry on Blockchain Technology*, developed a PoC demonstrating "music copyright registration and licensing through smart contracts on the Ethereum blockchain" as a potential solution for the lack of transparency and excessive middlemen in the music industry.[360]

Engebretsen and Haugen were motivated to produce their PoC because they wanted to show that blockchain has real-world applications, and could resolve issues musicians face "regarding transparency, efficiency and fairness."[361] Engebretsen and Haugen's two goals for the PoC were:

1. "[i]dentify the core problems in the music industry and understand how blockchain technology can be utilized to resolve the issues"; and
2. "[d]emonstrate that musicians and other industry players can benefit from transparent blockchain based decentralized applications."[362]

Engebretsen and Haugen's research question for their thesis was "[h]ow can blockchain technology be utilized in order to solve problems related to transparency, efficiency, and fairness along the music industry value chain?"[363] Engebretsen and Haugen's research methods for the thesis were to analyze the relationships between stakeholders in the music industry to determine core problems, and then applying their PoC to remedy these core problems.[364] For our research purposes, we only discussed Chapters 3 – 7 of Engebretsen and Haugen's thesis because the background information contained in Chapter 2 is discussed in another section.[365]

Concerning the relevant properties of distributed and decentralized networks, Engebretsen and Haugen discuss the three axes of centralization:

1. architectural,
2. political, and
3. logical,

and highlighted three advantages of these networks:

1. security,
2. immutability, and
3. transparency.[366]

[359] *Imogen Heap releases a single on the Ethereum blockchain*; *Imogen Heap's Tiny Human*.
[360] Hallvard Kristoffer Boland Haugen and Andreas Fougner Engebretsen. "The Music Industry on Blockchain Technology". eng. MA thesis. Norway: Norwegian University of Science and Technology, 2018. URL: https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2565110 (visited on 12/17/2019).
[361] Ibid.
[362] Ibid.
[363] Ibid.
[364] Ibid.
[365] Ibid.
[366] Ibid.

In Chapter 3, Engebretsen and Haugen discuss the design of their PoC, and why they chose the Ethereum blockchain as the underlying infrastructure for their PoC.[367] Engebretsen and Haugen's goal for the PoC was to implement a "copyright database and music licensing dApp" that appealed to both copyright holders and licensees.[368] Engebretsen and Haugen chose the Ethereum blockchain for their DApp because the Ethereum blockchain has built-in security measures that mitigate against distributed denial of service (DDoS) attacks, the Ethereum blockchain's transparency characteristic makes it a viable option for a global rights database, the use of ERC-721 tokens (i.e., Non-fungible Tokens (NFTs)) to represent copyright on the blockchain, and blockchain's immutability ensures that any data collected through the DApp will not be altered in the future.[369] Additionally, Engebretsen and Haugen chose the Ethereum blockchain because Ethereum has a strong community and strong leadership supporting the development of the blockchain.[370]
Engebretsen and Haugen's DApp focused on three essential use cases:

1. "Registering a musical work;
2. Creating license contracts; and
3. Searching for musical works and purchase licenses from a database."[371]

Engebretsen and Haugen defined a musical work as an object with the following attributes:

- "title",
- "type of work (song, recording, composition, lyrics, etc.)",
- "description",
- "time of registration",
- "list of all [contributors] and their respective share of ownersh[i]p", and
- "a file embodying the work itself."[372]

Engebretsen and Haugen determined that the only two attributes that need to be stored on the Ethereum blockchain were the file (specifically the hash) and the list of contributors.[373] Only these two attributes were needed because the file identifies the musical work, and the list of contributors identifies the royalty splits.[374] By storing only these two attributes, Engebretsen and Haugen determined that this would help reduce Gas fees since storing data on the Ethereum blockchain is expensive.[375]

In Engebretsen and Haugen's technical implementation of their DApp, they discuss the technical design choices and some critical code structures.[376] Engebretsen and Haugen describe their technical implementation of their DApp, which includes the back-end logic written in a collection of smart contracts, and the front-end user interface written in Angular, a JavaScript library.[377] Engebretsen and Haugen organized their back-end logic into the following smart contracts:

- "contract WorkBase",
- "contract ERC721",
- "contract TokenOwnership is WorkBase, ERC721",

[367] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[368] Ibid.
[369] Ibid.
[370] Ibid.
[371] Ibid.
[372] Ibid.
[373] Ibid.
[374] Ibid.
[375] Ibid.
[376] Ibid.
[377] Ibid.

- "contract LicenseBase is TokenOwnership", and
- "contract LicensePurchase is LicenseBase."[378]

Engebretsen and Haugen described the core smart contracts of their DApp: 1) WorkBase, 2) TokenOwnership, 3) LicenseBase, and 4) LicensePurchase, while leaving the other contracts to be understood based on in-line comments in the smart contracts.[379] For our research purposes, we focused on the back-end of the DApp rather than the front-end because the back-end describes how music licenses can be converted into smart contracts.[380]

The WorkBase smart contract defines the core data of the DApp:

- the musical work as a struct data type,
- an array to act as a master database for the musical works,
- a function to register a work and determine the contributors and their payment splits,
- certain mappings, including a mapping "of whether a work has been approved or not," and
- a function issuing copyright tokens to contributors as proof of registration.[381]

Engebretsen and Haugen defined the copyright tokens to be distributed based on the splits determined by the contributors with one token representing ten percent (10%) ownership of a work's overall copyright, thus only ten tokens are issued.[382] Engebretsen and Haugen chose to only issue ten (10) tokens to optimize the smart contract because Gas fees have a linear positive relationship with the number of tokens issued.[383]

The TokenOwnership smart contract defines:

- an array where all tokens are stored,
- a mapping to keep track of which tokens are owned by which addresses,
- a function to transfer tokens from one address to another, i.e., to assign copyrights from a holder to another person, and
- a token standard by inheriting the ERC-721 standard.[384]

The LicenseBase smart contract provides the code for creating and storing license profiles that can be "purchased through [the] web application."[385] Specifically, the LicenseBase smart contract defines the:

- a struct of license profiles,
- a mapping of license profiles to addresses,
- an array to act as a master database for the license profiles, and
- a function to register a license and add it to the array.[386]

[378] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[379] Ibid.
[380] Ibid.
[381] Ibid.
[382] Ibid.
[383] Ibid.
[384] Ibid.
[385] Ibid.
[386] Ibid.

Additionally, Engebretsen and Haugen discussed that the LicensePurchase smart contract can hold ETH as part of transactions, and that a mapping is included so that the ETH stored in the smart contract, i.e., paid royalties, will be mapped onto the token ID, i.e., the contributors addresses.[387] This mapping scheme was chosen to save on gas costs and to optimize the smart contracts.[388] The withdrawFromWorkId() function determines which tokens, i.e., copyrights to a work, the sender owns (through msg.sender), "calculates the aggregated token balance sum, [and sends the sum] from the smart contract account to the account of msg.sender."[389]

In the web application, Engebretsen and Haugen specifically mention the blockchain services needed to connect the web application to the smart contracts.[390] Engebretsen and Haugen included two blockchain services in their Angular application to handle blockchain-related services:

1. "web3.service.ts," and
2. "ethereum.service.ts."[391]

The web3.service.ts service is "mainly for establishing a Web3.js provider [to] connect [the] Angular application to the running blockchain.[392] That is the service where MetaMask is set as the current Web3 provider."[393] "The ethereum.service.ts service provides the components with access to the functionality of the deployed smart contract."[394]

Engebretsen and Haugen then summarized the results of their PoC.[395] Engebretsen and Haugen determined that in applying blockchain to the music industry, blockchain could provide more transparency within the ecosystem and optimize the industry's currently inefficient money flow.[396] Engebretsen and Haugen's PoC successfully implemented these four components:

1. "an open [and] transparent" registered works and licenses database,
2. representing copyright as erc721 tokens,
3. "[u]sers can create and purchase licenses for single musical works
4. "[m]usicians get real-time information about generated license royalties."[397]

Two unresolved problems Engebretsen and Haugen's PoC could not address were:

1. an international standard for regulating licensing, and
2. "[s]ingle license contracts that involve several musical works."[398]

A major accomplishment we ascertained from Engebretsen and Haugen's PoC (which they also acknowledged) was creating a Graphical User Interface (GUI) that made it less apparent to the user that they were interacting with smart contracts and the technicalities of a blockchain.[399] A specific feature of Engebretsen and Haugen's web application that we thought was very supportive of automated licensing was providing contributors the option to offer synchronization and public performance licenses by default, and the option for contributors create their own license as a license profile.[400] In developing our Tokenized Music License (TML) on the OpenLaw

[387] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[388] Ibid.
[389] Ibid.
[390] Ibid.
[391] Ibid.
[392] Ibid.
[393] Ibid.
[394] Ibid.
[395] Ibid.
[396] Ibid.
[397] Ibid.
[398] Ibid.
[399] Ibid.
[400] Ibid.

platform, we believe our license could be used in conjunction with Engebretsen and Haugen's Rights Done Right DApp and web application in the create work section by including our license as a license profile or creating a web form for the TML.[401]

After developing their PoC, Engebretsen and Haugen considered the challenges of blockchain, whether the music industry is ready for blockchain, blockchain as an economic transaction system, blockchain's immutability characteristic, centralized v. distributed storage, and web applications.[402] Because the challenges associated with smart contracts was mentioned earlier by Maher and van Moorsel, we only discussed challenges Maher and van Moorsel did not address in their paper.[403]

A major challenge for Engebretsen and Haugen's PoC were the Gas fees associated with registering a musical work on their DApp.[404] Engebretsen and Haugen estimated that the cost of registering a work to the DApp was approximately $0.10 - $0.60, an amount that may be trivial to an independent musician, but is a significant amount to a major publisher because of the large number of works that they need to register.[405] Engebretsen and Haugen discussed that the most popular Ethereum programming language, Solidity, has major limitations because of its relative immaturity compared to other mature languages such as Java or .NET, and certain technical limitations that Engebretsen and Haugen had to make up for on the front-end.[406] Engebretsen and Haugen do not believe the music industry is ready to transition to trustless DApps because the major intermediaries, CMOs and record labels, do not have the incentive to radically change their business models, especially to a new platform that they do not control.[407] Engebretsen and Hauge expect a slow transition from legacy systems to blockchain-backed systems in the music industry.[408] Then regarding the necessity of blockchain to solve issues in the music industry, Engebretsen and Haugen believe blockchain can disrupt the oligarchy in control of the music industry, but that a blockchain is not necessary for solving the lack of information and standards in the music industry because a centralized solution can be developed to address this issue.[409] Engebretsen and Haugen concluded that cryptocurrencies are currently not a "sound basis for [a] financial transaction" system because of their extreme volatility relative to fiat currencies, and that the current financial system revolves around government-issued fiat currencies.[410] In their DApp, Engebretsen and Haugen priced the licenses in ETH because ETH is a static value, but because ETH is volatile compared with fiat currencies, the price of a license will constantly fluctuate.[411] A possible workaround suggested by Engebretsen and Haugen is to price the licenses in USD instead through the aid of a data oracle, albeit with further research needed on whether "oracles weaken[] blockchain's core decentralization objectives."[412] Engebretsen and Haugen discussed the advantages and disadvantages of blockchain's immutability.[413] Immutability "provides data integrity as no stored records on the blockchain can be altered," but this also provides disadvantages if musicians want to make changes to their registered work, or the inability to patch a smart contract if a vulnerability is found.[414]

Engebretsen and Haugen discussed the advantages and disadvantages of centralized versus distributed storage.[415] Engebretsen and Haugen discussed that centralized storage's major advantage is its "easy configurability and integration with any application."[416] However, a disadvantage of centralized storage is that such data centers are a single point of failure, and users must trust a third party to keep their data safe and not

[401] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[402] Ibid.
[403] Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".
[404] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[405] Ibid.
[406] Ibid.
[407] Ibid.
[408] Ibid.
[409] Ibid.
[410] Ibid.
[411] Ibid.
[412] Ibid.
[413] Ibid.
[414] Ibid.
[415] Ibid.
[416] Ibid.

share their data with third parties.[417]

In distributed peer-to-peer storage, data is stored "across a network [of] nodes, making them more secure, possibly faster, cheaper and censorship resistant.[418] Distributed storage systems leverage the enormous amounts of unused storage space located on the user's hard drive[s] around the world."[419] Many of the distributed storage solutions are in development so Engebretsen and Haugen instead chose to use Google's Firebase, which does lead to more centralization than wanted, but they still believe their DApp is sufficiently decentralized.[420]

In answering their research questions, Engebretsen and Haugen concluded that blockchain could apply to solve problems in the music industry related to "transparency, efficiency, standards, and inaccessible copyright information."[421] However, Engebretsen and Haugen's research also revealed limitations of blockchain such as scalability and processing time, and the lack of maturity in tools and community which hinder DApp development.[422] Two areas for further research Engebretsen and Haugen mentioned were investigating the legal and governance issues involved with creating a music licensing DApp.[423]

1.7.2 Metadata

Bill Rosenblatt proposed the use of audio watermarks in conjunction with blockchain technology to track musical works in *Watermarking Technology and Blockchains in the Music Industry*.[424] In proposing this solution, Rosenblatt identified the following issues in the music industry that have led to the need for tracking musical works:

- there are two separate copyrights in the musical composition and the sound recording and the difficulty of tying sound recordings to specific musical compositions,
- the lack of a uniform "source for mapping recordings to their underlying compositions", and
- standard identifiers in the music industry are "neither ubiquitous nor comprehensive enough to enable automated identification of music without errors, gaps, or ambiguities."[425]

These issues led Rosenblatt to consider the need for unique identifiers for tracking musical compositions and sound recordings.[426] In creating unique identifiers, Rosenblatt analyzed four methods to bind identifiers to digital audio files that could curb the above issues:

1. header metadata;
2. hashes;
3. acoustic fingerprints; and
4. digital watermarks.[427]

In analyzing the four methods, Rosenblatt concluded that digital watermarks are the best method for binding identifiers to digital audio files.[428]

Rosenblatt examined the binding identifiers based on the following criteria:

[417] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[418] Ibid.
[419] Ibid.
[420] Ibid.
[421] Ibid.
[422] Ibid.
[423] Ibid.
[424] Bill Rosenblatt. *Watermarking Technology and Blockchains in the Music Industry*. Whitepaper. Digimarc Corporation, pp. 1–24. URL: https://www.digimarc.com/docs/default-source/digimarc-resources/whitepaper-blockchain-in-music-industry.pdf?sfvrsn=2.
[425] Ibid.
[426] Ibid.
[427] Ibid.
[428] Ibid.

- "Robustness: the identifier remains associated with the file even after the file has been transformed in various ways, such as transcoding, downsampling, excerpting, pitch-shifting, re-equalizing, and digital-analog-digital conversion";
- "Data Flexibility: the same audio data can exist in multiple files with different identifiers";
- "Identifier Reliability: the identifier can reliably identify the recording in the file for rights and royalty management purposes"; and
- "Security: the identifier is difficult to remove or change without altering or marring the content."[429]

Rosenblatt determined that header metadata provided data flexibility and identifier reliability because they are easy to insert into a file, even multiple headers, and can contain multiple types of values, but lacked in robustness and security because it is "trivially easy to change or remove header metadata without affecting the content," and may not survive when the file is transformed.[430]

Rosenblatt determined that hashes provided identifier reliability since hashes are generally unique for an individual file, but lacked in robustness, security, and data flexibility because "they do not give the copyright owner or distributor any flexibility or control over identifiers," and the hash can easily change if just a single bit of audio data is modified, such as by changing the file format.[431]

Rosenblatt determined that acoustic fingerprints[432] provided robustness and security because like "standard hashes, fingerprints are inherent in the data, so they can't be removed or separated from it. But unlike standard hashes, it's difficult (if not impossible) to alter a file's fingerprint without perceptibly marring its sound to a listener."[433] However, acoustic fingerprints lacked in data flexibility and identifier reliability because "fingerprinting is not very good at differentiating between certain versions of a given music track that might need to be distinguished for rights and royalty management purposes," and "it is impossible to assign different identifiers to different files containing the same recording."[434]

Rosenblatt determined that digital watermarks excelled in each category because "[a] well-designed watermarking scheme is robust to transformations . . . , can be used to associate any data desired . . . , can allow a level of certainty comparable to header metadata," and "can't be altered without seriously disrupting the audio itself."[435] The one disadvantage of watermarks is that they need to be inserted into legacy audio content.[436]

Rosenblatt also considered the application of blockchain technology with digital watermarks.[437] Concerning storing digital music files on a blockchain, Rosenblatt concluded that digital music files should not be stored on a blockchain because blockchains currently are not efficient enough to store files and transaction information.[438] Rather, the more appropriate use would be to store transaction information associated with digital music files on the blockchain, though with a loss of security.[439] To remedy the loss of security, Rosenblatt recommended creating links between transactions and digital audio files, whereby a unique identifier stored in the transaction references or matches an identifier in a digital audio file.[440] Rosenblatt identified two secure methods for linkage:

1. encryption, and
2. digital watermarks.[441]

[429] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[430] Ibid.
[431] Ibid.
[432] A special type of hash function that returns the same value for all inputs that sound the same to a human listener.
[433] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[434] Ibid.
[435] Ibid.
[436] Ibid.
[437] Ibid.
[438] Ibid.
[439] Ibid.
[440] Ibid.
[441] Ibid.

Rosenblatt assessed that encryption was a suitable method, but would be too complex and cumbersome for the user or service provider because the whole file (digital audio and metadata) must be encrypted together, and if the user or service provider wants to process or convert the file's format, they will "have to use a special application that will decrypt the file, do the conversion, and preserve the integrity of the metadata."[442] In comparison with digital watermarks, Rosenblatt assessed that digital watermarks are easier to deal with for users or service providers because they can process or convert the file's format without any intermediary step and avoid damaging the digital watermark's integrity.[443]

Rosenblatt provided an example of how Core Rights could use digital watermarking and blockchain for their venue licensing marketplace.[444] Core Rights could embed digital watermarks in its digital music files to identify them as Core Rights files for its venue licensing marketplace, and store transactions on the blockchain that include information about the licensee, ISRC, and underlying composition and/or sound recording.[445] Alternatively, this information can be stored in the digital watermark.[446] A player application can then be used to read the digital watermark and record acceptance of the license on Core Rights blockchain, or alternatively, the digital watermark can be used for auditing purposes by tracing the digital watermark to transactions on the blockchain.[447]

Rosenblatt provided examples of how producers could use embedded identifiers and blockchain for found music and for royalty payments.[448] For found music in remixes, "producer[s] could use an app that reads the watermark in a [digital] music file, deposits a licensing transaction on a blockchain, and then [the smart-contract will] provide stems (individual tracks) to the producer for remixing."[449] Once the producer has created remixes based on the individual stems, the producer will "submit the remix through the app to the service provider," which will give the remix its own unique digital watermark and associating the remix's digital watermark with the digital watermarks associated with the stems.[450] This will allow the service provider to easily process rights and royalty management for anyone who wants to use the remix, as well as the owner(s) of the stems.[451] For royalty payments, digital watermarks could be used for interactive streaming services because each time a music file is played, a transaction can be recorded on the blockchain with the applicable royalties due to rights holders.[452] These transactions can be traced to the digital watermark in the digital music file because the identifiers used would be the same, thereby allowing rights holders to access transaction information from extracting identifiers "without any need to contact the [digital music service providers (DSPs)] directly."[453] Lastly, Rosenblatt found this royalty scheme applicable with Dot Blockchain Media's[454] architecture and Open Music Initiative's vision.[455]

Benji Rogers approach for dotBlockchain Media (rebranded to Verifi Media) is to create an open-source technology for a file format (ending in ".bc") which will contain metadata referencing blockchain transactions, ownership information, and licensing information in addition to the digital music file.[456] Verifi Media is being developed to be interoperable with any blockchain (i.e., blockchain agnostic) and existing music rights databases.[457] Verifi Media's founders believe the file format's interoperability will depend on a Minimum Viable Data (MVD) standard.[458] The MVD standard's approach is to require the least amount of essential information needed to discern a

[442] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[443] Ibid.
[444] Ibid.
[445] Ibid.
[446] Ibid.
[447] Ibid.
[448] Ibid.
[449] Ibid.
[450] Ibid.
[451] Ibid.
[452] Ibid.
[453] Ibid.
[454] Rebranded to Verifi Media
[455] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[456] Benji Rogers. *The dotBlockchain Music Project — update #7 Minimum Viable Data Doc*. en. Sept. 2019. URL: https://medium.com/verifimedia/the-dotblockchain-music-project-update-7-minimum-viable-data-doc-561fdfadd5eb (visited on 12/17/2019); *Verifi Media*. URL: https://verifi.media/ (visited on 12/17/2019); Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[457] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[458] Rogers, *The dotBlockchain Music Project — update #7 Minimum Viable Data Doc*.

musical recording and associated rights holders from another musical recording.[459] With this model, musicians can easily upload their musical works and associated information, with changes tracked by a blockchain.[460] Additional information can also be provided for commercial uses and then tailored to external databases.[461]

Another initiative worth mentioning is the Open Music Initiative (OMI), described as "a non-profit initiative ... creating an open-source protocol for the uniform identification of music rights holders and creators."[462] The aim of the initiative is to facilitate platform interoperability. Presence of patrons such as Berklee and Massachusetts Institute of Technology (MIT) Connection Science gives hope that the approach taken may produce noticeable results, amid the myriad of solutions present in the digital music industry.[463]

1.7.3 Semantic Web

Primavera De Filippi, Greg McMullen, Trent McConaghy, Constance Choi, Simon de la Rouvière, Juan Benet, and Diana J. Stern, in *How Blockchains Can Support, Complement, or Supplement Intellectual Property*, discussed the benefits of blockchain for intellectual property (IP) with a particular discussion of copyright.[464] For our research purposes, we focused on Filippi et al.'s discussion of how automated licensing can remove the complexity associated with finding the licensing terms of a copyrighted work.[465] Automated licensing, with the aid of a public registry for works, can help potential licensees, find an appropriate license and the acceptable methods of payment.[466] By making it easier for potential licensees to find appropriate licenses, more people should be encouraged to follow the legal routes for using a copyrighted work.[467]

Additionally, we shall also discuss the Coalition of Automated Legal Applications Intellectual Property Working Group (COALA-IP) development of an IP licensing protocol that combines the Semantic Web with blockchain.[468] The two major goals of the licensing protocol are to develop a minimum viable data set for IP licensing (JSON-LD, RDF schemas) and a free and open messaging protocol for licensing transactions (ILP, IPLD, LCC).[469] COALA-IP's licensing protocol is built on four building blocks:

- Linked Content Coalition (LCC) framework,
- Linked Data (LD),
- InterPlanetary Linked Data (IPLD), and
- InterLedger Protocol (ILP).[470]

The LCC framework is meant to unify data standards for IP works through a Rights Reference Model (RRM) and Entity Model (EM).[471] LCC RRM is meant to provide a "formal framework of representing intellectual property rights," and is built on top of LCC EM.[472] LCC EM is a meta-model for identifying entities who are IP rightsholders, and is the base model for LCC RRM.[473]

[459] Rogers, *The dotBlockchain Music Project — update #7 Minimum Viable Data Doc*.
[460] Ibid.
[461] Ibid.
[462] *About*. en-US. URL: https://open-music.org/about (visited on 12/17/2019).
[463] *OMI API Specification - MVI 1.0 (beta) · Apiary*. URL: https://omi01.docs.apiary.io/#introduction/common-api-conventions/authentication-and-authorization (visited on 12/17/2019).
[464] Primavera De Filippi et al. *HOW BLOCKCHAINS CAN SUPPORT, COMPLEMENT, OR SUPPLEMENT INTELLECTUAL PROPERTY*. URL: https://github.com/COALAIP/specs/blob/master/presentations/COALA%20IP%20Report%20-%20May%202016.pdf.
[465] Ibid.
[466] Ibid.
[467] Ibid.
[468] *COALA-IP Protocol*. en. Whitepaper. Github, Oct. 2016. URL: https://github.com/COALAIP/specs/blob/master/presentations/COALA%20IP%20-%20short.pdf (visited on 12/17/2019).
[469] Ibid.
[470] Ibid.
[471] *COALAIP/specs*. original-date: 2016-10-11T09:21:36Z. Aug. 2019. URL: https://github.com/COALAIP/specs (visited on 10/10/2019).
[472] Ibid.
[473] Ibid.

Linked Data (LD) is a design approach to connect machine-readable, interlinked resources across the semantic web, i.e., the web of data, through the use of Semantic Web technologies such as Uniform Resource Identifiers (URIs) and the Resource Description Framework (RDF).[474] "RDF's core data structure is a graph-based model that uses sets of triplets [(subject, predicate, and object)] to construct graph subsets."[475] COALA-IP employs JSON-LD to link JSON object's "properties to a corresponding RDF schema through the concept of a context."[476] COALA-IP uses JSON-LD in conjunction with schemas from Schema.org, "a collaborative initiative with the mission to create, maintain and promote schemata for structured data on the internet."[477]

IPLD is "an attempt to put Linked Data on distributed ledgers by using hashes as content-addressed links, a technique referred to as "Merkle Links."[478] Merkle Links provide "the ability to cryptographically check the data referred to by a link."[479] Through IPLD, IP data stored on different blockchains can reference the existence of related IP data on other blockchains.[480]

ILP is an open source protocol being developed in a W3C Community Group "for sending payments across different ledgers" over the web.[481] COALA-IP may use ILP to conduct IP licensing transactions on multiple blockchains.[482]

In COALA-IP's IP licensing protocol, COALA-IP implements the LCC framework with JSON-LD and IPLD, and with certain modifications to meet COALA-IP's needs.[483] COALA-IP's IP licensing protocol implements the following models of the LCC RRM framework:

- Place,
- Party,
- Creation,
- Right,
- RightsAssignment,
- Assertion, and
- RightsConflict.[484]

1.7.4 Ricardian Contracts

Usman W. Chohan in *What Is a Ricardian Contract?*, discussed how recent technological innovations have made Ricardian Contracts (RCs) viable and considered their wider implementations and uses given their benefits.[485] Chohan defines a RC as a "method of expressing, encoding, and executing a contractual document through

[474] *What are Linked Data and Linked Open Data?* en-US. URL: https://www.ontotext.com/knowledgehub/fundamentals/linked-data-linked-open-data/ (visited on 10/10/2019); *Introduction to the Solid Specification | Solid*. URL: https://solid.inrupt.com/docs/intro-to-solid-spec (visited on 10/18/2019).
[475] *COALAIP/specs*.
[476] Ibid.
[477] Ibid.
[478] Ibid.
[479] Ibid.
[480] Ibid.
[481] *COALA-IP Protocol*; *Interledger Overview*. publisher: Interledger. URL: https://interledger.org/overview.html (visited on 12/17/2019); *Interledger Payments Community Group*. en-US. URL: https://www.w3.org/community/interledger/ (visited on 12/17/2019).
[482] *COALA-IP Protocol* (Additional Semantic Web approaches to examine are Oasis LegalRuleML, Open Digital Rights Language, and Creative Commons Rights Expression Language.).
[483] *COALAIP/specs*.
[484] Ibid.
[485] Usman W. Chohan. "What Is a Ricardian Contract?" en. In: *SSRN Electronic Journal* (2017). ISSN: 1556-5068. DOI: 10.2139/ssrn.3085682. URL: https://www.ssrn.com/abstract=3085682 (visited on 10/18/2019).

software, which means that it represents the recording of documents as contractually lawful, and then securely linking them to other ambits/systems, such as of accounting, for the contract to serve as an issuance of value."[486]

RCs have three primary advantages:

1. "robust,
2. transparent, and
3. efficient."[487]

RCs are robust because they utilize cryptographic hashes.[488] RCs are transparent because the legal prose is human-readable.[489] RCs are efficient because the markup language extracts essential information as machine-readable tags.[490] Chohan describes the advantages of Ricardian Contracts from a legal perspective and a computing perspective.[491]

From a legal perspective, the markup language "leads to reduced transaction costs, faster dispute resolution, better contract enforcement and enhanced transparency."[492] From a computing perspective, "the software design pattern [] digitizes documents ... without losing any of the richness of the contracting tradition."[493] An additional benefit for both perspectives is that cryptographic hash functions mitigate against fraud because there is a cryptographic hash function that refers to the agreement, and the parties both sign the agreement with a cryptographic signature (similar to signing a transaction with a public-private key pair in a cryptocurrency transaction).[494]

Chohan describes the four components of a RC as follows:

1. "a contract is offered by an issuer to contract holders";
2. "[i]t is held for a valuable right by holders and managed by the issuer";
3. "[i]t is easily readable on paper and by programs"; and
4. "[i]t is digitally signed, carrying the keys and server information, and is allied with a unique, secure identifier."[495]

Chohan describes the characteristics of a RC as follows:

- "dislocalization of parties across time and domain";
- cryptographic hashes to bind the parties for "legal and accounting aspects";
- each subsequent transaction references the hash of the Ricardian contract;
- "operations of ... transactions and the issuance of the contract are cleanly separated"; and
- agreements may be done in counterparts and/or in smaller sub-agreements that are combined to form one single agreement.[496]

[486] Ibid.
[487] Ibid.
[488] Ibid.
[489] Ibid.
[490] Chohan, "What Is a Ricardian Contract?"
[491] Ibid.
[492] Ibid.
[493] Ibid.
[494] Ibid.
[495] Ibid.
[496] Ibid.

Chohan reflects that the concept of RCs is similar to the concept of smart contracts.[497] However, Chohan discusses that the difference between RCs and smart contracts is that "smart contracts [relate] to the automated execution of already agreed contracts, while Ricardian Contracts represent a design pattern that captures the intent of agreeing parties."[498] Thus, this difference leads to the realization that "Ricardian Contracts are a vehicle for [implementing] smart contracts."[499]

For an interesting implementation of a Ricardian Contracts for connecting online transactions with offline legal agreements, please refer to Jørgen Svennevik Notland, Jakob Svennevik Notland, and Donn Morrison's masters thesis, *The Minimum Hybrid Contract (MHC): Combining legal and blockchain smart contracts.*[500]

1.7.5 Online Dispute Resolution

Derric Yeoh in *'Is Online Dispute Resolution The Future of Alternative Dispute Resolution?'* discusses online mediation, online arbitration, and blockchain-based arbitration.[501] Yeoh describes online mediation as disputants interacting with a mediator in virtual chatrooms.[502] Yeoh described asynchronous mediation as the most popular method for three reasons:

- "[it] allows parties flexibility and faster resolution of the matter compared to offline mediation,"
- it provides "savings in cost, time and convenience," and
- it gives the "parties time to fashion their response."[503]

Though, a drawback of online mediation is that it does not capture the "human relational aspect of mediation."[504] Yeoh describes online arbitration "as an arbitration in which all aspects of the proceedings are conducted online," with the disputants generally sometimes interacting via video conferencing, but more often than not simply submitting evidentiary documents to the arbitrator, receiving feedback, and then the arbitrator's decision.[505] Online arbitration provides the same advantages and disadvantages of online mediation, but there is less of a concern over the human relational aspect since the disputants rarely directly interact in traditional arbitration.[506]

Yeoh, than transitions to discuss blockchain-based arbitration as the ADR choice for smart contract-related disputes, especially in the case of complex smart contracts.[507] Yeoh highlights two blockchain-based ADR organizations, CodeLegit and Coopérative Kleros (Kleros) as pioneering blockchain-based ADR.[508] Yeoh highlighted two issues that might prevent blockchain-based arbitration from replacing traditional arbitration.[509] First, certain national legislatures may not recognize smart contracts as contracts under their contract law framework, and the difficulty of translating legal contracts into smart contracts.[510] Second, whether including an arbitral clause in a smart contract will satisfy a legal requirement of an arbitration clause be in writing.[511] Though, these two issues can be avoided with a Ricardian Contract.[512] An interesting issue Yeoh raised with

[497] Ibid.
[498] Ibid.
[499] Ibid.
[500] Jørgen Svennevik Notland, Jakob Svennevik Notland, and Donn Morrison. *The Minimum Hybrid Contract (MHC): Combining legal and blockchain smart contracts*. 2020. arXiv: 2002.06850 [cs.CY].
[501] Derric Yeoh. *Is Online Dispute Resolution The Future of Alternative Dispute Resolution?* en-US. Mar. 2018. URL: http://arbitrationblog.kluwerarbitration.com/2018/03/29/online-dispute-resolution-future-alternative-dispute-resolution/ (visited on 12/19/2019).
[502] Ibid.
[503] Ibid.
[504] Ibid.
[505] Ibid.
[506] Ibid.
[507] Ibid.
[508] Ibid.
[509] Ibid.
[510] Ibid.
[511] Ibid.
[512] Supra Section 5.9.

Kleros is that since jurors in Kleros court can only consider blockchain transactions as evidence, then any decision rendered by the Kleros court "may be refused recognition and enforcement under Article V(1)(b) of the New York Convention for not giving the party the opportunity to present its case."[513]

Kleros ADR Protocol

Coopérative Kleros (Kleros) is a French cooperative that is developing an open source, decentralized ADR system ("Kleros Court") and escrow service on the Ethereum blockchain to resolve disputes (generally with a focus on disputes arising from, or related to, smart contracts).[514] Kleros Court is a crowdsourced juror system which incentivizes people to become jurors with cryptoeconomic schemes (i.e., game theory) where jurors (who must purchase Kleros' PNK tokens to participate in Kleros Court) earn arbitration fees for ruling on disputes, dependent on the juror's good or bad behavior.[515]

The Kleros Court adjudication process comprised of seven (7) components:

1. "Contract,
2. Securing Evidence,
3. Jury Selection,
4. Analysis,
5. Voting,
6. Appeal, [and]
7. Token Redistribution."[516]

The Contract component requires the parties to voluntary opt-in to resolving their dispute on Kleros Court, decide the subcourt to hear their dispute, and to pay a deposit fee to cover juror's fees.[517] The Securing Evidence component requires the parties to submit evidence to Kleros via public key cryptography.[518]

The Jury Selection component is made up of two parts, self-selection and sortition.[519] A candidate self-selects to be a juror in a specific subcourt by depositing a "reputation token called pinakion (PNK)" with the subcourt.[520] "The probability [of being drawn] as [a] juror is [positively] proportional to the [deposit amount]."[521] Sortition describes the process of how juries are selected for specific disputes.[522] In Kleros Court, juries are randomly selected from the juror pool (candidates who have self-selected to be jurors) for a specific subcourt.[523] Each juror's voting power, and the amount of tokens they will win or lose as a result of voting, in a dispute depends on the number of times they are drawn (i.e., the number of times their PNK tokens were randomly selected) for a dispute.[524]

[513] Yeoh, *Is Online Dispute Resolution The Future of Alternative Dispute Resolution?*

[514] Nick Sawinyh. *Kleros - decentralized court system to adjudicate smart contracts*. en. Nov. 2019. URL: https://defiprime.com/kleros (visited on 12/11/2019); *About Us*. URL: https://kleros.io/about/ (visited on 12/11/2019).

[515] Sawinyh, *Kleros - decentralized court system to adjudicate smart contracts*; *About Us*.

[516] Federico Ast. *Kleros, a Protocol for a Decentralized Justice System*. en. Jan. 2018. URL: https://medium.com/kleros/kleros-a-decentralized-justice-protocol-for-the-internet-38d596a6300d (visited on 12/12/2019).

[517] Ibid.

[518] Ibid.

[519] Ibid.

[520] Ibid.

[521] Ibid.

[522] Ibid.

[523] Ibid.

[524] ibid. ("Jury selection is done randomly among all the users that activated their pinakion in a subcourt. Theoretically a candidate may be drawn more than once for a specific dispute. The amount of times a user is drawn for a dispute (called its weight) will define the number of votes he will get in the dispute and the amount of tokens he will win or lose as a result of his vote. Imagine that 6 token owners signed up for the dispute and activated 10,000 in total with the following distribution: For a dispute that requires 5 votes, 5 tokens are drawn out of the 10,000 that were activated. The drawn tokens are number 2519, 4953, 2264, 3342 and 9531. The token owners B, C and F are drawn with a weight of 1. The token owner D is drawn with a weight of 2. Activated pinakion will be frozen during the court session and will be unfrozen after the court has reached a verdict.").

In the Analysis component, jurors can assess evidence and vote on decisions pursuant to the subcourt's rules and procedures.[525]

In the Voting component, jurors are required to cast their votes on issues presented in the case.[526] All votes cast are final, and jurors must provide a justification for their vote.[527] Juror votes are hidden from other jurors during this process and are only revealed after the final decisions has been entered.[528] The winning option is based on the median of the votes.[529] "Any option below the median will be vetoed by more than half of the voters (the upper half), and the same will happen with options above the median (and the lower-half of voters)."[530]

In the Appeal component, the losing party may appeal the jury's decision in the dispute (this may be done several times).[531] In doing so, the losing party must deposit tokens again to pay for arbitration fees, with the cost of appeal calculated as the arbitration fee multiplied by the number of jurors.[532] In each appeal, the number of jurors is doubled plus one from the previous instance, thus, the cost of appeal becomes cost prohibitive in the long run for the losing party.[533]

In the Token Redistribution component, after a decision has been made, jurors will "gain or lose [PNK] depending on whether their vote was coherent with the rest [(i.e., whether their vote was within the 25 -75th percentile of the vote distribution]."[534] If the juror's vote is outside the 25-75th percentile, then their PNK will be transferred to the jurors who voted in the 25-75th percentile. Regardless of their vote, jurors will receive arbitration fees equally.[535]

For subcourt parameters (very much needed depending on the type of dispute), token holders "have the right to make a number of decisions affecting ... subcourts ... include[ing] policies, session time, arbitration fees, maximum number of jurors drawn and minimum number of tokens activated."[536]

Given the unclear nature of blockchain-based arbitration, it is possible that Kleros may or may not be a valid venue for ADR under the United Nations Commission on International Trade Law's (UNCITRAL) model law on international commercial arbitration? In Dmitry Narozhny's analysis, Kleros satisfies the necessary criteria to be considered an arbitration venue under the model law.[537] Narozhny analyzed two pertinent questions to reach the above conclusion:

1. does Kleros conform to the law? and
2. "[w]ould a court recognize a Kleros ruling?"[538]

Narozhny answered affirmatively to the first question because "UNCITRAL principles explicitly preserve parties' full freedom to determine the rules of arbitration procedure on their own" and Kleros complies with core principles of due process.[539] Narozhny answered affirmatively to the second question as well because Kleros is a self-enforcing arbitration method, and a subsequent review and refusal of a Kleros decision under the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards is unlikely to occur because "procedural grounds to refusal are mitigated in advance by Kleros' protocol design."[540]

[525] Ibid.
[526] Ibid.
[527] Ibid.
[528] Ibid.
[529] Ibid.
[530] Ibid.
[531] Ast, *Kleros, a Protocol for a Decentralized Justice System*.
[532] Ibid.
[533] Ibid.
[534] Ibid.
[535] Ibid.
[536] Ibid.
[537] Dmitry Narozhny. *Is Kleros Legally Valid as Arbitration?* en. June 2019. URL: http://blog.kleros.io/is-kleros-legally-valid-as-arbitration/ (visited on 12/11/2019).
[538] Ibid.
[539] Ibid.
[540] ibid. ("[P]rocedural grounds [for] refusal: incapacity, lack of jurisdiction, lack of proper notice, tribunal not composed according to

1.7.6 Legal Engineering

Token engineering can be defined as the practice of designing token economic systems (aka token systems) built on Web3 technologies through rigorous engineering practices (though, Web3 technologies are not required).[541] Token engineering can be subdivided into four disciplines:

1. Technical Engineering,
2. Economic Engineering,
3. Legal Engineering, and
4. Ethical Engineering.[542]

All four disciplines are required to design an effective token economic system.[543] For our research purposes, we shall only discuss legal engineering. For more information on token engineering, please refer to Shermin Voshmgir's *How do Design a Token System* and her book, *Token Economy* (2nd edition).[544] Legal engineering, as described by Voshmgir, is the practice of tokenizing traditional governance and business models through Web3 technologies (e.g., "smart contracts replac[ing] many of the existing human/paper/client-server based operations") to be compliant with the applicable laws, rules and regulations of a jurisdiction(s).[545] Legal engineering plays a larger role in the design of simple token economic systems ("The term "simple" [a]s used in the "complex systems" domain."), which are systems where the "dynamics of the business or governance models of ... tokens is well known," such as "(i) central bank money, (ii) securities and other assets, (iii) identification and certification processes, (iv) voting rights, (v) vouchers and coupons or (vi) entry tickets and other access rights."[546]

1.8 Value Web Perspective

Derek Sellin and Timo Seppälä in *Digital Music Industry – Background Synthesis* synthesized the current state of the music industry with the factors that have led to a lack of transparency and complexity in the industry.[547] Sellin and Seppälä frame their synthesis from the viewpoint of musicians, a central stakeholder that is concerned with inadequate royalty rates and a lack of transparency from streaming services as streaming services have finally raised revenue for the digital music industry for the first time since the 1990s.[548]

The ire over royalties is very apparent for musicians, especially for composers because musicians do not receive royalties until the end of the following year, or even later.[549] Other than delayed payment, there is also the issue of black box royalties, royalties held by entities on behalf of an unidentified rightsholder, that are "distributed arbitrarily, according to the market share of known rights holders."[550]

Sellin and Seppälä articulated a non-exhaustive list of reasons why black boxes may occur:

- "the inability to identify rights holders despite payments made for the use of their compositions;
- "the lengthy time required for filing domestic and ultimately international copyrights, often begun only when a recording is actually released";

arbitration agreement, non-arbitrability of subject-matter, right to present a case, right to be heard and right to present an evidence and defences.").

[541] Shermin Voshmgir. *How do Design a Token System*. en. Mar. 2020. URL: https://medium.com/@sherminvoshmgir/how-do-design-a-token-system-6a19e73c56f3 (visited on 05/12/2020).

[542] Ibid.

[543] Ibid.

[544] Ibid.

[545] Ibid.

[546] Ibid.

[547] Derek Sellin and Timo Seppälä. "Digital Music Industry – Background Synthesis". In: *ETLA Working Paper* (Feb. 2017).

[548] Ibid.

[549] Ibid.

[550] Ibid.

- "multiple claims for the same rights exceeding 100% of ownership, resulting in indefinite disputes";
- "international collaborations with less than all creators asserting their rights";
- "international legal inconsistencies regarding what type of performances result in payments (most visible in the fact that radio play does not generate royalties for recording artists in the United States)"; and
- "the slow and often manual processes to report usage and clear payments under international reciprocal agreements."[551]

Sellin and Seppälä discussed that the issues described above cannot be remedied by technology yet, but applying better record keeping and rights data sharing methods with real-time consumption data among stakeholders would greatly improve the speed and completeness of royalty payments to musicians.[552]

Sellin and Seppälä outlined the music industry in a layered approach to weave through the industry's complexity.[553] Sellin and Seppälä divided the music industry into three layers:

1. Ownership Data (Layer 1),
2. Consumption Data (Layer 2), and
3. Payment Systems (Layer 3).[554]

Sellin and Seppälä describe the current state of the music industry in Layer 1.[555] Sellin and Seppälä further delineated the scope of Layer 1 into three sub-layers:

1. Future Music,
2. All Formats, and
3. Royalty Rates.[556]

Future Music covers the creation of new music and systems built for new music.[557] All Formats covers underlying ownership, consumption and payment issues for physical and digital formats.[558] Royalty Rates covers solutions that increase the efficiency of royalty payments and enable direct licensing schemes.[559]

Sellin and Seppälä also discussed the sources of complexity in the music industry.[560] A major source of complexity in the music industry is the constant reaction to technological innovations, and correcting for perceived market abuses.[561] The reaction to technological innovations and perceived market abuses led to the rise of Collective Management Organizations (CMOs), and subsequent legislation and regulation to protect copyright holders.[562] The complexity is evident in the United States, and even more so when considering the global music.[563]

In describing the global music industry value web, Sellin and Seppälä created a generalized model describing two (2) copyrights (musical composition and sound recording), three (3) licenses (performance, mechanical, sound

[551] Sellin and Seppälä, "Digital Music Industry – Background Synthesis".
[552] Ibid.
[553] Ibid.
[554] Ibid.
[555] Ibid.
[556] Ibid.
[557] Ibid.
[558] Ibid.
[559] Ibid.
[560] Ibid.
[561] Ibid.
[562] Ibid.
[563] Ibid.

recording/neighboring rights), and their functional roles.[564] Sellin and Seppälä discussed the general functions of each copyright in its lifecycle from creation-to-consumption.[565]

In the Musical Composition[566] Copyright section of the value web, Sellin and Seppälä described the functions as follows:

- Songwriters create and copyright original musical works;
- Songwriters assign the copyright in the original musical work to Publishers;
- Publishers promote the use of Songwriters' musical works in exchange for fifty percent (50%) of licensing revenue; and
- Rights Societies (aka CMOs) track and estimate public performances of Songwriter's musical works to collect and distribute royalties to Songwriters and Publishers.[567]

In the Sound Recording Copyright section of the value web, Sellin and Seppälä described the functions as follows:

- Recording Artists (including performer and producers) create a recording of a performance of a musical work, generally on behalf of a record label, in exchange for royalties on sales;
- Labels fund the recording of a performance of a musical work, promote and distribute the sound recording through sales channels, and pay sound recording royalties to Recording Artists and composition royalties to CMOs; and
- Distributor/Aggregator distributes sound recordings through physical and/or digital distribution channels on the behalf of Labels.[568]

In the Consumption section of the value web, Sellin and Seppälä described the functions as follows:

- Performance Use of a musical composition requires a license from a Songwriter (or Publisher or CMO) where music is broadcasted or consumed in a public forum;
- Mechanical Use of a musical composition requires a license from a Songwriter (or Publisher or CMO) when a music recording is available for purchase; and
- Sound Recording/Neighboring Rights requires a license whenever a sound recording is used for commercial purposes. Neighboring Rights are rights distinct from the Songwriter of the musical work, and generally also requires a license.[569]

Sellin and Seppälä shortly discussed the payment flows from the end user to rightsholders in the music industry.[570] Citing to Berklee College of Music's Rethink Music project, Sellin and Seppälä mentioned eight (8) unique scenarios for payment flows in the United States, each with "its own delays, its own information & reporting standards, and its own commissions."[571] Additional factors that amplify the complexity of the value web are:

- poor metadata identifier and transmission standards;
- incompatible rights databases among stakeholders;
- "error-prone and labor-intensive human processes"; and

[564] Ibid.
[565] Sellin and Seppälä, "Digital Music Industry – Background Synthesis".
[566] Ibid. (Musical Composition is defined as "the creative output of songwriters, lyricists, composers, and arrangers.").
[567] Ibid.
[568] Ibid.
[569] Ibid.
[570] Ibid.
[571] Sellin and Seppälä, "Digital Music Industry – Background Synthesis".

- the numerous relationships between musical compositions and sound recordings (multiple parties involved).[572]

Sellin and Seppälä then identified the following inefficiencies in the current infrastructure that contribute to black boxes and slow royalty payments:

- database replication: stakeholders do not share one common database for rights data (thus, stakeholders must replicate the same rights data in each of their private databases);
- manual matching: CMOs needing to identify relevant foreign CMO to collect royalties from, and manually synchronize their databases;
- identification codes: multiple standards that may or may not be applicable to identify a musician; and
- metadata: commercial databases for mapping artists to works does not exist, commercial databases are "voluntary, incomplete and centralized by a single commercial entity," and the metadata in the music file can be modified later.[573]

Sellin and Seppälä summarized the features the music industry lacks as the following:

- "[e]fficient processes for sharing comprehensive rights data";
- "[s]ystematic adherence to rich metadata standards";
- "[s]calable systems for the growing pace of digital music releases and detailed per-stream reporting"; and
- "[w]illingness to share rights and reporting data openly with others in the industry."[574]

Lastly, Sellin and Seppälä recommend that any proffered solution to the issues in the music industry should meet the four following requirements:

1. "[i]t must be proven to be more efficient than the current system, or else payments to creators will, by necessity, decrease";
2. "[i]t must be scalable to handle the demands of both the pace of digital music releases and the growth of global per-stream consumption data";
3. "[i]t must embrace common standards, enabling interoperability and selective sharing of data"; and
4. "[i]t must recognize the reality of a fundamental lack of trust within the industry, or the resistance by many to reveal data, even that which simply represents factual 'musical historical events.'"[575]

[572] Ibid.
[573] Ibid.
[574] Sellin and Seppälä, "Digital Music Industry – Background Synthesis".
[575] Ibid.

2 Music Industry Supply Chain and Work Registration Standards

DDEX, formed in 2006 as the "Digital Data Exchange," is a consortium of media-related companies developing digital supply chain standards for use among music industry stakeholders.[576] In 2008, DDEX developed and released its digital supply chain standard, a standardized eXtensible Markup Language (XML) format for transmitting information between parties (generally business-to-business).[577] DDEX's supply chain standard has been adopted all across the music industry ("digital retailers, digital distributors and aggregators, record companies, music rights societies and various technical service providers"), with "more than 3,500 implementation licences [] issued."[578] DDEX's supply chain standards generic enough so that it can be adapted to other digital supply chains.[579] DDEX offers an implementation license that allows the implementation of the DDEX supply chain standards via an application programming interface (API)."[580] DDEX implements its standards similar to W3C, such that anyone may become a contributor to the standards by joining as a member, but differs from W3C in that its standards are not publicly available.[581]

The Common Works Registration (CWR) standard is a supply chain standard developed by performance rights organizations and music publishers, and maintained by the International Confederation of Societies of Authors and Composers (CISAC).[582] The CWR is a standard format, that provides the necessary data required for registering and revising works with performance rights organizations or mechanical rights organizations.[583] Additionally, the standard allows for tracking and facilitating the transfer of musical works "between publishers and societies."[584] CISAC also maintains the International Standard Work Code (ISWC) for musical works in ISO 15707.[585] ISWC is the international standard for identifying a musical work.[586] The minimum descriptive metadata required for a ISWC is:

- "the title of the work,
- all composers, authors and arrangers of the work identified by their IPI numbers and role codes,
- the work classification code (from the CIS standards list), [and]
- in the case of 'versions', for example arrangements, identification of the work from which the version was made."[587]

The International Standard Recording Code (ISRC) is an international standard for identifying sound and music video recordings.[588] The ISRC is comprised of the following elements, in the following order:

[576] Michael Petychakis. *DDEX: AN API for the Music Industry*. en-US. June 2018. URL: https://apilama.com/2018/06/25/ddex-api-music-industry-technology/ (visited on 12/18/2019); *About DDEX*. en-US. URL: https://ddex.net/about-ddex/ (visited on 12/18/2019).

[577] Petychakis, *DDEX*; *About DDEX*.

[578] Petychakis, *DDEX*; *About DDEX*; . *Frequently Asked Questions*. en-US. URL: https://ddex.net/implementation/frequently-asked-questions/ (visited on 12/18/2019).

[579] *About DDEX*.

[580] Petychakis, *DDEX*.

[581] Petychakis, *DDEX*; *About DDEX*.

[582] *MusicMark*. URL: https://www.musicmark.com/ (visited on 12/18/2019).

[583] *MusicMark*; *Common Works Registration User Manual*. User Manual CWR11-1494. Confederation of Societies of Authors and Composers (CISAC), Sept. 2011, pp. 1–54. URL: https://musicmark.com/documents/cwr11-1494_cwr_user_manual_2011-09-23_e_2011-09-23_en.pdf.

[584] *Common Works Registration User Manual*.

[585] François Nuttall. *PRIVATE COPYRIGHT DOCUMENTATION SYSTEMS AND PRACTICES: COLLECTIVE MANAGEMENT ORGANIZATIONS' DATABASES (PRELIMINARY VERSION)*. tech. rep. World Intellectual Property Organization (WIPO), Sept. 2011, pp. 1–34. URL: https://www.wipo.int/export/sites/www/meetings/en/2011/wipo_cr_doc_ge_11/pdf/collective.pdf.

[586] *Frequently Asked Questions*. publisher: International Confederation of Societies of Authors and Composers. URL: http://www.iswc.org/en/faq.html (visited on 10/12/2019).

[587] *Frequently Asked Questions*.

[588] *ISRC - International Standard Recording Code*. publisher: International Standard Recording Code. URL: https://www.usisrc.org/ (visited on 12/18/2019).

- "Country Code",
- "Registrant Code",
- "Year of Reference", and
- "Designation Code."[589]

"The Country Code identifies the country of residence of the registrant."[590] "The Registrant Code identifies the entity assigning the Designation Code in an ISRC."[591] "The Year of Reference Element identifies the year in which the ISRC is allocated to the recording."[592] "The Designation Code consists of five digits assigned by the Registrant."[593]

The International Standard Name Identifier (ISNI) is an international standard for public identification of contributors to creative works.[594] A creative seeking an ISNI will have to contact an ISNI Registration Agency to obtain an ISNI from the ISNI International Agency.[595]

[589] *International Standard Recording Code (ISRC) Handbook*. 3rd. International ISRC Agency (IFPI Secretariat), 2009. URL: https://www.ifpi.org/content/library/isrc_handbook.pdf.
[590] Ibid.
[591] Ibid.
[592] Ibid.
[593] Ibid.
[594] *About the ISNI International Agency*. URL: http://www.isni.org/about (visited on 12/18/2019).
[595] *ISNI | ISNI Registration Agencies*. URL: http://www.isni.org/content/isni-registration-agencies (visited on 12/18/2019).

3 Legal Frameworks Primer

In discussing the background on our research topic, we also decided to include a primer on the relevant legal frameworks applicable to music licensing. The legal frameworks primer will provide basic information on:

- International copyright treaties;
- United States of America (USA) legal frameworks;
- European Union (EU) legal frameworks; and
- Alternative dispute resolution.

This primer is intended to provide further clarity on the legal frameworks applicable to music licensing, and the extent of the legal complexity of music licensing for non-legal audiences. We chose the USA and EU because the majority of automation approaches (projects, organizations, technologies, etc.) are based in these two geographical areas, and the USA, France and Germany (EU member-states) are in the top five (5) largest music markets in the world (as of 2018).[596]

3.1 International Copyright Treaties

International copyright has been heavily shaped by the following non-exhaustive list of treaties and agreements:

- the Berne Convention for the Protection of Literary and Artistic Works, first accepted in Berne, Switzerland, in 1886;
- the Universal Copyright Convention, adopted in Geneva, Switzerland, in 1952, then amended in Paris, France, 1971;
- the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations, Rome, Italy, 1961;
- the Geneva Convention for the Protection of Producers of Phonograms Against Unauthorized Duplication of Their Phonograms, Geneva, 1971;
- the World Intellectual Property Organization (WIPO) Copyright Treaty, 1996, under the Berne Convention;
- the WIPO Performances and Phonograms Treaty, 1996;
- the Agreement on Trade-Related Aspects of Intellectual Property Rights (the TRIPS Agreement), 1995, within the World Trade Organization (WTO); and
- the Beijing Treaty on Audiovisual Performances, 2012.[597]

Treaties and international agreements provide minimum legal standards that the international parties to these acts (i.e., member-states) must comply with on a national level.[598] Setting an international framework for copyright was necessary to secure interests of the right owners across national borders.[599] Thus, international treaties help avoid major discrepancies between jurisdictions, allowing for a better exchange - of goods, services, art and ideas. However, it is often argued that, these international treaties, some of which are over 100 years old, are ill-equipped to deal with the challenges and opportunities presented by technology today.

[596] *Global Music Report 2019: State of the Industry*. Tech. rep. The International Federation of the Phonographic Industry (IFPI), Apr. 2019, p. 40. URL: https://www.ifpi.org/news/IFPI-GLOBAL-MUSIC-REPORT-2019.

[597] *International Issues | U.S. Copyright Office*. URL: https://www.copyright.gov/international-issues/ (visited on 10/12/2019).

[598] *IP-related Multilateral Treaties: World Trade Organization (WTO) - Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) (1994)*. en. URL: https://www.wipo.int/treaties/en/text.jsp?file_id=305907 (visited on 10/12/2019).

[599] Ibid.

The international copyright treaties that have had the most influence in the past 100 years are the Berne Convention, Universal Copyright Convention, WIPO Copyright Treaty (WCT), and the TRIPS Agreement.[600] The Berne Convention requires contracting states to abide by three basic principles and provide minimum protections to copyrighted works of other contracting states.[601] The three basic principles are:

- "[w]orks originating in one of the Contracting States must be given the same protection in each of the other Contracting States as the latter grants to the works of its own nationals";
- "[p]rotection must not be conditional upon compliance with any formality"; and
- "[p]rotection is independent of the existence of protection in the country of origin of the work."[602]

The minimum protections required by contracting states are:

- Providing protection for artistic, literary, and scientific works; and
- The following exclusive rights of authors:
  - "the right to translate,
  - the right to make adaptations and arrangements of the work,
  - the right to perform in public dramatic, dramatico-musical and musical works,
  - the right to recite literary works in public,
  - the right to communicate to the public the performance of such works,
  - the right to broadcast,
  - the right to make reproductions in any manner or form,
  - the right to use the work as a basis for an audiovisual work, and the right to reproduce, distribute, perform in public or communicate to the public that audiovisual work."[603]

The Berne Convention also provides moral rights for authors.[604] Lastly, the Berne Convention requires duration of copyright to last for at least fifty (50) years.[605]

The WCT is an agreement under the Berne Convention that requires contracting states to adopt national legislation that protects computer programs and compilations of data as copyrightable.[606] The WCT recognizes the rights of 1) distribution, 2) rental, and 3) communication to the public, in addition to the rights granted under the Berne Convention.[607] The WCT is an agreement under the Berne Convention that obliges contracting states to adopt national legislation that provides legal remedies against circumvention of technological measures and removal or alternation of rights information.[608]

The Universal Copyright Convention (UCC) is an alternative copyright convention to the Berne Convention developed by the United Nations Educational, Scientific and Cultural Organization, primarily for developing countries.[609] The main features of the UCC are:

[600] *International Issues | U.S. Copyright Office*.
[601] *Summary of the Berne Convention for the Protection of Literary and Artistic Works (1886)*. en. URL: https://www.wipo.int/treaties/en/ip/berne/summary_berne.html (visited on 10/12/2019).
[602] Ibid.
[603] Ibid.
[604] Ibid.
[605] Ibid.
[606] *Summary of the WIPO Copyright Treaty (WCT) (1996)*. en. URL: https://www.wipo.int/treaties/en/ip/wct/summary_wct.html (visited on 10/12/2019).
[607] Ibid.
[608] *Summary of the WIPO Copyright Treaty (WCT) (1996)*.
[609] *Universal Copyright Convention as revised at Paris on 24 July 1971, with Appendix Declaration relating to Article XVII and Resolution concerning Article XI*. URL: http://portal.unesco.org/en/ev.php-URL_ID=15241&URL_DO=DO_TOPIC&URL_SECTION=201.html (visited on 10/12/2019).

- contracting states should not accord domestic authors more protection than authors of other contracting states;
- "a formal copyright notice must appear in all copies of a work";
- copyright duration must be the life of the author plus twenty-five (25) years; and
- all contracting states must grant "an exclusive right of translation for a seven-year period, subject to a compulsory license under certain circumstances for the balance of the term of copyright."[610]

Out of the agreements and treaties listed above, the TRIPS Agreement is considered the most comprehensive.[611] The TRIPS Agreement supports the rules set out previously in the Berne Convention and the Paris Convention.[612] The rules laid out in the TRIPS Agreement relevant to copyright are:

- constraining national exceptions to copyright law under Article 9(2) (i.e., the Berne three-step test)
- computer programs are protected as literary works under the Berne Convention
- compilations of data are protected as copyrightable
- duration of copyright must be fifty (50) years unless calculated based on the life of the author.[613]

3.2 United States of America (USA)

3.2.1 Copyright Law

General Copyright Law

Under Article I, Section 8, Clause 8 of the United States Constitution, Congress has the enumerated power to legislate concerning copyright and patents. Pursuant to its enumerated power, Congress has passed multiple acts related to copyright, with the Copyright Act of 1976 being the most recent version.[614] Under the Copyright Act, only "works of original authorship" can receive federal protection.[615] To receive federal protection, a work must satisfy three elements.[616] First, there must be a human author (i.e., a human being creates the work).[617] Second, the work must be original, i.e., it must exhibit a minimal degree of creativity.[618] Third, the work must be fixed in a tangible medium of expression, such that it may be "perceived, reproduced, or communicated for more than a short time."[619] If all three conditions are met, the author's copyright in the work is automatic, i.e., no formalities such as registering with the Copyright Office is required.[620]

Under 17 U.S.C. § 102, the types of works eligible for copyright protection are:

- "literary works;
- musical works, including any accompanying words;
- dramatic works, including any accompanying music;
- pantomimes and choreographic works;

[610] *Universal Copyright Convention*. en. URL: https://www.britannica.com/topic/Universal-Copyright-Convention (visited on 10/12/2019).
[611] *IP-related Multilateral Treaties*.
[612] Ibid.
[613] Ibid.
[614] *Circular 1 Copyright Basics*. URL: https://www.copyright.gov/circs/circ01.pdf.
[615] Ibid.
[616] Ibid.
[617] Ibid.
[618] Ibid.
[619] *Circular 1 Copyright Basics*.
[620] Ibid.

- pictorial, graphic, and sculptural works;
- motion pictures and other audiovisual works;
- sound recordings; and
- architectural works."[621]

An author under 17 U.S.C. § 106 is granted an exclusive bundle of rights and may have more rights depending on the type of work.[622] The six rights granted under 17 U.S.C. § 106 are:

1. to reproduce the copyrighted work in copies or phonorecords;
2. to prepare derivative works based upon the copyrighted work;
3. to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending;
4. in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly;
5. in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly; and
6. in the case of sound recordings, to perform the copyrighted work publicly by means of a digital audio transmission.[623]

Additionally, an author may have additional rights such as moral rights under the Visual Artists Rights Act (VARA), specifically the right to attribution and integrity, if their work can be described as a work of visual art under 17 U.S.C. § 101.[624] However, rights under copyright are limited by defenses such as fair use, antitrust law and freedom of expression, case law, and other specific limitations under the Copyright Act.[625] Specific to sound recordings, 17 U.S.C. § 114 limits the scope of rights granted under § 106.[626]

Copyright duration, as of the Sonny Bono Copyright Term Extension Act of 1998 that amended the Copyright Act of 1976, is the life of the author plus seventy (70) years.[627] For works created on or after January 1, 1978, the duration of copyright is the life of the author plus seventy (70) years.[628] Copyright in the USA is under an international exhaustion scheme since the United States Supreme Court determined in *Kirtsaeng v. John Wiley & Sons, Inc.* that the first sale of an authorized copy of a work in any market in the world will exhaust the author's right to control further disposition of that copy.[629] An author is not required to undergo any formalities to obtain copyright to a work, but registration with the US Copyright Office provides certain litigation advantages.[630] Any right under copyright may be transferred or licensed to a third party (as a whole or percentage), and such transfer or license need not be recorded with the U.S. Copyright Office.[631] Only exclusive agreements are required to be written and signed by the transferor or their authorized agent.[632]

Because the research topic of this report is automated music licensing, we shall specifically mention copyright as it relates to musical works (composition, sound recordings, streaming, etc.).[633] For musical works, there are two

[621] Ibid.
[622] Ibid.
[623] Ibid.
[624] 17 U.S.C. §106A
[625] *Circular 1 Copyright Basics*.
[626] Ibid.
[627] Ibid.
[628] Ibid.
[629] 568 US 519 (2013);ibid.
[630] Ibid.
[631] Ibid.
[632] *Circular 1 Copyright Basics*.
[633] *Circular 56 Copyright Registration of Musical Compositions and Sound Recordings*. URL: https://www.copyright.gov/circs/circ56.pdf.

primary copyrights, one in the musical composition (e.g., sheet of music), and one in the sound recording.[634] The musical composition refers to the music ("melody, rhythm, and/ or harmony expressed in a system of musical notation") and lyrics of a composition, while a sound recording refers to the fixation of a performance of a musical composition.[635] The sound recording of the musical composition is often referred to as the "master."[636] Under 17 U.S.C. § 101, phonorecords are defined as "material objects in which sounds, other than those accompanying a motion picture or other audiovisual work, are fixed by any method now known or later developed, and from which the sounds can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device." Phonorecords includes "the material object in which the sounds are first fixed." The distinction between musical composition and sound recording is very important because the rights granted under copyright differs between the two. For example, only the copyright holder of a sound recording has the exclusive right to publicly perform a sound recording by means of a digital audio transmission.[637]

Digital Millennium Copyright Act

The Digital Millennium Copyright Act (DMCA) of 1998 is an act that prohibits the circumvention of technological measure, or the trafficking of such technological measures, put into place by a copyright holder, to prevent unauthorized access to a copyrighted work (i.e., access controls), or that affects the copyright holder's exclusive rights under the Copyright Act (i.e., copying controls).[638] The DMCA provides legal protection against copyright infringement on for internet service providers (ISPs) if the ISP qualifies for one of four safe harbor categories under 17 U.S.C. § 512(a)-(d).[639]

For an ISP to avail themselves of any safe harbor category, they must meet the following criteria:

- Qualify as a service provider under 17 U.S.C. § 512(k)(1)(B),
- Meet conditions of eligibility under 17 U.S.C. § 512(i), including having a repeat infringer policy,
- Accommodate standard technical measures implemented by copyright holders/owners, and
- Meet the specific requirements of a safe harbor category.[640]

The Librarian of Congress can promulgate regulations to exempt classes of works from anti-circumvention rules if it would adversely affect users' ability to make non-infringing uses of such works under.[641] Under the DMCA, copyright holders can send a notice-and-takedown to an ISP to remove certain infringing content on the ISP's website.[642]

Music Modernization Act

The Music Modernization Act (MMA) of 2018 passed into public law three separate acts as titles:

1. The Music Modernization Act (Title I),
2. Compensating Legacy Artists for their Songs, Service, & Important Contributions to Society (CLASSICS) (Title II), and

[634] Ibid.
[635] Ibid.
[636] *Music Copyrights 101 - Protect and Copyright Your Music*. en-US. URL: https://www.tunecore.com/guides/copyrights-101 (visited on 10/12/2019).
[637] 17 U.S.C. § 106(6)
[638] 17 U.S.C. § 1201;*Section 1201 Study | U.S. Copyright Office*. URL: https://www.copyright.gov/policy/1201/ (visited on 10/12/2019);2019); Compare MDY INDUSTRIES, LLC v. Blizzard Entertainment, Inc., 629 F. 3d 928 (9th Cir. 2010) with Chamberlain Group, Inc. v. Skylink Techs., Inc., 381 F.3d 1178 (Fed.Cir.2004); *Overview*. en. URL: https://dmca.harvard.edu/pages/overview (visited on 10/12/2019)
[639] Viacom Int'l, Inc. v. YouTube, Inc., 676 F. 3d 19, 27 (2d Cir. 2010).
[640] Viacom Int'l, Inc. v. YouTube, Inc., 676 F. 3d 19, 27 (2d Cir. 2010).
[641] 17 U.S.C. § 1201(a)(1)(C).
[642] 17 U.S.C. § 1201

3. The Allocation for Music Producers (AMP) Act (Title III).[643]

The MMA primarily amended Sections 114 and 115 of the Copyright Act.[644] Title I of the MMA amended Section 115 to replace the bulk Notice Of Intent (NOI) with a Mechanical Licensing Collective (MLC), a non-government agency which will act as the respondent for mechanical licensing requests, collection of mechanical royalties from digital downloads and digital streaming, and distributor of such royalties to licensors.[645] Title I of the MMA also creates a song ownership database that is "transparent and publicly accessible," allow publishers to claim missing royalties based on songs in the database, and an audit right for songwriters and publishers.[646] The database will be funded by digital streaming services.[647] Title I amended the rate setting dispute procedure (process for royalty rate disputes), so that instead of only one judge in the Southern District of New York overseeing the dispute, "a district judge in the Southern District of New York would be randomly assigned from the wheel of district judges for rate setting disputes" (aka "wheel" approach) .[648] Title I amended Section 115 to require the Copyright Royalty Board, the administrative judges who "determine and adjust royalty rates and terms applicable to the statutory copyright licenses," to use the "willing buyer/willing seller" (fair market value) standard for determining rates, for all online music platforms.[649] Lastly, Title I of the MMA repealed 17 U.S.C. § 114(i) to allow rate court judges to "consider royalties paid to recording artists when determining what streaming services will pay songwriters for the exact same performance" as evidence in setting performance royalty rates for songwriters and composers.[650]

Title II of the MMA granted federal copyright protection for public performance of sound recordings fixed pre-1972 and granting protection until 2067.[651]

Title III of the MMA granted licensing collectives the ability to follow a letter of direction from a musician to distribute royalties for a sound recording "to a producer, mixer, or sound engineer who was part of the creative process that created the sound recording."[652]

3.2.2 Contract Law

We shall provide a very brief introduction to the core elements of USA contract law because other than intellectual property law, music licenses are also subject to contract law. The basic topics discussed here are also discussed in greater detail by Giancaspro.[653]

At common law in the United States, a contract is a legally enforceable set of promises between two or more parties.[654] A legally enforceable contract requires three elements:

[643] *Overview of the Music Modernization Act*. URL: https://lieu.house.gov/sites/lieu.house.gov/files/Overview%5C%20of%5C%20the%5C%20Music%5C%20Modernization%5C%20Act.pdf; Dani Deahl. *The Music Modernization Act has been signed into law*. en. Oct. 2018. URL: https://www.theverge.com/2018/10/11/17963804/music-modernization-act-mma-copyright-law-bill-labels-congress (visited on 10/12/2019); *The Music Modernization Act*. en. URL: http://www.ascap.com/about-us/stand-with-songwriters (visited on 10/12/2019).

[644] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[645] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[646] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[647] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[648] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[649] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[650] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[651] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*.

[652] *Overview of the Music Modernization Act*; Deahl, *The Music Modernization Act has been signed into law*; *The Music Modernization Act*; *The Fair Play Fair Pay Act*. en-US. URL: https://www.soundexchange.com/advocacy/reintroduction-fair-play-fair-pay-act/ (visited on 10/12/2019).

[653] Supra Section 1.6.2.

[654] *Legal Elements of a Contract*. URL: https://hnr.k-state.edu/doc/rres-690/legalelementsofacontract.pdf.

- offer,
- acceptance, and
- consideration.[655]

An offer is a "manifestation of the "willingness to enter into a bargain so made as to justify another person in understanding that his assent to the bargain is invited and will conclude it."[656] An acceptance "is a manifestation of assent to the terms thereof made by the offeree in a manner invited or required by the offer."[657] At common law, an acceptance is required to mirror the exact terms of the offer (aka the "mirror-image" rule).[658] For a valid offer and acceptance, there must be a meeting of the minds between the parties, such that based on an objective view of the facts, the parties mutually understood and assented to the terms of the agreement.[659] Consideration is a "present exchange bargained for in return for a promise" between the parties that causes a change in the position of the either party. Consideration may be satisfied when a party makes:

- "a promise to do something you're not legally obligated to do, or
- a promise not to do something you have the right to do."[660]

Other than the three basic elements, contract formation also requires the subject matter of the agreement to be sufficiently described.[661]
Uniform Commercial Code Article 2 (UCC Art. 2) is the contract law framework that is generally applicable to contracts between merchants, and between merchants and non-merchants for the sale of goods.[662] Common law is generally applicable to contracts for services and other subject matter not under UCC Art. 2.[663] UCC Art. 2 provides different rules from the common law, such as the abandonment of the "mirror image" rule discussed above for a less stringent acceptance rule.[664] UCC Art. 2 is not applicable to music licenses because copyrighted works are not goods under UCC Art. 2-105 (i.e., since copyrighted works are intangible assets, they are not movable).[665]

3.2.3 Electronic Records & Signatures

At the federal level, Congress has passed the Electronic Records in Global and National Commerce Act ("E-sign") to regulate electronic records and signatures.[666] Under E-sign, electronic signatures are defined as "an electronic sound, symbol, or process, attached to or logically associated with a contract or other record and executed or adopted by a person with the intent to sign the record."[667] Under E-sign, electronic records are defined as "a contract or other record created, generated, sent, communicated, received, or stored by electronic means."[668]

E-sign does not expressly preempt state law in this field, thus forty-seven (47) states have passed their own electronic signatures and records law, namely, a version of the Uniform Electronic Transactions Act (UETA) that is consistent with E-sign.[669] E-sign and UETA's main objective is to give electronic transactions the same

[655] Ibid.
[656] Ibid.
[657] Ibid.
[658] Ibid.
[659] Ibid.
[660] Richard Stim and Attorney. *Consideration: Every Contract Needs It*. en. URL: https://www.nolo.com/legal-encyclopedia/consideration-every-contract-needs-33361.html (visited on 10/12/2019).
[661] *Legal Elements of a Contract*.
[662] *General Obligations under UCC Article 2*. URL: https://saylordotorg.github.io/text_advanced-business-law-and-the-legal-environment/s11-04-general-obligations-under-ucc-.html (visited on 10/12/2019).
[663] Ibid.
[664] Ibid.
[665] Ibid.
[666] Edward Walker. *PRACTICAL GUIDE TO E-SIGN AND THE UNIFORM ELECTRONIC TRANSACTIONS ACT*. 2002. URL: https://cwrolaw.com/wp-content/uploads/2009/08/esign-uniform-electronic-transaction-act.pdf.
[667] 15 U. S. C. §7006(5); ibid.
[668] 15 U. S. C. §7006(4); Walker, *PRACTICAL GUIDE TO E-SIGN AND THE UNIFORM ELECTRONIC TRANSACTIONS ACT*
[669] Ibid.

enforceability and legal interpretation as transactions memorialized on paper.[670] For a valid electronic signature under UETA and E-sign, four requirements must be met:

1. "Intent to sign",
2. "Consent to do business electronically",
3. "Association of signature with the record", and
4. "Record retention."[671]

In the electronic agreement context, the federal courts have had relatively few chances to consider whether a transfer of copyright in an electronic agreement would satisfy 17 U.S.C. § 204(a).[672]

In *Metro. Reg'l Info. Sys., Inc. v. Am. Home Realty Network, Inc.*, the Fourth Circuit Court of Appeals considered whether a transfer of copyright via an electronic agreement satisfies the writing requirement of 17 U.S.C. § 204(a).[673] Specifically, the Court needed to resolve whether "a subscriber, who 'clicks yes' in response to MRIS's electronic TOU prior to uploading copyrighted photographs, has signed a written transfer of the exclusive rights of copyright ownership in those photographs consistent with Section 204(a)."[674] The Court ultimately concluded that a written transfer of copyright had occurred by referring to the Federal Electronic Signature Act (E-Sign) for guidance.[675] The Court determined that Sections 7001(b) and 7003 of the E-sign Act conclude that a transfer of copyright may occur via electronic agreement.[676] Section 7001(b) applies to 17 U.S.C. § 204(a) because 7001(b) states that the E-sign Act only affects "a requirement that contracts or other records be written, signed, or in nonelectric form ," and 17 U.S.C. § 204(a) "requires transfers be 'written' and 'signed.'"[677] Section 7003 applies to 17 U.S.C. § 204(a) because 7003 does not specifically enumerate agreements to transfer copyright as a specific contract or record excepted from the E-Sign Act's applicability.[678] The District Court for the Southern District of Florida reached a similar conclusion to the Fourth Circuit Court of Appeals in *Vergara Hermosilla v. Coca–Cola Co.*, but only offered a brief analysis on the issue.[679]

3.3 European Union (EU)

3.3.1 Digital Single Market

There are several areas which can be covered by the European Union (EU) legislation.[680] One of the foundations of the EU is the single market policy, effected through principles and legislation concerning free movement of goods and services, alongside free movement of persons, capital, labor and establishment. One of the policies currently

[670] Walker, *PRACTICAL GUIDE TO E-SIGN AND THE UNIFORM ELECTRONIC TRANSACTIONS ACT*; . *Electronic Transactions Act - Uniform Law Commission*. URL: https://www.uniformlaws.org/committees/community-home?CommunityKey=2c04b76c-2b7d-4399-977e-d5876ba7e034 (visited on 10/12/2019).

[671] *US electronic signature laws and history*. URL: https://www.docusign.com/learn/us-electronic-signature-laws-and-history (visited on 10/12/2019).

[672] Metro. Reg'l Info. Sys., Inc. v. Am. Home Realty Network, Inc., 722 F.3d 591 (4th Cir. 2013) Although the Copyright Act itself does not contain a definition of a writing or a signature, much less address our specific inquiry, Congress has provided clear guidance on this point elsewhere, in the E–Sign Act.

[673] *Id.* at 600 ("Courts have elaborated that a qualifying writing under Section 204(a) need not contain an elaborate explanation nor any particular "magic words," Radio Television Espanola S.A. v. New World Entm't, Ltd., 183 F.3d 922, 927 (9th Cir.1999), but must simply "show an agreement to transfer copyright." Lyrick Studios, 420 F.3d at 392 (citation omitted).")

[674] Metro. Reg'l Info. Sys., Inc. v. Am. Home Realty Network, Inc., 722 F.3d 591, 600 (4th Cir. 2013)

[675] *Id.* at 601.

[676] *Id* ("Courts have elaborated that a qualifying writing under Section 204(a) need not contain an elaborate explanation nor any particular "magic words," Radio Television Espanola S.A. v. New World Entm't, Ltd., 183 F.3d 922, 927 (9th Cir.1999), but must simply "show an agreement to transfer copyright." Lyrick Studios, 420 F.3d at 392 (citation omitted). ").

[677] *Id.*

[678] *Id.*

[679] *Id citing* Vergara Hermosilla v. Coca–Cola Co., 2011 WL 744098, at *3 (S.D.Fla. Feb. 23, 2011), *aff'd by per curiam opinion*, 446 Fed.Appx. 201 (11th Cir.2011).

[680] *Areas of EU action*. en. Text. URL: https://ec.europa.eu/info/about-european-commission/what-european-commission-does/law/areas-eu-action_en (visited on 10/12/2019).

building the single market in the EU is the Digital Single Market, announced in 2015.[681] Acts related to the Digital Single Market include directives and regulations related to digital marketing, e-commerce and telecommunications, covering also such areas as copyright, data protection, cybersecurity, electronic signatures, digital administration services and other issues specific to digital and online activities.[682] Some of the achievements of the DSM were the end of the roaming charges within the EU, research initiatives concerning artificial intelligence and cybersecurity. There are several acts relevant from the perspective of music license contracts.[683] The short description provided below is not exhaustive, in particular it does not consider issues such as competition or data protection that often require the most attention from non-EU establishments.[684] Contract law is not unified per se across the EU–the areas that can be observed as common relate to selected aspects, such as competition, very often consumer protection, e-commerce, copyright–or various aspects of jurisdiction and the conflict of law rules, which have a great impact on contract law in practice.[685]

3.3.2 Copyright

Copyright is regulated in the EU by several acts, mostly directives that require national legislation to achieve their purposes (harmonization) and some regulations, applicable directly. Certain aspects or copyright are not harmonized (such as the moral rights), while the economic aspects of copyright are harmonized.

The acts regulating copyright in the EU include:

- Regulation on cross-border portability of online content services in the internal market ("Portability Regulation") (June 2017);[686]
- Directive and a Regulation implementing the Marrakesh Treaty in the EU (September 2017) concerning the visually impaired persons;[687]
- Directive on copyright and related rights in the Digital Single Market (May 2019), regulating several issues related to copyright (this Directive is in the process of being implemented by Member States);[688]
- Directive on television and radio programmes (May 2019), facilitating access to online TV and radio across borders - these are the acts initiated under the Digital Single Market policy;[689]
- Directive on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market ("CRM Directive") (February 2014);[690]

[681] Ibid.
[682] Ibid.
[683] Ibid.
[684] Ibid.
[685] Ibid.
[686] *Regulation (EU) 2017/1128 of the European Parliament and of the Council of 14 June 2017 on cross-border portability of online content services in the internal marketText with EEA relevance.* en. June 2017. URL: http://data.europa.eu/eli/reg/2017/1128/oj/eng (visited on 10/12/2019).
[687] *Directive (EU) 2017/1564 of the European Parliament and of the Council of 13 September 2017 on certain permitted uses of certain works and other subject matter protected by copyright and related rights for the benefit of persons who are blind, visually impaired or otherwise print-disabled and amending Directive 2001/29/EC on the harmonisation of certain aspects of copyright and related rights in the information society.* en. Sept. 2017. URL: http://data.europa.eu/eli/dir/2017/1564/oj/eng (visited on 10/12/2019).
[688] *Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC (Text with EEA relevance.)* en. May 2019. URL: http://data.europa.eu/eli/dir/2019/790/oj/eng (visited on 10/12/2019).
[689] *Directive (EU) 2019/789 of the European Parliament and of the Council of 17 April 2019 laying down rules on the exercise of copyright and related rights applicable to certain online transmissions of broadcasting organisations and retransmissions of television and radio programmes, and amending Council Directive 93/83/EEC (Text with EEA relevance.)* en. May 2019. URL: http://data.europa.eu/eli/reg/2019/789/oj/eng (visited on 10/12/2019).
[690] *Directive 2014/26/EU of the European Parliament and of the Council of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market Text with EEA relevance.* en. Mar. 2014. URL: http://data.europa.eu/eli/dir/2014/26/oj/eng (visited on 10/12/2019).

- Directive on the harmonisation of certain aspects of copyright and related rights in the information society ("InfoSoc Directive") (May 2001);[691]
- Directive on rental right and lending right and on certain rights related to copyright in the field of intellectual property ("Rental and Lending Directive") (December 2006);[692]
- Directive on the resale right for the benefit of the author of an original work of art ("Resale Right Directive") (September 2001);[693]
- Directive on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission ("Satellite and Cable Directive") (September 1993);[694]
- Directive on the legal protection of computer programs ("Software Directive") (April 2009);[695]
- Directive on the enforcement of intellectual property right ("IPRED") (April 2004);[696]
- Directive on the legal protection of databases ("Database Directive") (March 1996);[697]
- Directive on the term of protection of copyright and certain related rights amending the previous 2006 Directive ("Term Directive") (September 2011);[698]
- Directive on certain permitted uses of orphan works ("Orphan Works Directive") (October 2012);[699] and
- Directive on certain permitted uses of certain works and other subject matter protected by copyright and related rights for the benefit of persons who are blind, visually impaired or otherwise print-disabled (Directive implementing the Marrakech Treaty in the EU) (September 2017).[700]

Most of the above acts may be relevant specifically to the music industry sector although one of these acts regulates the music industry sector specifically (the CRM Directive). The CRM Directive deals with certain issues related to the operations of the collective rights management organizations (CMOs), attempting to make them more democratic and to tackle the issue of the value gap, bringing certain new accountability and transparency requirements for the CMOs, as well as requirements to speed up royalty payments (which had in practice taken a long time in the EU). The preparations for the 2014 CRM Directive involved a few extensive reports analyzing, i.e., transactions costs of music licensing.[701] The Directive introduced the multi-territorial licensing scheme, aiming at improving competition in that sector and larger music portfolios.

[691] *Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society*. en. June 2001. URL: http://data.europa.eu/eli/dir/2001/29/oj/eng (visited on 10/12/2019).

[692] *EUR-Lex - 32006L0115 - EN - EUR-Lex*. en. URL: https://eur-lex.production.op.aws.cloud.tech.ec.europa.eu/legal-content/EN/ALL/?uri=CELEX%5C%3A32006L0115 (visited on 10/12/2019).

[693] *Directive 2001/84/EC of the European Parliament and of the Council of 27 September 2001 on the resale right for the benefit of the author of an original work of art*. en. Oct. 2001. URL: http://data.europa.eu/eli/dir/2001/84/oj/eng (visited on 10/12/2019).

[694] *EUR-Lex - 31993L0083 - EN - EUR-Lex*. en. URL: https://eur-lex.production.op.aws.cloud.tech.ec.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31993L0083 (visited on 10/12/2019).

[695] *Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (Codified version) (Text with EEA relevance)*. en. May 2009. URL: http://data.europa.eu/eli/dir/2009/24/oj/eng (visited on 10/12/2019).

[696] *DIRECTIVE 2004/48/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the enforcement of intellectual property rights (Text with EEA relevance)*. en. Apr. 2004. URL: http://data.europa.eu/eli/dir/2004/48/oj/eng (visited on 10/12/2019).

[697] *EUR-Lex - 31996L0009 - EN - EUR-Lex*. en. URL: https://eur-lex.production.op.aws.cloud.tech.ec.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A31996L0009 (visited on 10/12/2019).

[698] *Directive 2011/77/EU of the European Parliament and of the Council of 27 September 2011 amending Directive 2006/116/EC on the term of protection of copyright and certain related rights*. en. Oct. 2011. URL: http://data.europa.eu/eli/dir/2011/77/oj/eng (visited on 10/12/2019).

[699] *Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works Text with EEA relevance*. en. Oct. 2012. URL: http://data.europa.eu/eli/dir/2012/28/oj/eng (visited on 10/12/2019).

[700] *EUR-Lex - 32017L1564 - EN - EUR-Lex*. en. URL: https://eur-lex.production.op.aws.cloud.tech.ec.europa.eu/eli/dir/2017/1564/oj (visited on 10/12/2019).

[701] *Reports and Studies about Copyright*. en. Text. URL: https://ec.europa.eu/digital-single-market/en/reports-and-studies/75982/73820 (visited on 10/12/2019).

There have been several initiatives and studies concerning the music industry sector in the EU, including a "Licences for Europe" stakeholder dialogue[702] between 2012 and 2013, with certain statements made by participating stakeholders and Music Moves Europe (MME) framework of the European Commission active since 2015. Within the MME, EU provides funding for music-related projects under the umbrella of the Creative Europe Project Results platform, with plans to provide additional funding after 2020 with such goals in mind as promoting diversity, creativity and innovation in the field of music, in particular in the distribution of musical repertoire in Europe and beyond. In terms of policy and adoption of new legal acts, there have been efforts to make the marketplace for music more transparent and fairer - such purposes were set out both for the CRM Directive and the new Copyright in the Digital Single Market Directive. MME allows also for dialogue through conferences and exchange of ideas, as well as awards for achievements in the field of popular and contemporary music. A competition under the MME framework produced a book including 10 winning business models for online and offline distribution of music, none of which used blockchain or distributed ledger technology.[703]

In the EU, the framework of rights subject to licensing is set out in the Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001[704] on the harmonisation of certain aspects of copyright and related rights in the information society, including the rights of reproduction (Art. 2), rights of communication to the public of works and right of making available to the public other subject-matter (Art. 3), the rights of distribution (Art. 4). The rights which may be granted under licenses are listed in EU legislation and international treaties, leading to the same scope being reflected at national levels though using different wording, categorization and specific rules.[705]

3.3.3 Electronic Identification

Another large topic falling under the scope of the Digital Single Market policy, is related to e-signatures and digital exchanges requiring a high degree of trust. The eIDAS Regulation (Regulation (EU) No. 910/2014 on electronic identification and trust services for electronic transactions in the internal market, July 2014),[706] sets out a legal framework for authentication solutions and schemes which may be adopted by people and businesses, and allow to facilitate (or digitalize) citizen-government exchanges and filings. The eIDAS Regulation is particularly relevant to technological solutions utilizing blockchain or distributed ledger.

3.3.4 General Data Protection Regulation (GDPR)

As mentioned at the beginning of this section, the Digital Single Market tackles also the issues of data protection and cybersecurity. The main act related to the protection of personal data is the Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, known as the General Data Protection Regulation (GDPR).[707] The Regulation applies across the EU since May 2018. The Regulation applies directly, however, there are a number of country-specific

[702] Anonymous. *"Licences for Europe" stakeholder dialogue*. en. Text. Dec. 2017. URL: https://ec.europa.eu/digital-single-market/en/news/licences-europe-stakeholder-dialogue (visited on 10/12/2019).

[703] Jamie KENDRICK. *Music Moves Europe*. en. Text. May 2017. URL: https://ec.europa.eu/programmes/creative-europe/actions/music-moves-europe_en (visited on 10/12/2019).

[704] *Regulation (EU) No 167/2013 of the European Parliament and of the Council of 5 February 2013 on the approval and market surveillance of agricultural and forestry vehicles Text with EEA relevance*. en. Mar. 2013. URL: http://data.europa.eu/eli/reg/2013/167/oj/eng (visited on 10/17/2019).

[705] *Act of February 4, 1994, on Copyright and Related Rights (as amended up Act of September 25, 2015)*. URL: https://wipolex.wipo.int/en/legislation/details/16154 (visited on 05/23/2020) (For instance, the approach taken in the Polish jurisdiction (one of the EU member states), the approach taken involved listing of fields of exploitation (exemplification of fields on which a license can be granted: 1) within the scope of fixing and reproduction of works–production of copies of a piece of work with the use of specific technology, including printing, reprographics, magnetic fixing and digital technology; 2) within the scope of trading the original or the copies on which the work was fixed–introduction to trade, letting for use or rental of the original or copies; 3) within the scope of dissemination of works in a manner different from defined in subparagraph 2–public performance, exhibition, screening, presentation and broadcast as well as rebroadcast, and making the work publicly available in such a manner that anyone could access it at a place and time selected thereby.).

[706] *Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC*. en. Aug. 2014. URL: http://data.europa.eu/eli/reg/2014/910/oj/eng (visited on 10/12/2019).

[707] *Data protection in the EU*. en. Text. URL: https://ec.europa.eu/info/law/law-topic/data-protection/data-protection-eu_en (visited on 10/12/2019).

provisions enacted in every Member State. Another act covering the protection of personal data is the Directive (EU) 2016/680 on the protection of natural persons regarding processing of personal data connected with criminal offences or the execution of criminal penalties, and on the free movement of such data, with the transposition deadline for the Member States in May 2018. A wide framework of initiatives has been set for the development of cybersecurity in the EU, with examples such as (i) the European Cybersecurity Act in force since June 2019 concerning cybersecurity certifications issued by ENISA, the EU Agency for Cybersecurity,[708] and (ii) the NIS Directive (Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union, July 2016)[709] which sets out standards, collaboration topics and supervision sectors concerning cybersecurity issues across the EU.

3.4 Alternative Dispute Resolution

Alternative dispute resolution (ADR) is a dispute resolution process that does not involve litigation (i.e., disputes are resolved outside of the traditional court system).[710] Generally, ADR can be used to resolve any dispute or conflict between parties.[711] The supposed benefits of ADR are that it is cheaper and faster than litigation, the processes are less formal, and the rules are more flexible, and that the parties can have a greater participatory role in resolving their conflict.[712]

Mediation and arbitration are the two primary types of ADR.[713] "In mediation, a neutral third party tries to help disputants come to a consensus on their own. Rather than imposing a solution, a professional mediator seeks to assist the conflicting sides in exploring the interests underlying their positions."[714] Generally, mediation is a voluntary and non-binding process for dispute resolution, i.e., the mediation is not a final resolution of the dispute.[715]

"In arbitration, [], a neutral third party serves as a judge who is responsible for resolving the dispute."[716] Generally, arbitration is an involuntary and binding process for dispute resolution, i.e., arbitration is a final resolution of the dispute.[717] The parties can usually negotiate the terms of the arbitration, such as who chooses and pays for the arbitrator, the arbitration venue, whether the arbitration is confidential, and the arbitration rules.[718] Then there is a mediation-arbitration hybrid where disputants will first attempt to resolve their dispute by mediation, and if unsuccessful, will then arbitrate their dispute.[719] Arbitration is a legally recognized ADR procedure in the USA under the Alternative Dispute Resolution Act (28 U.S.C. § 651), in the EU under Directive 2013/1/EU, and in international law under the United Nations Commission on International Trade Law's (UNCITRAL) model law on international commercial arbitration.[720]

[708] *European Commission - PRESS RELEASES - Press release - State of the Union 2017 - Cybersecurity: Commission scales up EU's response to cyber-attacks*. URL: https://europa.eu/rapid/press-release_IP-17-3193_en.htm (visited on 10/12/2019).
[709] *EUR-Lex - 32016L1148 - EN - EUR-Lex*. en. URL: https://eur-lex.production.op.aws.cloud.tech.ec.europa.eu/eli/dir/2016/1148/oj (visited on 10/12/2019).
[710] Katie Shonk. *What is Alternative Dispute Resolution?* en-US. Nov. 2019. URL: https://www.pon.harvard.edu/daily/dispute-resolution/what-is-alternative-dispute-resolution/ (visited on 12/11/2019).
[711] *Dispute Resolution Processes*. en. URL: https://www.americanbar.org/groups/dispute_resolution/resources/DisputeResolutionProcesses/ (visited on 12/11/2019).
[712] *Dispute Resolution Processes*; Shonk, *What is Alternative Dispute Resolution?*
[713] *Dispute Resolution Processes*; Shonk, *What is Alternative Dispute Resolution?*
[714] *Dispute Resolution Processes*.
[715] *Dispute Resolution Processes*; Shonk, *What is Alternative Dispute Resolution?*
[716] Shonk, *What is Alternative Dispute Resolution?*
[717] Ibid.
[718] Ibid.
[719] Shonk, *What is Alternative Dispute Resolution?*
[720] Narozhny, *Is Kleros Legally Valid as Arbitration?*

4 Music Licensing Primer

Music licensing is an extremely important tool for musicians and copyright owners ("rightsholder") to exploit the marketability of a musical work. As only authors and rightsholders may exploit a musical work, any third party that intends to use the copyrighted work for a purpose that falls under 17 U.S.C. § 106[721] will need to obtain a license from rights holders to use the work.[722] For example, if a TV show wanted to play a certain sound recording in an episode, the company producing the TV show would need to obtain a synchronization license from the rightsholder(s) to perform the sound recording in the episode.[723] In discussing the background on our research topic, we also decided to include a primer on music licensing to provide basic information on:

- Types of music licenses;
- Approaches to licensing;
- Territorially-restrictive licensing; and
- Licensing costs and issues.

Though music licensing is an important tool for rightsholders to exploit their music, it is also very difficult for rightsholders (licensors) and users (licensees) because of a lack of coordination and information.[724] Rights holders are unlikely to have the resources to track down every use of their music, and intended users may not understand how, when, and who to contact about licensing.[725] This is where collective management organizations (CMOs), such as the American Society of Composers, Authors, and Publishers (ASCAP), the Society of Authors, Composers and Publishers of Music (SACEM), and the Harry Fox Agency, become particularly important.[726] CMOs play the role of intermediary between the rightsholder and user, ensuring that licenses are being followed while collecting and distributing royalties to rightsholders.[727]

4.1 Music License Typology

The most common types of music licenses are:

- mechanical,
- synchronization,
- public performance, and
- print.[728]

Mechanical licenses are licenses from the copyright owner for the right to reproduce and distribute a musical work in a recording (e.g., CDs, tapes, digital configurations).[729] Synchronization licenses are licenses from the copyright owner for the right to synchronize the performance of a musical work with visual images.[730] Public

[721] Assuming copyright defenses are not raised

[722] *Do I need a music license? - Easy Song Licensing*. URL: https://www.easysonglicensing.com/pages/help/articles/music-licensing/do-i-need-a-music-license.aspx (visited on 10/17/2019).

[723] Ibid.

[724] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; KEA European Affairs. *"Licensing music works and transaction costs in Europe"*. Study. KEA European Affairs, Sept. 2012, pp. 1–72. URL: http://serci.org/congress_documents/2013/ranavoson.pdf.

[725] Christian Handke and Ruth Towse. "Economics of Copyright Collecting Societies". In: *IIC International Review of Intellectual Property and Competition Law* 38 (July 2008). DOI: 10.2139/ssrn.1159085.

[726] *What is a Collective Management Organization? (CMO)*. en. publisher: Songtrust. URL: https://help.songtrust.com/knowledge/what-is-a-collective-management-organization-cmo (visited on 10/17/2019).

[727] Ibid.

[728] *Types of Music Licenses*. publisher: Musicbed. URL: https://www.musicbed.com/knowledge-base/types-of-music-licenses/28 (visited on 10/17/2019).

[729] *Types of Music Licenses*.

[730] Ibid.

performance licenses are licenses from the copyright owner for the right to perform the musical work in public settings.[731] Print licenses are licenses from the copyright owner for the right to print their musical composition in a print format such as sheet music, folio or collection.[732]

4.2 Licensing Approaches

In the music industry, there are two general licensing approaches:

1. licensing on a collective basis ("collective licensing"), and
2. licensing on an individual basis ("individual licensing")[733].[734]

Collective licensing is the most popular form of licensing, wherein musicians will give certain rights to their works to a collective management organization (CMO), that will negotiate licensing fees, collect & distribute royalties, and monitor use of copyrighted works on the rightsholder's behalf.[735] The most popular CMOs for performance royalties are ASCAP, SACEM, and PRS for Music.[736] In addition to CMOs for performance royalties, there are also CMOs for mechanical royalties, such as the Harry Fox Agency.[737] In contrast to collective licensing, individual licensing is when rightsholders directly negotiate with users on the terms of use for their music.[738]

Collective licensing is the dominant approach because CMOs enable markets where rightsholder cannot directly interact with users, which is generally the case in the music industry.[739] CMOs play such a prominent role in music licensing because they reduce the administrative costs associated with the complexity of licensing copyrighted works.[740] The administrative costs for rightsholders are:

- negotiating license fees,
- collecting royalties,
- stopping infringements, and
- monitoring use of copyrighted works among multiple and different types of users.[741]

While the administrative costs for users are:

- identifying rightsholders, and
- avoiding conflict with rightsholders.[742]

CMOs provide economies of scale for the administrative costs of rightsholders and users when the two following conditions are met:

1. licensees are identical, i.e., the same information needs to be investigated for each licensee; and
2. when average costs fall as the number of works increases indefinitely.[743]

[731] Ibid.
[732] Ibid.
[733] Also known as direct licensing or transactional licensing.
[734] *The New Paradigm in Music Licensing*. URL: http://www.nprex.com/FAQ.aspx#question-2 (visited on 10/17/2019).
[735] Frederic Haber. *The Evolution of Collective Licensing*. en-US. URL: https://www.copyright.com/blog/evolution-collective-licensing/ (visited on 10/17/2019).
[736] Liane Bonin Starr. *ASCAP, BMI, SESAC: The Guide to PROs*. en. URL: https://blog.songtrust.com/songwriting-tips/pros-whats-the-difference (visited on 10/17/2019).
[737] Rosenblatt, *Watermarking Technology and Blockchains in the Music Industry*.
[738] *The New Paradigm in Music Licensing*.
[739] Handke and Towse, "Economics of Copyright Collecting Societies".
[740] Ibid.
[741] Ibid.
[742] Handke and Towse, "Economics of Copyright Collecting Societies".
[743] Ibid.

4.2.1 Blanket Licensing Model

The primary licensing model employed by CMOs is a blanket license.[744] A blanket license is a license that "bundl[es] the entire repertoire" and then charges users a price depending on the "intensity of their use."[745] Blanket licensing is administratively efficient because it "spares market participants the costs of negotiating the exact size of the bundle of rights and its price for every transaction."[746]

Ruth Towse identified the main differences between transactional licensing and blanket licensing in *The Economic Effects of Digitization on the Administration of Musical Copyrights*. In transactional licensing, every transaction is itemized and valued, which gives greater transparency and clearer market signals that users are interested in the work.[747] In blanket licensing, the user pays set rates for the whole repertoire and revenue is distributed to members based on the quantity of a work's (within their repertoire) usage.[748]

4.2.2 Compulsory Licensing Model

Under the US Copyright Act of 1976 and amendments thereto, compulsory licenses are pre-negotiated, statutorily created licenses that allow specific uses of a copyrighted work if certain conditions are met, without the permission of the rightsholder.[749] Statutory exemptions to rights under copyright in 17 U.S.C. § 106 can be found in multiple sections in the U.S. Copyright Act, including 17 U.S.C. §§ 110, 112, 114, and 115. For example, under Section 115 of the US Copyright Act, after a songwriter has released the first sound recording of their song, a compulsory mechanical license is automatically granted for subsequent sound recordings, thus allowing for the creation of cover songs.[750]

Under Sections 112 and 114, an organization may obtain a compulsory license to digitally transmit a sound recording to the public, "under the limitation on exclusive rights specified by Section 114(d)(1)(C)(iv) or under a statutory license in accordance with Section 114(f)."[751] Under Section 112, an organization may obtain a compulsory license to make one ephemeral recording (i.e., make and keep a copy of the sound recording) of a sound recording, if a Section 114 compulsory license has been met.[752]

To obtain a compulsory license, a user needs to "(1) serve a timely Notice of Intention to Obtain a Compulsory License (NOI), either on the copyright owner or on the Copyright Office if the identity or address of the copyright owner is unknown; and (2) when the copyright owner is known, make monthly royalty payments and provide monthly statements of account to the copyright owner."[753] The traditional NOI for compulsory mechanical licensing was recently amended with the passage of the Music Modernization Act (MMA).[754]

4.2.3 Creative Commons Licensing Model

Creative Commons (CC) licenses are a suite of public copyright licenses developed by the Creative Commons, a U.S. nonprofit, that are geared towards rightsholders who desire to make their works accessible, easily distributed, and usable by members of the general public.[755] CC licenses are generally applicable to any copyrighted work, but

[744] Ibid.
[745] Ibid.
[746] Ibid.
[747] Ruth Towse. "The Economic Effects of Digitization on the Administration of Musical Copyrights". In: *Review of Economic Research on Copyright Issues* 10(2) (2013), pp. 55–67. URL: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2381882.
[748] Ibid.
[749] *Compulsory License*. en. URL: https://www.law.cornell.edu/wex/compulsory_license (visited on 10/17/2019).
[750] *Compulsory Mechanical Licensing Law - Easy Song Licensing*. URL: https://www.easysonglicensing.com/pages/help/articles/copyright-law/compulsory-law.aspx (visited on 10/17/2019); *Circular 73 Compulsory License for Making and Distributing Phonorecords*. URL: https://www.copyright.gov/circs/circ73.pdf.
[751] U. S. Copyright Office. *Section 112 and 114 - Notice of Use of Sound Recordings | U.S. Copyright Office*. eng. Web page. URL: https://www.copyright.gov/licensing/sec_112.html (visited on 12/19/2019).
[752] Ibid.
[753] *Compulsory Mechanical Licensing Law - Easy Song Licensing*; *Circular 73 Compulsory License for Making and Distributing Phonorecords*.
[754] Supra Section 3.2.1.
[755] *About The Licenses - Creative Commons*. URL: https://creativecommons.org/licenses/ (visited on 10/17/2019); *What We Do*. en-US. URL: https://creativecommons.org/about/ (visited on 10/17/2019).

are preferred for creative works (art, books, etc.), and are drafted to be amenable to any copyright framework.[756]

CC licenses can be commercial or noncommercial, and generally deal with three types of permissions:

1. attribution,
2. adaption, and
3. redistribution.[757]

CC licenses present advantages for those who want to make their works accessible to the public because CC licenses, specifically the CC Attribution-ShareAlike license, offers the option of controlling future licensees down the road to the same terms as the original licensee for derivative works.[758]

The current CC license suite is comprised of six licenses, with varying degrees of openness:

- Attribution (CC BY),
- Attribution-ShareAlike (CC BY-SA),
- Attribution No-Derivs (CC BY-ND),
- Attribution Non-commercial (CC BY-NC),
- Attribution-NonCommercial-ShareAlike (CC BY-NC-SA), and
- Attribution-NonCommercial-NoDerivs (CC BY-NC-ND).[759]

Attribution (BY) requires that licensees credit the licensor for all uses of the copyrighted work.[760] ShareAlike (SA) requires that the licensees distribute derivative works under identical terms to the license governing the copyrighted work.[761] Non-commercial (NC) requires that licensees do not use the copyrighted work for any non-commercial purposes.[762] NoDerivs (ND) requires that the licensee does not make a derivative work from the copyrighted work.[763]

CC licenses are comprised of three layers:

1. legal code,
2. human readable, and
3. machine readable .[764]

The legal code is the traditional legal language involved in licensing.[765] The human readable layer is a summary of the legal code intended for non-legal audiences.[766] The machine readable code is a summary of the legal code formatted for software (primarily web services) to know that a work is licensed under a CC license under the standardized CC Rights Expression Language (ccREL).[767] ccREL is a means of expressing copyright licensing metadata based on the WorldWideWeb Consortium's (W3C) resource description framework (RDF) and eXtensible Markup Language (XML), and can be embedded in various file types.[768]

[756] *About The Licenses - Creative Commons*.
[757] Ibid.
[758] Ibid.
[759] Ibid.
[760] Ibid.
[761] Ibid.
[762] Ibid.
[763] Ibid.
[764] Ibid.
[765] Ibid.
[766] Ibid.
[767] *About The Licenses - Creative Commons*.
[768] Hal Abelson et al. *ccREL: The Creative Commons Rights Expression Language*. Tech. rep. Creative Commons, Mar. 2008. URL: https://wiki.creativecommons.org/images/d/d6/Ccrel-1.0.pdf.

4.3 Territorially-restrictive Licensing

Neil Conley in *The Future of Licensing Music Online: The Role of Collective Rights Organizations and the Effect of Territoriality* discussed the inefficiencies of CMO reciprocal agreements that include territorially-restrictive clauses, stating that such licenses are inefficient in an online music marketplace because transactions over the internet are inherently cross-border.[769]

CMOs enter into reciprocal agreements with foreign CMOs to collect royalties, and distribute their repertoire, on the CMO's behalf in the foreign CMOs territory.[770] Additionally, Conley highlighted four major issues with territorially-restrictive licenses imposed by CMOs[771] that lead to inefficiencies, summarized in the list below:

- online music providers can infringe CMO's reciprocal agreement with a foreign CMO by foreign users accessing music in a foreign territory subject to the foreign CMOs control;
- online music providers can infringe copyright holder's public performance right in a foreign jurisdiction by allowing a foreign person access to the music in the foreign jurisdiction without obtaining permission from the copyright holder to perform songs in the foreign jurisdiction;
- online music provider infringes foreign CMO right to collect royalties and distribute repertoire in foreign jurisdiction on behalf of native CMO; and
- online music provider breaches their blanket license with CMO when music is accessed in a foreign territory.[772]

Conley proposed many reasons why territorially-restrictive clauses remain in reciprocal agreements, in particular, that CMOs receive a large portion of their revenue from licensing their repertoire, and charge administrative fees[773].

4.4 Licensing Costs and Issues

For our research topic, we organized the licensing costs and issues into four categories, some of which were described in the Literature Review.[774] The four categories of issues are:

1. transactional costs,
2. membership costs,
3. multi-territorial issues, and
4. contract management issues.

The first category of issues can be categorized as transactional costs. Transactional costs identified by Bodo et al. were:

- "identifying and matching rights holders and users,
- the high costs of monitoring use,
- the costs of enforcement, and

[769] Neil Conley. "The Future of Licensing Music Online: The Role of Collective Rights Organizations and the Effect of Territoriality". In: *John Marshall Journal of Computer & Information Law* 25.3 (2008), pp. 409–86. URL: https://repository.jmls.edu/cgi/viewcontent.cgi?article=1013&context=jitpl.
[770] Ibid.
[771] Named Collective Rights Organizations (CROs) in the paper.
[772] Conley, "The Future of Licensing Music Online: The Role of Collective Rights Organizations and the Effect of Territoriality".
[773] ibid. (There is uncertainty over what kinds of administrative services are actually being performed).
[774] Supra Section 1.

- the complexities of setting the price and negotiating the terms of use."[775]

Ex ante transaction costs (costs before a transaction is concluded) identified by KEA for online music service providers includes:

- "[i]dentification costs, which correspond to all the costs incurred to identify and find the rights owners"; and
- "[n]egotiation costs, which correspond to all the costs incurred between identification and the actual agreement."[776]

Ex post transaction costs (costs after a transaction is concluded) identified by KEA for online music service providers include "identifying repertoire and uses for reporting and invoicing purposes."[777]

The second category of issues can be categorized as collective management organization (CMO) issues, which we define as membership costs. Handke and Towse identified the three following membership costs:

1. membership fee,
2. revenue distribution, and
3. few if any alternatives to joining a CMO.[778]

The third category of issues can be categorized as multi-territorial issues. Multi-territorial issues include:

- multiple copyright frameworks, and
- territorially-restrictive licenses in a digital market context.[779]

The fourth category of issues can be categorized as contract management issues. Contract management issues include:

- how contracts should be stored and audited;
- parties not fulfilling obligations under the agreement;
- poor communication between the parties;
- hidden risks in a contract; and
- hard to find the important information in the contract.[780]

[775] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[776] Affairs, *"Licensing music works and transaction costs in Europe"*.
[777] Ibid.
[778] Handke and Towse, "Economics of Copyright Collecting Societies".
[779] Handke and Towse, "Economics of Copyright Collecting Societies".
[780] *Top 8 Challenges in Contract Management*. en-us. Mar. 2018. URL: https://www.intelligentcontract.com (visited on 03/19/2018).

5 Technology Primer

In discussing the background on our research topic, we also decided to include a primer on the technologies (with an emphasis on Web3 technologies) applicable to automated music licensing. The technology primer will provide a basic information on:

- Blockchain;
- Smart Contracts;
- InterPlanetary File System;
- Application Programming Interfaces;
- Data Oracles;
- Decentralized Applications;
- Digital Assets;
- Non-fungible Tokens;
- Linked Data;
- Ricardian Contracts; and
- Kleros's ADR Protocol.

5.1 Blockchain

Blockchain[781] is an append-only database, often described as a trustless (also referred to as trust-minimization a or low-trust) system, that is secured by a peer-to-peer (p2p) computer network.[782] In the network, the blockchain is replicated so that each node has a copy of the blockchain.[783] The main advantage of a blockchain is that it allows counterparties to transact in a secure manner without the need for a trusted third (or centralized) party.[784] The term "blockchain" originates from Satoshi Nakamoto's whitepaper, *Bitcoin: A Peer-to-Peer Electronic Cash System*, though Satoshi Nakamoto never mentions the word blockchain in the whitepaper to describe the block-based data structure.[785]

The blockchain data structure is an ordered list of blocks that each reference the previous block by the previous block's cryptographic hash.[786] "Each block consists of a set of transactions[787]."[788] Once a new block is mined, each node will add the newly mined block to their copy of the blockchain.[789] Once a block is appended to the blockchain, the newly-appended block cannot be removed or modified as to ensure the blockchain's data integrity.[790]

[781] Treiblmaier, "Toward More Rigorous Blockchain Research"; Julie Maupin, Jonas Kahlert, and Timo Honsel. "Blockchain: A World Without Middlemen?" In: 2019 (Blockchain is often used synonymously or interchangeably with Distributed Ledger Technology (DLT) and Horst Treiblmaier recommends also mentioning the term when discussing blockchain.).

[782] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; M.E. Burge. "Apple pay, bitcoin, and consumers: The ABCs of future public payments law". In: *Hastings Law Journal* 67 (Aug. 2016), pp. 1493–1550.

[783] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".

[784] Ibid.

[785] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study"; Satoshi Nakamoto. "Bitcoin: A Peer-to-Peer Electronic Cash System". In: *Cryptography Mailing list at https://metzdowd.com* (Oct. 2008); Treiblmaier, "Toward More Rigorous Blockchain Research"; Haugen and Engebretsen, "The Music Industry on Blockchain Technology".

[786] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".

[787] Transactions is often used synonymously with data.

[788] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".

[789] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".

[790] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study"; Burge, "Apple pay, bitcoin, and consumers: The ABCs of future public payments law"; Garry Gabison. "Policy Considerations for the Blockchain Technology Public and Private Applications". In: *Southern Methodist University Science & Technology Law Review* 19 (3 Aug. 2016), pp. 327–350; Jake Frankenfield. *Cryptocurrency*. en. URL: https://www.investopedia.com/terms/c/cryptocurrency.asp (visited on 12/19/2019).

The first blockchain implementation, Bitcoin, mitigated two major problems:

1. double spending[791] , and
2. eliminating fraud, through the Proof of Work (PoW) mining algorithm and the Longest Chain Rule consensus algorithm[792] process.[793]

Mining is the process of authenticating and adding blocks of transactions to the blockchain, and is a means of stopping spam (i.e., anti-sybil measure).[794] Nodes on the p2p network mine (These specific nodes are called "miners") attempt to solve a complex math problem by ordering transactions in a manner to have the hash of the block have a certain number of leading zeros.[795] Once the problem is solved, the block can then be added to the Bitcoin blockchain.[796] In exchange for authenticating and adding a block, miners are rewarded with new Bitcoins.[797]

To ensure that each node has the correct copy of the blockchain without a trusted intermediary, the Bitcoin blockchain also implements the Longest Chain Rule, a consensus algorithm on the state of the Bitcoin blockchain.[798] In simplest terms, the longest chain rule will steer the nodes on the Bitcoin p2p network towards the blockchain which has the most work done, i.e., the chain that has the most computational effort supplied.[799]

The hash of each block maintains the integrity of the data stored in the blockchain.[800] In a hashing algorithm, the input is an arbitrary amount of data that is mapped to an output of a unique, fixed-size number of bytes.[801] Since the output is unique for each input, it is nearly impossible to get the same hash for two different inputs.[802] A new block primarily holds a set of transactions, an index, a timestamp, and a header.[803] In the block header, there are two hashes:

1. the previous block's hash, and
2. the current block's hash.[804]

By requiring new blocks to reference the hash of the previous block, we obtain an immutable, sequential chain of transactions.[805] If someone tried to change the contents of a block, that particular block's cryptographic hash would change, and this would change the hashes of all the sequential blocks after the altered block.[806] Thus, it becomes nigh impossible for one party to commit fraud because a fraudster would need to alter the copy of the blockchain for fifty-percent or greater (>50%) of the nodes, and that's before a new block gets added to the blockchain .[807]

Horst Treiblmaier in *Toward More Rigorous Blockchain Research: Recommendations for Writing Blockchain Case Studies*, summarized the most important characteristics of blockchain as:

[791] Burge, "Apple pay, bitcoin, and consumers: The ABCs of future public payments law".
[792] Referring specifically to Bitcoin's Proof-of-Work mining algorithm and Longest Chain consensus algorithm.
[793] Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Burge, "Apple pay, bitcoin, and consumers: The ABCs of future public payments law"; Frankenfield, *Cryptocurrency*.
[794] Gabison, "Policy Considerations for the Blockchain Technology Public and Private Applications"; Burge, "Apple pay, bitcoin, and consumers: The ABCs of future public payments law"; Frankenfield, *Cryptocurrency*.
[795] Johannes Mueller. *Building Blockchains in R*. Feb. 2018. URL: https://www.datacamp.com/community/tutorials/blockchain-r (visited on 12/20/2019).
[796] Ibid.
[797] Ibid.
[798] Ibid.
[799] Ibid.
[800] Ibid.
[801] Patrick Schueffel, Nikolaj Groeneweg, and Baldegger Rico. *The Crypto Encyclopedia: Coins, Tokens and Digital Assets from A to Z*. Aug. 2019. ISBN: 978-2-940384-47-1.
[802] Mueller, *Building Blockchains in R*.
[803] Ibid.
[804] Ibid.
[805] Ibid.
[806] Mueller, *Building Blockchains in R*.
[807] ibid. (Small window of time to make that happen, especially since a new block is added to the Bitcoin blockchain every ten (10) minutes.).

- "[i]mmutability",
- "[t]ransparency",
- "[p]rogrammability",
- "[d]ecentralization",
- "[c]onsenus", and
- "[d]istributed trust."[808]

Blockchains can be categorized based on a permission typology.[809] In the permission typology, there are two types of blockchains, permissioned and permissionless.[810] A permissionless blockchain is a blockchain in which anyone may read (examine transactions contained in blocks) and write (submit a transaction to be stored in a block) to the blockchain.[811] A permissioned blockchain is a blockchain in which there is a restriction on who can read and/or write to the blockchain.[812] The issues with the current state of blockchain architecture, mentioned in the literature and in the industry, are readily summarized by Treiblmaier, and reproduced here for convenience:

- "Throughput: Number of transactions being processed within a specific period of time.
- Latency: Amount of time before a transaction is processed.
- Size and bandwidth: The Blockchain grows over time as new blocks are constantly added. This also consumes considerable bandwidth for downloading data.
- Wasted resources: Blockchain-intrinsic inefficiencies such as redundant data transmission, storage and energy-consuming consensus protocols.
- Usability Users': interactions with Blockchain applications.
- Versioning: Hard forks, multiple chains. A multitude of Blockchain versions and forks facilitate attacks and hamper cross-transactions.
- Privacy: The right to control access to (personal) information as well as to delete it.
- Evidentiary quality: Trustworthiness of Records; Questions pertaining to the truthfulness of content on the Blockchain.
- Lack of Standards: No standards have emerged yet for access rights, data structures and allowable transactions.
- Regulations: Legislation is lagging behind technological development.
- Shared governance: Blockchain solutions call for new structures that might disrupt existing governance.
- Viable ecosystem: The attraction of a critical mass of adopters.
- Attack Surface: The Blockchain as a target of potential attacks."[813]

The blockchain characteristics we explicitly sought to utilize in our research and in the creation of our Tokenized Music License (TML) were:

- Immutability,
- Transparency,

[808] Treiblmaier, "Toward More Rigorous Blockchain Research".
[809] Ibid.
[810] Ibid.
[811] Ibid.
[812] Treiblmaier, "Toward More Rigorous Blockchain Research".
[813] Ibid.

- Programmability, and
- Decentralization.[814]

We desired the immutability characteristic because we wanted to ensure that once an agreement is signed by the parties, the record of the transaction and signatures thereto cannot be modified in the future.[815]

We desired the transparency characteristic because we wanted to make transactions with the TML publicly accessible so that potential parties can have a negotiating reference from the prior negotiations of other parties, to have proof that a transaction occurred and was validated, to help musicians and users have knowledge of and seek out the TML, and to mitigate against potential disputes arising over the content of the license (not necessarily the interpretation of the license) or confusion regarding whether a license has been signed.[816]

We desired the programmability characteristic because we wanted to utilize smart contracts to guarantee the fulfillment of certain objective demands and requirements envisioned in the TML, optimize the licensing process by alleviating licensing costs and issues, and the need to ensure that the smart contracts embedded in the TML will execute with little to no worry for down-time.[817]

We desired the decentralization characteristic because we believe decentralization will enable musicians to gain a greater foothold in the music industry's value web by reducing the number of intermediaries needed to license their works. We expect that this will lead to fairer remuneration for musicians and will help alleviate concerns of collusion among music industry stakeholders whose interests do not align with the interests of musicians.[818]

5.2 Smart Contracts

A smart contract is executable code stored on a blockchain to facilitate agreements among two or more parties that will automatically execute based on a set of predefined conditions.[819] The idea of smart contracts came from Nick Szabo in 1994.[820] According to Nick Szabo, despite the digital era creating entirely new tools, applying the known concepts of contract law may be key, given the rapid development of the modern world: "By extracting from our current laws, procedures, and theories those principles which remain applicable in cyberspace, we can retain much of this deep tradition, and greatly shorten the time needed to develop useful digital institutions."[821] As Dariusz Szostek points out, smart contracts were defined by the UK Government in 2016 in the report titled "Distributed Ledger Technology: beyond block chain", where smart contracts were defined as "contracts whose terms are recorded in a computer language instead of legal language (...) can be automatically executed by a computing system, such as a suitable distributed ledger system [and having the benefits of] low contracting, enforcement, and compliance costs; consequently it becomes economically viable to form contracts over numerous low-value transactions."[822] Smart contracts did not truly become a viable option until the emergence of blockchain technology, and especially the Ethereum blockchain.

[814] Ibid.
[815] Ibid.
[816] Ibid.
[817] Ibid.
[818] Treiblmaier, "Toward More Rigorous Blockchain Research"; Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Sitonio and Nucciarelli, "The Impact of Blockchain on the Music Industry".
[819] *Smart Contracts*. en-US. URL: https://blockchainhub.net/smart-contracts/ (visited on 10/18/2019).
[820] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".
[821] Nick Szabo. *Formalizing and Securing Relationships on Public Networks | Satoshi Nakamoto Institute*. URL: https://nakamotoinstitute.org/formalizing-securing-relationships/ (visited on 10/18/2019).
[822] U.K. Government Chief Scientific Adviser. *Distributed Ledger Technology: beyond block chain*. Tech. rep. Government Office of Science, 2016. URL: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf.

5.3 InterPlantery File System (IPFS)

"Distributed data storage is data stored among multiple devices rather than a single device."[823] "Distributed peer-to-peer (p2p) data storage is a type of distributed storage where data is shared among the nodes on a p2p network."[824] "The InterPlanetary File System (IPFS) is a project by Filecoin that enables distributed storage and transfer of files among nodes in a peer-to-peer network."[825] "In the IPFS, file storage is distributed among the nodes on the network such that each node has a chunk of the file data, thereby ensuring that no single node holds a complete copy of a file."[826] "To achieve the above, the IPFS implements a [D]istributed [H]ash [T]able (DHT) that allows 'any participating node to efficiently retrieve the value associated with a given key.'"[827] "By relying on a p2p network, the DHT can scale to an 'extremely large numbers of nodes and to handle continual node departures, arrivals and failures.'"[828] "A major advantage of using the IPFS is that it ensures that a node requesting a file will receive it from the closest nodes storing the file, thereby making file retrieval faster."[829]

5.4 Application Programming Interface (API) and Data Oracles

An application programming interface (API) is a software intermediary that allows interaction between two distinct software programs, i.e., how one software application can request another software application to provide a service.[830] In general, API often refers to web-based APIs, APIs that provide a connectivity interface for applications to communicate with servers over web protocols such as Hypertext Transfer Protocol (HTTP), and the use of JavaScript Object Notation (JSON) format.[831] For example, when an end user authenticates their identity on a software application via their Facebook profile or email address, they are utilizing an API that interfaces between the software application and Facebook or their email provider.[832]

There are three types of APIs:

1. public,
2. private, and
3. partnership.[833]

A public API is an API that is accessible to developers or the public (developers, startups, governments, etc.) on a free or structured freemium basis (e.g., a limited number of API calls per month).[834] A private API is an API that is only used internally within an organization.[835] A partner API is a platform-esque API that multiple organizations can integrate within their systems.[836]

[823] Ledgerback Cooperative. *My Data! My Rules!* en. Sept. 2019. URL: https://medium.com/the-backers/my-data-my-rules-60890ffa0e56 (visited on 12/20/2019); Eugene Cheah. *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.* en. URL: https://dev.to/uilicious/explain-distributed-storage---and-how-it-goes-down-for-github--uilicious--cloud--etc-1mni (visited on 12/20/2019).
[824] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[825] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[826] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[827] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[828] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[829] Cooperative, *My Data! My Rules!*; Cheah, *Explain Distributed Storage - and how it goes down for github / uilicious / cloud / etc.*
[830] *What is an API? (Application Programming Interface)*. en. URL: https://www.mulesoft.com/resources/api/what-is-an-api (visited on 10/18/2019).
[831] Ibid.
[832] Ibid.
[833] *What is an API?*. en-US. URL: https://nordicapis.com/focus-topics/what-is-an-api/ (visited on 10/18/2019).
[834] Ibid.
[835] *What is an API?*.
[836] Ibid.

Data oracles ("oracles") are data providers, akin to application programming interfaces (APIs), that input external information into smart contracts on a blockchain.[837] Oracles are very powerful because they not only control what information gets inputted into the blockchain, they also determine which functions a smart-contract will execute in response to the information.[838]

5.5 Decentralized Applications (DApps)

Decentralized applications (commonly known as dApps or DApps, but for this report, DApp shall be used) are becoming increasingly popular in the blockchain ecosystem, and are deemed the biggest application of smart contract platforms such as Ethereum and EOS.[839] DApps are applications that run on peer-to-peer (P2P) computer networks, and for our purposes, applications that run on a blockchain P2P network.[840] DApps provide several advantages over traditional web applications, such as decentralization (no single entity can shut it down) and open source (the source code is available to the public).[841] Blockchain DApps, at least in their current form, are Web3-enabled websites (websites that interact with blockchains) that use smart contracts and the blockchain as the backend for web applications .[842]

5.6 Digital Assets

We shall introduce three types of digital assets:

1. cryptocurrencies,
2. tokens, and
3. stablecoins.

A cryptocurrency (also known as a coin) is a digital token (often the first token and is considered the native token) created on a blockchain, that operates as a medium of exchange, in which supply growth is constrained through mining or a similar process.[843] A token is a digital token created on a blockchain, that is a digital representation of a real or virtual asset, rights, or unit of value[844] Common token standards are ERC-20 and ERC-721 on the Ethereum blockchain.[845] A stablecoin is a digital token that is collateralized by an underlying asset to maintain a relatively stable price.[846]

5.7 Non-fungible Tokens (NFTs)

Non-fungible[847] tokens (NFTs) are unique tokens meant to represent digital assets, commonly based on the ERC-721 standard, that have a "name, a description, and a URI."[848] The ERC-721 is a standard on the Ethereum

[837] Delphi. *The Oracle Problem*. en. July 2017. URL: https://medium.com/@DelphiSystems/the-oracle-problem-856ccbdbd14f (visited on 10/18/2019).
[838] Ibid.
[839] Rick D. *Number of DApps on Ethereum and EOS Soaring, Yet Usage Lags*. en-US. Jan. 2019. URL: https://www.newsbtc.com/2019/01/07/dapps-ethereum-eos/ (visited on 10/18/2019).
[840] *What is a dApp? Decentralized Application on the Blockchain*. en-US. URL: https://blockchainhub.net/decentralized-applications-dapps/ (visited on 10/18/2019).
[841] Ibid.
[842] Ibid.
[843] *What is Cryptocurrency. Guide for Beginners*. en. URL: https://cointelegraph.com/bitcoin-for-beginners/what-are-cryptocurrencies (visited on 10/18/2019); Schueffel, Groeneweg, and Rico, *The Crypto Encyclopedia: Coins, Tokens and Digital Assets from A to Z*.
[844] Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Schueffel, Groeneweg, and Rico, *The Crypto Encyclopedia: Coins, Tokens and Digital Assets from A to Z*(Though, tokens can be used to represent anything.).
[845] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".
[846] Kyle Ellicott. *An Overview of Stablecoins*. en. Sept. 2019. URL: https://medium.com/coinmonks/an-overview-of-stablecoins-fed7553fb25b (visited on 12/20/2019).
[847] Haugen and Engebretsen, "The Music Industry on Blockchain Technology" ("[Non-f]ungible refers to something that can[not] be replaced by another item.").
[848] John Gordon. *NIFTY Blockchain Gaming Thoughts*. en. Aug. 2018. URL: https://medium.com/@jagordon/nifty-blockchain-gaming-thoughts-92075a4f934a (visited on 10/18/2019).

blockchain that "defines a minimum interface a smart contract must implement to allow unique tokens to be managed, owned, and traded."[849] NFTs are generally created for one-of-a-kind collectibles, and can represent anything ranging from art, in-game items, tickets, to even digital pets (e.g., CryptoKitties).[850]

Other than the ERC-721 standard, there is also the ERC-1155 and ERC-998 standards for NFTs.[851] The ERC-1155 standard was developed by Enjin, a blockchain videogames and wallet company.[852] ERC-1155 standard allows the ID field to represent a class of assets, rather than a single asset.[853] The advantage over ERC-721 that ERC-1155 provides is that it is cheaper to transfer multiple assets (e.g., a single transfer operation to transfer 1,000 items, rather than 1,000 transfer options to transfer 1,000 items).[854] The disadvantage is that it is no longer possible to track a single asset within the class.[855] The ERC-998 standard (aka Composables), is a standard that allows NFTs to own other digital assets (non-fungible and fungible).[856]

5.8 Linked Data

Linked Data (LD) is a design approach to connect machine-readable, interlinked resources across the Semantic Web, i.e., the web of data, via technologies such as Uniform Resource Identifiers (URIs) and the Resource Description Framework (RDF).[857] The Semantic Web refers to an extended functionality of the WorldWideWeb where data is interlinked and machine-readable by adding additional data descriptors to existing content on the web.[858] URIs are unique identifiers for any type of content or data utilizing a single global identification system.[859] RDF is a model for data publishing and interchange developed by the WorldWideWeb Consortium (W3C).[860] In RDF, all data is published in a database as a triplestore. Triplestores materialize the links between data through a subject, predicate (or verb) and object linked model (subject > predicate > object).[861]

The four principles of LD are:

1. "Use URIs as names for things";
2. "Use HTTP URIs so that people can look up these names";
3. "When someone looks up a URI, provide useful information, using standards (RDF, SPARQL)"; and
4. "Include links to other URIs so that they can discover more things."[862]

An example project working with Linked Data is SoLiD, another project by Sir Tim Berners Lee, in which the LD approach defines the relationships among data by:

- by having a uniform resource location (URL) for each piece of data, and
- explicitly stating how each piece of data is related to each other.[863]

[849] *ERC-721*. URL: http://erc721.org/ (visited on 10/18/2019).
[850] Gordon, *NIFTY Blockchain Gaming Thoughts*.
[851] dfinzer. *The Non-Fungible Token Bible: Everything you need to know about NFTs*. en-US. Jan. 2020. URL: https://opensea.io/blog/guides/non-fungible-tokens/ (visited on 05/15/2020).
[852] Ibid.
[853] Ibid.
[854] Ibid.
[855] Ibid.
[856] Ibid.
[857] *What are Linked Data and Linked Open Data?* en-US. URL: https://ontotext.com/knowledgehub/fundamentals/linked-data-linked-open-data/ (visited on 09/14/2019); *Introduction to the Solid Specification | Solid*.
[858] *What Is the Semantic Web?* en-US. URL: https://ontotext.com/knowledgehub/fundamentals/what-is-the-semantic-web/ (visited on 09/14/2019).
[859] *What are Linked Data and Linked Open Data?*
[860] *What is RDF Triplestore?* en-US. URL: https://ontotext.com/knowledgehub/fundamentals/what-is-rdf-triplestore/ (visited on 09/14/2019).
[861] Ibid.
[862] *What are Linked Data and Linked Open Data?*; Sir Tim Berners Lee. *Linked Data - Design Issues*. URL: https://www.w3.org/DesignIssues/LinkedData.html (visited on 10/18/2019).
[863] *What are Linked Data and Linked Open Data?*; Lee, *Linked Data - Design Issues*; *Introduction to the Solid Specification | Solid*.

5.9 Ricardian Contracts

Ricardian Contracts (RC) are semi-automated, human- and machine-readable contracts that are expressed and executed as software, with the parties signing the contract via cryptographic signatures.[864] RCs were first conceptualized by Ian Grigg in 1995.[865] RCs utilize markup language for combining legal prose with machine-readable tags.[866] The goal is to automate generally objective terms so that they may be performed by software programs, while leaving subjective language to be determined by the parties.[867]

The Accord Project, OpenLaw, Clause, and other similar projects are developing software stacks and standards for RCs.[868] With the emergence of such software, users will be able to draft legal prose in markup language that interacts with blockchains, the Semantic Web, and other software.[869] Though these platforms are in their infancy, they represent the potential for RCs to dramatically change contract management.[870]
DocuSign, a member of the Ethereum Enterprise Alliance and the Accord project, has implemented two RC-related services that interact with the Ethereum blockchain.[871] The first service is a document verification service that allows anyone to verify a DocuSign agreement exists (or compare the authenticity of a copy of the agreement) via a hash of the original DocuSign agreement stored on the Ethereum blockchain.[872] The second service is providing a Trust Service Provider model for projects that work on digital identity management to integrate their blockchain application with DocuSign's platform.[873]

[864] Chohan, "What Is a Ricardian Contract?"
[865] *Ricardian contracts: A smarter way to do smart contracts?* en. URL: https://www.schoenherr.eu/publications/publication-detail/ricardian-contracts-a-smarter-way-to-do-smart-contracts/ (visited on 10/18/2019); Dmitri Koteshov. *Smart vs. Ricardian Contracts: What's the Difference?* en-US. Feb. 2018. URL: https://www.elinext.com/industries/financial/trends/smart-vs-ricardian-contracts/ (visited on 10/18/2019); I. Grigg. "The Ricardian contract". In: *Proceedings. First IEEE International Workshop on Electronic Contracting, 2004.* San Diego, CA, USA: IEEE, 2004, pp. 25–31. ISBN: 9780769521848. DOI: 10.1109/WEC.2004.1319505. URL: http://ieeexplore.ieee.org/document/1319505/ (visited on 10/18/2019).
[866] *Ricardian contracts*; Dmitri Koteshov, *Smart vs. Ricardian Contracts*; Grigg, "The Ricardian contract"; *What is a Ricardian Contract?* en. July 2017. URL: https://www.r3.com/blog/what-is-a-ricardian-contract/ (visited on 10/18/2019).
[867] *Ricardian contracts*; Dmitri Koteshov, *Smart vs. Ricardian Contracts*; Grigg, "The Ricardian contract"; *What is a Ricardian Contract?*
[868] *Accord Project*. URL: https://www.accordproject.org/ (visited on 10/18/2019); *Overview | OpenLaw Docs*. URL: https://docs.openlaw.io/ (visited on 10/18/2019); *Clause Inc.* URL: https://clause.io/ (visited on 10/18/2019).
[869] *Accord Project*.
[870] *Ricardian contracts*.
[871] Daniel Zhang. *DocuSign and Blockchain*. en. Text. June 2018. URL: https://www.docusign.com/products/blockchain (visited on 10/18/2019).
[872] Zhang, *DocuSign and Blockchain*.
[873] Ibid.

Part II

Ricardian Contract

6 Motivation

More and more research is focusing on how Web3 technologies (with an emphasis on blockchain and smart contracts) can:

- be applied to the music and legal industries, and
- comport with existing legal frameworks and industry standards.

Most of this research focuses on possible Web3 technology use cases for cost-savings and disrupting the status quo, the new costs that arise with Web3 technologies, and what issues need to be addressed before Web3 technology use cases are feasible. However, there is not enough research on practical applications (e.g., Proof-of-Concepts (PoC)) of Web3 technologies beyond mentioning feasibility issues.

In Part II, we focus on a practical application of Web3 technologies to automate, wholly or partially, the music licensing process. Specifically, we seek to investigate the feasibility (and most importantly, the necessary know-how) of licensing musical works with Ricardian Contracts and Web3 technologies (RC-Web3 Templates). Through this report, we develop an understanding of the interdisciplinary and emerging field of research spanning the legal, music, computer science and engineering disciplines centered on the intersection of music complexity and Web3 technologies, and how this interdisciplinary research field can aid in addressing the various costs, issues and impairments to make RC-Web3 Templates feasible for automating the music licensing process.

Our understanding ultimately culminates with the development of the Practical Tokenized Drafting (PTD) method, a set of core principles and design practices for developing RC-Web3 Templates, and the Tokenized Music License (TML), a standard form for music licensing in a Web3 technologies context. We believe the development of the PTD method and the TML standard form contribute to this emerging field of interdisciplinary research because it sheds a light on the feasibility and concerns of practical applications of Web3 technologies in the music industry from a legal perspective.

7 Decentralized Media Platforms

In addition to our Literature Review[874], we also reviewed the Terms of Service (ToS) of six decentralized media platforms[875] to determine how they are assisting musicians and creatives[876] in licensing their works on their platforms. The list of decentralized streaming platforms we considered for our analysis were:

1. Musicoin,
2. Resonate,
3. Choon,[877]
4. Creativechain,
5. LBRY, and
6. Ujo Music.

We chose the six above platforms for ToS review for two reasons. First, we could easily find their ToS or similar documents. Second, these platforms are prominent decentralized media platforms in the blockchain ecosystem. For the sake of brevity, we evaluated these six platforms to answer three questions:

1. What are the licensing options available to creatives?
2. How are the platforms abating transaction costs? and
3. What are the new costs arising from using decentralized media platforms?

From evaluating the six above platforms, and after reviewing *Overview of Licensing Platforms based on Distributed Ledger Technology*, we came to the conclusion further described in the *Need for Greater Licensing Options* section that there is a need for greater licensing options for creatives on decentralized media platforms (especially for an automated license (preferably a RC) that is interactive with Web3 technologies).[878] For another analysis of licensing on distributed ledger technology (DLT) platforms, please refer to *Overview of Licensing Platforms based on Distributed Ledger Technology*.[879]

7.1 Musicoin

Musicoin is a decentralized, advertisement-free streaming platform "launched on the 11th of February 2017 when the genesis block of the Musicoin blockchain was mined."[880] Musicoin's blockchain is a fork of the Ethereum blockchain, "with network nodes and protocols configured as an Ethereum Virtual Machine (EVM), capable of executing smart contracts in a Turing-complete language."[881] Musicoin incentivizes musicians to upload their music on the free streaming platform through their Pay-Per-Play (PPP) model, where musicians receive a certain amount of $MUSIC, the native cryptocurrency on the Musicoin blockchain, for each play of their music, from an artist Universal Basic Income (UBI) pool.[882]

[874] Supra Section 1.

[875] Decentralized media platform refers to a platform that is interactive (e.g., built on the technology) with Web3 technologies such as a blockchain or the IPFS

[876] Creative refers to anyone who creates a creative work such as music, art, and is used in this report to generally refer to non-musicians

[877] The Choon streaming service shut down between late 2019 and early 2020

[878] Alexander Schönhals et al. "Overview of Licensing Platforms based on Distributed Ledger Technology". In: *HICSS*. 2019.

[879] Ibid.

[880] Musicoin Foundation. *Musicoin: A decentralized platform revolutionizing creation, distribution and consumption of music*. Whitepaper. Musicoin Foundation, Oct. 2017, pp. 1–29.

[881] Musicoin. *Musicoin Blockchain Upgrades to V3.0("Quantitative Tightening")*. en. May 2019. URL: https://medium.com/@musicoin/musicoin-blockchain-upgrades-to-v3-0-quantitative-tightening-dfbd36e621ee (visited on 11/12/2019); Foundation, *Musicoin: A decentralized platform revolutionizing creation, distribution and consumption of music*; Musicoin, *Musicoin Blockchain Upgrades to V3.0("Quantitative Tightening")*; *How it works?* publisher: Musicoin. URL: https://musicoin.org/how-it-works (visited on 11/12/2019).

[882] *How it works?*; John Bartmann. *Musicoin | Blockchain Music Streaming Platform*. en-US. Feb. 2019. URL: https://johnbartmann.com/blockchain/musicoin-blockchain-music-streaming-platform/ (visited on 05/12/2020).

The Musicoin Foundation's (MCF) Terms of Service and Artist Policy describe the legal relationship between the Foundation, musicians and users regarding intellectual property on the platform.[883] For musicians on the platform, the only license they can offer to other users is the PPP protocol (though, musicians may choose a different payment scheme than the PPP model) .[884] Musicians can license their works for streaming under the PPP protocol by uploading a musical work to the platform, and in the smart contract, placing their address in the recipient field.[885] Additionally, musicians can have their licenses interact with other licenses via the PPP smart contract, thus allowing for musicians to collaborate with each other, and enforce their negotiated terms via the PPP smart contract.[886]

The PPP protocol is a license between Musicians and MCF, in which musicians grant MCF the right to "perform tracks using the Service" in exchange for payment in $MUSIC.[887] MCF provides musicians a Musicoin wallet "following verification of the [Musician's] identity."[888] Musicians "receive $MUSIC per stream of each track at the rate identified in the PPP license and according to the percentages submitted to the Service."[889] Musicians are required to acknowledge "that they will accurately submit the PPP terms to allow for compensation of rights to Artist Content including tracks and agrees that Artist shall be responsible for any incurred costs of MCF due to any failure to assign, report or submit percentages for payments in accordance with our Agreement."[890] The royalty rate is determined by each stream of the track on the Musicoin platform and the percentages the Musician submits to MCF.[891] Lastly, In the event Musician is in default of payment obligations, Musicoin may notify interested third parties if the default is not cured after receiving a notification of such.[892]

7.2 Resonate

Resonate is a multi-stakeholder platform cooperative that offers an advertisement-free streaming service under the stream2own model.[893] Currently, Resonate is in the beta-stage of developing their streaming service.[894] In the stream2own model, the cost of a digital download is broken into nine separate streams, with the price increasing after every play until the ninth and final play, upon which the listener may stream the music for free or download a copy of the music .[895] On Resonate's streaming platform, musicians are known as Music Maker members, and are subject to the ToS for the streaming platform.[896] The ToS describe how Music Makers license their intellectual property to Resonate and Music Listener members.[897] Similar to Musicoin, the only licensing option available for musicians on Resonate is a license in accordance with the stream2own model..[898]

[883] *Legal: TOS*. URL: https://musicoin.org/legal/tos (visited on 12/13/2019).

[884] *Resources: FAQ*. URL: https://musicoin.org/resources/faq (visited on 12/20/2019); *Legal: Artist Content Policy*. publisher: Musicoin Foundation. URL: https://musicoin.org/legal/artist-policy (visited on 11/12/2019) (Additionally, musicians acknowledge and agree to receive $MUSIC in exchange for a "waiver of other royalty payments, statutory or otherwise that MCF or its Account Holders may or may not be obligated to pay Artist in connection with the use of Artist Content, ...").

[885] *Resources: FAQ*.

[886] Ibid. ("For example, if you're sampling part of another artist's song and you both agree on a 10% royalty share each time your song is played, you would enter that artist's song license address in the recipient field under your license. Now, every time your song is played, 10% of your revenue from each play, will be automatically distributed to their license.").

[887] *Legal: Artist Content Policy*.

[888] Ibid.

[889] Ibid.

[890] Ibid.

[891] Ibid.

[892] Ibid.

[893] Kieran Devlin. *Relaunched music sharing platform, 'Resonate', operates "stream to own" model*. Apr. 2019. URL: https://djmag.com/news/relaunched-music-sharing-platform-%E2%80%98resonate%E2%80%99-operates-%E2%80%9Cstream-own%E2%80%9D-model; John Bartmann. *Resonate | Blockchain Music Streaming Platform*. en-US. Oct. 2018. URL: https://johnbartmann.com/blog/resonate-blockchain-music-streaming-platform/ (visited on 05/12/2020).

[894] Devlin, *Relaunched music sharing platform, 'Resonate', operates "stream to own" model*; Bartmann, *Resonate | Blockchain Music Streaming Platform*.

[895] *stream2own*. en-US. URL: https://resonate.is/stream2own/ (visited on 12/13/2019).

[896] *Resonate Player Terms of Use*. en-US. publisher: Resonate. URL: https://resonate.is/terms-conditions/ (visited on 12/13/2019).

[897] *Resonate Player Terms of Use*.

[898] Ibid.

7.3 Choon

Choon is an advertisement-free streaming service built on top of the Ethereum blockchain.[899] Choon's streaming model operates similarly to Musicoin's PPP model, in that musicians who upload their music to the platform receive payment in $NOTES on a "pro-rata basis on the number of streams of their [music].".[900] Additionally, musicians can share revenue with other users who curate their music into playlists.[901] Choon describes the licenses it grants to registered (a user who has created an account with Choon) and unregistered (a user who has not created an account with Choon) users in using the platform, the licenses registered users grant to Choon, and the license registered users grant to other users (registered and unregistered) and affiliated platforms and services.[902] From analyzing Choon's ToS, it appears that a musician could offer multiple licenses (e.g., mechanical, synchronization, public performance) to other users on Choon, but we did not see such functionality available on the service..[903]

7.4 Creativechain

Creativechain is a multimedia content blockchain platform, where content creators (specifically targeted towards artists who create digital works of art) are rewarded for creating and curating content via Creativechain's Proof-of-Creation algorithm.[904] Creators and viewers can interact with Creativechain's blockchain on Creary, a social network DApp where creators can share their creative works with their followers and receive rewards in the CREA cryptocurrency based on user votes.[905]

In Creary's ToS, Creativechain describes the intellectual property licensing relationship between users (creatives and consumers) and between creators and Creativechain.[906] In particular, Creary's ToS differs from the other five (excluding LBRY) platform's ToS considerably because Crea does not store user uploads to their blockchain or centralized servers, instead uploads are stored on the InterPlanetary File System (IPFS), and are accessible through Creary.[907] On Creary, creatives upload their works to the IPFS, and store the associated metadata (hash, name, URL, license, type, size, tags, and description) on the Creativechain blockchain. When uploading (i.e., publishing) a work, creatives are required to complete four steps in the publishing process:

1. Content;
2. Information;
3. Download; and
4. License.[908]

In Content, creatives present their project "by combining different video or audio image files with text."[909] In Information, creatives add basic information about the work.[910] In Download, creatives choose whether to allow

[899] John Bartmann. *Choon | Blockchain Music Streaming Platform*. en-US. Aug. 2018. URL: https://johnbartmann.com/blog/choon-blockchain-music-streaming-platform/ (visited on 05/12/2020); Marco Svarda. *Official Statement On Choon's Dissolvement*. en. Dec. 2019. URL: https://medium.com/@marcosvarda/official-statement-on-choons-dissolvement-bbf7bcb1e9e4 (visited on 05/12/2020)(Choon's streaming service shut down between late 2019 and early 2020. Choon was initially discussed in the drafts of this report and is included in this version of the final print because Choon was a prominent decentralized media platform at the time of writing.).

[900] *About Choon*. URL: https://choon.co/about (visited on 12/13/2019); *Choon Account - Terms and Conditions*. en. URL: https://choon.co/serverauth/showterms (visited on 12/13/2019).

[901] Bartmann, *Choon | Blockchain Music Streaming Platform*.

[902] *Choon Account - Terms and Conditions*.

[903] Ibid.

[904] *Decentralized Creative Communities*. en-GB. URL: https://creaproject.io/crea-en/ (visited on 12/13/2019); Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology".

[905] *Creary*. en-GB. URL: https://creaproject.io/creary/ (visited on 12/13/2019).

[906] *Terms of service*. en. URL: https://creary.net/terms_and_conditions (visited on 12/13/2019).

[907] *FAQ*. en. URL: https://creary.net/faq (visited on 12/13/2019); Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology".

[908] *FAQ*.

[909] *FAQ*.

[910] Ibid.

users to download their work, and the price per download.[911] In License, creatives choose the licensing scheme for their work.[912]

Regarding authorship, Creary "automatically creates incorruptible timestamps that issue a certificate of authorship and a distribution license for any digital work."[913] For creatives, this means that there is an unofficial certificate of authorship that comes along with uploading works, which can provide some aid in tracing the origins of a work. Regarding distribution licenses, Creary offers Creative Commons (CC) licenses when a creative is publishing their work to Creary.[914] However, we could not ascertain whether Creary will allow users to associate their own custom licenses with works uploaded to Creary, or the allowance of an automated licensing DApp on top of Creary that offers different licensing schemes..[915]

Creatives on Creary can receive rewards from other users curating their content via voting, and by making their works available for purchase as a digital download.[916] For a work published and sold on Creary, creatives receive seventy-percent 70%) of the payment while curators receive thirty-percent (30%) of the payment..[917]

In Creativechain's multi-token economic system, there are three tokens:

1. CREA,
2. CREA Energy (CGY), and
3. CREA-based Dollar (CBD).[918]

CREA is the main cryptocurrency of the Creativechain blockchain, intended to be a liquid asset that operates like Bitcoin.[919] CGY and CBD derive their value from CREA.[920] CGY represents the power a user has when "voting for content or network witnesses (DPOS).".[921] The influence a user has on the payout of a work published onto Creary "is directly proportional to the amount of CGY they have."[922] CREA can be converted into CGY or exchanged for CBD.[923] CBD is intended to have a price correlation with the US Dollar (i.e., a Crea-based stablecoin).[924] CBD primarily tracks the price of CREA to USD (i.e., the price of converting X amount of units of CREA into 1 US Dollar)..[925] Users can withdraw CBD at any time. CBD can be exchanged for CREA through the CREA Core "tak[ing] and destroy[ing] the CBD and then creat[ing] new CREA."[926]

7.5 LBRY

LBRY is a multimedia content protocol for distributing and discovering media.[927] LBRY utilizes a BitTorrent-like protocol for file sharing and hosting, a blockchain for tracking transactions, channels, and metadata associated with content, channels, and transactions, a DApp for users to interact with content, and a naming system for content so that users do not have to rely on a Content Identifier (CID).[928]

[911] Ibid.
[912] Ibid.
[913] *Creary*; utkudedetas. *My Tiny Demon*. URL: https://creascan.net/devil/@utkudedetas/my-tiny-demon (visited on 12/13/2019).
[914] *FAQ*.
[915] Ibid.
[916] Ibid.
[917] Ibid.
[918] Ibid.
[919] Ibid.
[920] Ibid.
[921] Ibid.
[922] Ibid.
[923] Ibid.
[924] Ibid.
[925] Ibid.
[926] Ibid.
[927] Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology".
[928] *How does content hosting work?* en. URL: https://lbry.com/faq/host-content (visited on 12/13/2019); Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology".

Creatives (specifically targeted towards YouTube-style content creators) are rewarded for uploading content to LBRY at a set price in either LBRY Credits (LBC) or US Dollars (USD), or a creative can offer their content for free.[929] Creatives also have the option to associate a specific distribution license with their works regarding how other LBRY users interact with their content.[930] When a creative publishes a work on LBRY, the creative can choose the distribution license associated with their work, with LBRY setting defaults for Creative Commons (CC) international licenses, Public Domain, None, Copyrighted, and Other.[931] The Other option lets creatives associate a custom license with the work, which requires a description of the license and an accompanying URL.[932] Concerning None's relation to Public Domain and Copyrighted, we are unsure how None differs from Public Domain or Copyrighted.[933] LBRY, like Creativechain, provides creatives flexibility regarding the distribution license associated with their works, but we were not able to ascertain whether LBRY has any DApps for automated licensing via RCs.[934]

7.6 Ujo Music

Ujo Music ("Ujo") is a music streaming and download service built on the Ethereum blockchain (in the beta stage).[935] Ujo promotes a direct fan-to-artist model where fans can purchase a stream of a musician's work or a digital download of a work, tip musicians in cryptocurrency or buy a musician's NFT badge to represent support for a musician (purchasing badges is a planned feature to be added to Ujo).[936]

Ujo stores all musical works on the Ethereum blockchain and ties the musical works to the musician's Ethereum public address (i.e., musical works uploaded to Ujo cannot be deleted).[937] Musicians are required to upload full albums to Ujo.[938] Creatives can be compensated in Ether (ETH) or DAI for streams or downloads of their musical works.[939] Currently, the streaming rate is one cent per play.[940]

In Ujo's ToS, users are granted "a limited, non-exclusive, non-transferable, non-sublicensable license to access and make personal and non-commercial use of the Service [(The Site and any other features, tools, materials, or services offered from time to time by Ujo, including our smart contracts)]."[941] As such, users are only allowed to utilize Ujo's platform for personal and non-commercial use.[942] We did not find anything specific in Ujo's ToS about licensing options available to musicians other than streaming and digital downloads.[943] Though, this may change if Ujo integrates OpenLaw and uPort into the platform.

7.7 The Wicked Costs of Decentralized Media Platforms

The six decentralized media platforms, in trying to address the complexity and issues in the music industry and the licensing process, also need to contend with wicked problems.[944] Wicked problems are systemic problems that

[929] *How do I earn LBRY Credits (LBC)?*. en. URL: https://lbry.com/faq/earn-credits (visited on 12/13/2019).
[930] *How do I Publish Content to LBRY?*. en. URL: https://lbry.com/faq/how-to-publish (visited on 12/13/2019).
[931] Ibid.
[932] Ibid.
[933] ibid. (None could imply that the creative does not intend any license to be associated with the work, that the work is in the Public Domain, or that they are reserving all rights to the work, i.e., Copyrighted.).
[934] *Build*. en. URL: https://lbry.tech/build (visited on 12/13/2019); LBRY. *Contributor's Guide*. en. URL: https://lbry.tech/contribute (visited on 12/13/2019); LBRY. *Overview*. en. URL: https://lbry.tech/overview (visited on 12/13/2019).
[935] John Bartmann. *Ujo Music | Blockchain Music Streaming Platform*. en-US. Aug. 2018. URL: https://johnbartmann.com/blog/ujo-music-blockchain-music-streaming-platform/ (visited on 05/12/2020).
[936] Ibid.
[937] *Ujo Music FAQ*. en. URL: https://ujomusic.com/faq (visited on 05/12/2020).
[938] Ibid.
[939] Bartmann, *Ujo Music | Blockchain Music Streaming Platform*.
[940] *Ujo Music FAQ*.
[941] *Terms of Service*. en. URL: https://ujomusic.com/terms-of-service (visited on 12/13/2019).
[942] Ibid.
[943] Ibid.
[944] Joss Colchester. *Complex Wicked Problems*. en-US. July 2018. URL: https://systemsinnovation.io/complex-wicked-problems/ (visited on 06/02/2020); *Wicked Problems – Austin Center for Design*. en-US. URL: https://www.ac4d.com/our-

arise in complex systems[945] from the interaction of local parts that do not have a simple nor a single solution.[946] The complexity of the music industry gives rise to these wicked problems, and thus requiring solutions that affect the industry at multiple points to solve them.[947] If not addressed in a systematic approach, any one solution to a wicked problem will lead to new, additional problems that keep the status quo. As stated by Sellin and Seppälä and Torbensen and Ciriello in their analyses of the music industry, a solution(s) to address the complexity and inequities of the music industry needs to be systemic and incentivize stakeholders to align their interests with each other.[948] Here, in abating the licensing costs and issues of the music licensing process[949] and other issues in the music industry (though, not at a systemic level), these platforms also create a new host of costs that must be contended with and addressed by platform owners and users.[950]

The six decentralized media platforms aid in abating transaction costs, specifically monitoring, enforcement and negotiating costs, associated with licensing.[951] LBRY, Ujo, Musicoin, Choon, Creativechain and Resonate (when Resonate is out of beta) abate monitoring and enforcement costs because all transactions are tracked and made transparent on the blockchain, and all transactions are made via smart contracts which self-enforce the licensing model(s) for the platform. The above platforms also reduce negotiating costs because:

- the price of a stream is predetermined by the licensing model on the platform;
- the creative can associate a price with their work on the platform; or
- the creative work is offered for free on the platform.

However, the six above platforms, do not necessarily reduce identification costs because the platforms do not pre-verify whether the user who is uploading the work is the author or an appropriate rightsholder of the work.[952] Though, this is not meant to diminish the efforts of Resonate, Ujo, and Musicoin to verify users on the platform, but pre-verifying users this does not necessarily prevent misattribution of authorship or copyright ownership in a work.[953] Besides abating licensing costs and issues associated with the traditional licensing process, the platforms also bring with them five new costs.[954].

The first cost is the volatility cost, which arises from the usage of cryptocurrencies and tokens (e.g., $MUSIC, $NOTES, $ETH) on these platforms. These cryptocurrencies are inherently volatile, and their market value can have major fluctuations on even a daily basis.[955]

The second cost is the exit cost, which arises from converting the cryptocurrencies and tokens into other cryptocurrencies or fiat currencies (i.e., leaving the platform's ecosystem).[956] The exit cost arises from creatives cementing or realizing the expected value garnered from these platforms. In other words, the creatives only know

work-philosophy-and-approach-to-education/understanding-wicked-problems/ (visited on 06/02/2020); *What are Wicked Problems?* en. URL: https://www.interaction-design.org/literature/topics/wicked-problems (visited on 06/02/2020).

[945] The music industry is a complex system

[946] Colchester, *Complex Wicked Problems*; *Wicked Problems – Austin Center for Design*; *What are Wicked Problems?*

[947] Colchester, *Complex Wicked Problems*; *Wicked Problems – Austin Center for Design*; *What are Wicked Problems?*; Sellin and Seppälä, "Digital Music Industry – Background Synthesis".

[948] Colchester, *Complex Wicked Problems*; *Wicked Problems – Austin Center for Design*; *What are Wicked Problems?*; Sellin and Seppälä, "Digital Music Industry – Background Synthesis"; Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN".

[949] Supra Section 4.4.

[950] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN"; Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology"; Treiblmaier, "Toward More Rigorous Blockchain Research"; Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study".

[951] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".

[952] Though, this may change for Ujo if Ujo integrates uPort into the platform.

[953] Schönhals et al., "Overview of Licensing Platforms based on Distributed Ledger Technology"; *Resources: FAQ*.

[954] Each platform has one or more of these new costs, but not necessarily all five costs

[955] Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".

[956] Haugen and Engebretsen, "The Music Industry on Blockchain Technology".

the true value or remuneration of their work in the outside economy once they convert their cryptocurrencies or tokens (which are only local to the blockchain, and thus the blockchain's or network's local economy).[957]

The third cost is the technical issues cost, which arises from the inherent technical architecture of Web3 technologies (specifically blockchain and smart contracts).[958] For example, blockchain's immutability feature can be an issue (and is a major issue for Ujo) because if a creative ever needs to remove their content for any reason, e.g., copyright infringement, it is nearly impossible to do so. Though, this can be mitigated against by making the content inaccessible on the platform or storing the content on a mutable data storage solution such as the IPFS.

The fourth cost is the network-industry cost, which arises from the need for network effects and/or industry adoption for these platforms to gain a foothold. The network-industry cost can inhibit a platform's growth if the platform cannot garner enough users[959] for network effects to kick in.[960] Additionally, if a platform cannot become adopted in the industry, it will be nigh impossible for the platform to incentivize all music industry stakeholders to share data with the platform, use the platform, and participate in the platform's governance.[961]

The fifth cost is the effective governance cost. For these platforms to survive and grow, especially in the face of uncertainty, they must have effective governance models.[962] For example, since most of these platform's (and the underlying software they utilize) have their software licensed under an open source license (and this is the norm for most Web3 technology projects), if a segment (or class of stakeholders) of the platform's community is no longer satisfied with the platform owner's maintenance of the platform, they can, at any time, fork the software and run their own version of the platform (i.e., a hard fork).[963] This can lead to loss of personnel, knowledge, software advances, and other resources that would otherwise have stayed with the platform.[964] To prevent a hard fork, a platform's owner(s) must satisfy the needs and concerns of the segments in the platform's community, including external and internal stakeholders.[965] This can be an issue for platforms that operate at the protocol layer (i.e., base layer or layer 1), and the application layer (i.e., layer 2 or DApp layer).[966]

[957] Ibid.

[958] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study"; Treiblmaier, "Toward More Rigorous Blockchain Research".

[959] For example, a streaming platform would need both music listener users and music maker users. Though, a platform usually just needs to garner enough users on one side (e.g., listeners or makers) to incentivize the other side to join the platform.

[960] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN".

[961] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN".

[962] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Haugen and Engebretsen, "The Music Industry on Blockchain Technology"; Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN"; Treiblmaier, "Toward More Rigorous Blockchain Research"; Juri Mattila and Timo Seppälä. *Distributed Governance in Multi-Sided Platforms*. May 2017. DOI: 10.13140/RG.2.2.35409.74086.

[963] Treiblmaier, "Toward More Rigorous Blockchain Research"; Mattila and Seppälä, *Distributed Governance in Multi-Sided Platforms*; *Brave New Coin*. URL: https://bravenewcoin.com/insights/bitcoin-core-developers-issue-segwit2x-hard-fork-warning (visited on 06/02/2020); *How Many Bitcoin Forks Are There?* en. URL: https://forkdrop.io/ (visited on 06/02/2020); Michael del Castillo. *Ethereum Executes Blockchain Hard Fork to Return DAO Funds*. en. July 2016. URL: https://www.coindesk.com/ethereum-executes-blockchain-hard-fork-return-dao-investor-funds (visited on 06/02/2020); Jake Frankenfield. *Hard Fork (Blockchain) Definition*. en. URL: https://www.investopedia.com/terms/h/hard-fork.asp (visited on 06/02/2020).

[964] Treiblmaier, "Toward More Rigorous Blockchain Research"; Mattila and Seppälä, *Distributed Governance in Multi-Sided Platforms*; Jamie Redman. *Two BCH Devs Leave Bitcoin Unlimited as Network Upgrade Approaches*. en-US. Mar. 2019. URL: https://news.bitcoin.com/two-bch-devs-leave-bitcoin-unlimited-as-network-upgrade-approaches/ (visited on 06/02/2020) (An additional concern is other projects misusing a platform's open source software for their own gains to compete with them in the market.Digital Asset Research. *TRX: We Found New Instances of Code Copy without Attribution*. en. June 2018. URL: https://medium.com/digitalassetresearch/trx-we-found-new-instances-of-code-copy-without-attribution-but-these-pale-in-comparison-to-the-305aff860f8b (visited on 06/02/2020); Greg Thomson. *Ethereum's Vitalik Buterin on 'Zombie' BitTorrent Under Justin Sun 'Dictatorship'*. en. URL: https://cointelegraph.com/news/ethereums-vitalik-buterin-on-zombie-bittorrent-under-justin-sun-dictatorship (visited on 06/02/2020)).

[965] Treiblmaier, "Toward More Rigorous Blockchain Research"; Mattila and Seppälä, *Distributed Governance in Multi-Sided Platforms*; *Brave New Coin*; *How Many Bitcoin Forks Are There?*; Castillo, *Ethereum Executes Blockchain Hard Fork to Return DAO Funds*; Frankenfield, *Hard Fork (Blockchain) Definition*.

[966] Treiblmaier, "Toward More Rigorous Blockchain Research"; Mattila and Seppälä, *Distributed Governance in Multi-Sided Platforms*.

Additionally, for platforms that operate on the application layer, they must be prescient and ready to participate in the governance processes at the protocol layer, lest they be blindsided by unexpected changes to the protocol's software.[967]

7.8 The Need for Greater Licensing Options

Based on our review of the ToS, copyright related policies, and other relevant policies governing the use of user-uploaded content onto decentralized media platforms, we came to the following three conclusions. First, the legal documentation for the platforms reviewed concerning user-uploaded music does not grant musicians as much autonomy as they may perceive or expect from using a decentralized media platform, often described as alternatives that put the control back into the hands of musicians. Second, other than Creativechain and LBRY, the decentralized media platforms did not offer creators the option of attaching a license to accompany their works other than those prescribed in the ToS. Third, the platforms that allow creatives to attach a license not prescribed in the ToS to their works, Creativechain and LBRY, only provided default options for CC licenses for distribution, which unfortunately, does not fully span the spectrum of licensing options available to, or desired by, creatives. With these conclusions in mind, we believe that there is a need for:

- further study in developing automated music licenses (and copyright licenses in general) that interact with Web3 technologies; and
- offering more licensing options to creatives than what is currently available on decentralized media platforms.

[967] Alharby and Moorsel, "Blockchain Based Smart Contracts : A Systematic Mapping Study"; Treiblmaier, "Toward More Rigorous Blockchain Research"; Castillo, *Ethereum Executes Blockchain Hard Fork to Return DAO Funds*; *Brave New Coin*.

8 Methods

8.1 Practical Tokenized Drafting (PTD)

In developing our automated music license, we developed the Practical Tokenized Drafting (PTD) method, a set of core principles and design practices for drafting RCs that interact with Web3 technologies (with an emphasis on blockchain and smart contracts) (hereafter "RC-Web3 Templates"). Our PTD method is an outgrowth of legal engineering and automated transactions. PTD is an outgrowth of legal engineering because we are tokenizing a simple system, here being the copyright in musical works, with the aid of RCs and Web3 technologies.[968] PTD is an outgrowth of automated transactions because the method explicitly describes practices for utilizing machines to execute and store some dimension of an exchange of value, and this is actualized through the Tokenized Music License (TML).[969] Our PTD method was derived from Verifi Media's Minimum Viable Data (MVD) standard, our Literature Review, and our interviews with a music composer and Coopérative Kleros.

In PTD, we approach drafting with three (3) core principles and ten (10) core design practices in mind from creation to testing to finally release, from the viewpoint of a legal practitioner (used synonymously with drafter) working individually or in partnership with a software engineer(s) (i.e., a programmer).

The three core principles of PTD are:

1. Stay On-chain[970];
2. Seek Minimalism; and
3. Jurisdiction Agnostic.

The ten core design practices of PTD are:

1. Minimum Legal Requirements;
2. Minimum Technical Requirements;
3. Drafting Legal Prose;
4. Minimum Automation Requirements;
5. Programming Software Components;
6. Prose & Software;
7. Draft Commentary;
8. Test Template;
9. Audit Template; and
10. Release Template.

8.1.1 Core Principles

Stay On-chain

The first principle, Stay On-chain, is to guide the legal practitioner to always approach PTD with an on-chain first mindset. In other words, the legal practitioner should always be looking for ways to keep the interactions between the parties, and the execution and enforcement of the RC-Web3 Template, on the blockchain, online, or handled by another Web3 technology. By keeping matters on-chain, the legal practitioner can reduce the variability that may arise because of different types of users, territories, and legal systems.

[968] Supra Section 1.7.6.
[969] Supra Section 1.7.1.
[970] On-chain is a term often used to signify that something is stored and created on, or interacted with, wholly or partially on a blockchain.

Seek Minimalism

The second principle, Seek Minimalism, is directly inspired by Verifi Media's MVD standard. As applied to PTD, the legal practitioner should try to simplify the agreement (i.e., reduce complexity) to its most essential parts (this will also help in figuring out the MAR practice) that can be specifically handled reasonably well with Web3 technology by a RC-Web3 Template.

Jurisdiction Agnostic

The third principle, Jurisdiction Agnostic, is to guide the legal practitioner to avoid using multiple jurisdictions or try to find a common ground on jurisdiction between the parties because the parties in a RC-Web3 Template context are likely to span multiple jurisdictions. By keeping the jurisdiction limited to one or few, it will be easier for the parties to know what to expect when utilizing a RC-Web3 Template and reduce the chances of unexpected legal occurrences arising from the different legal frameworks of jurisdictions. A good way to apply this principle is to look for jurisdictions that have adopted international treaties and agreements applicable to the subject matter of the agreement.

8.1.2 Core Design Practices

Minimum Legal Requirements

The Minimum Legal Requirements (MLR) practice requires the drafter to consider the legal frameworks that prescribe the boundaries and minimum requirements of the legal subject matter of the agreement. For any RC-Web3 Templates, the drafter will need to evaluate the following laws, rules and regulations applicable in their jurisdiction(s):

- Electronic Signatures;
- Electronic Transactions;
- Contracts[971];
- Evidence;
- Alternative Dispute Resolution;
- International Treaties;
- Tax Liability;
- Conflict of Laws;
- Data Privacy; and
- Web3-specific laws and regulations.[972]

Once the additional frameworks are ascertained, the drafter should incorporate the minimum requirements for each framework into the RC-Web3 Template.

Minimum Technical Requirements

The Minimum Technical Requirements (MTR) practice requires the drafter to consider the technical frameworks for the desired Web3 infrastructure and best practices for developing Web3-interactive programmable software components. For example, since the OpenLaw platform is on Ethereum, the drafter will need to consider the following:

[971] Especially contractual remedies.
[972] Additionally, a drafter may need to consider securities laws and trade laws.

- programming frameworks and best practices for deploying a smart contract on the Ethereum blockchain[973]; and
- how transactions on OpenLaw are conducted and stored on the Ethereum blockchain.

For an additional example, if the drafter wants to deploy an ERC-20 token to the Ethereum blockchain, the drafter should examine the ERC-20 token standard and good practices associated with ERC-20 tokens.

Drafting Legal Prose

The Drafting Legal Prose (DLP) practice requires the drafter to draft the legal prose of the RC-Web3 Template in accordance with the MLR practice and the purpose of the legal document.

Minimum Automation Requirements

The Minimum Automation Requirements (MAR) practice requires the drafter to consider which parts of the legal prose are ripe for automation. Generally, the objective and computable provisions can be automated (e.g., payments, dates and times), while the subjective or difficult to compute provisions should be left as legal prose. Additionally, any existing assets or rights are generally tokenizable.

Programming Software Components

The Programming Software Components (PSC) practice requires the drafter to program or cause to program, if not already programmed, the software components of the RC-Web3 Template (generally in accordance with the MTR practice). Additionally, the drafter needs to consider if they can directly embed the legal prose into the metadata of any file containing a digital representation of the agreement's subject matter.

Prose & Software

The Prose and Software (P&S) practice requires the drafter to combine the legal prose, considerations for automation, and software components to produce one complete draft of the RC-We3 Template.

Draft Commentary

The Draft Commentary (DC) practice requires the drafter to draft commentary explaining to the relevant parties (licensor, licensee, drafters, etc.) the provisions of the RC-Web3 Template, the legal and technical contours of the RC-Web3 Template, and any disclaimers and licenses. Generally, this practice is akin to a cover letter explaining the agreement to a client.

Test Template

The Test Template (TT) practice requires the drafter to test the RC-Web3 Template on the Web3 infrastructure. For example, if the RC-Web3 Template is developed on the OpenLaw platform on the Ethereum blockchain, the drafter should execute the RC-Web3 Template on one of the Ethereum blockchain test networks, such as the Rinkeby network, or on a private Ethereum network.

Audit Template

The Audit Template (AT) practice requires the drafter to have a third-party audit (public or private) of the RC-Web3 Template's software components for security and optimization purposes.

[973] However, if the drafter is working with a software engineer well versed in Web3, then these considerations can be left with the software engineer

Release Template

The Release Template (RT) practice requires the drafter to release the RC-Web3 Template to the parties involved, or make available to the public, in an easily accessible and editable manner, such as a template on the OpenLaw platform. Additionally, if the RC-Web3 Template is made available to the public, the drafter should also include any copyright distribution licenses associated with the template, any preferred audiences, and the commentary for the RC-Web3 Template.

8.2 Automating Legal Prose

Automating legal prose raises serious issues concerning how to translate subjective terms in a legal document into objective programmable software.[974] An additional concern is also implied covenants in contracts, which are included even if the parties did not consider them. This is often the case for a duty of good faith and fair dealing.[975] Generally, terms that are easily computable (i.e., quantitative or tending to be quantitative) are the easiest to translate into programmable software (the programmable software we are most concerned with are smart contracts and we shall refer to smart contracts for the rest of this section), while terms that are subjective, indeterminable at the time of contracting, or ambiguous, are the hardest to translate into a smart contract.[976] Our perception of the difficulty of translating legal prose, specifically provisions in a copyright license, into smart contracts is described in the table below.

[974] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".
[975] Ibid.
[976] Giancaspro, "Is a 'smart contract' really a smart idea? Insights from a legal perspective".

Provision	Difficulty	Reasoning
Royalties	Easy to Medium	Royalties are generally quantitative in nature, and can be easily computed from the outset, including payment splits. Recurring payments can be done as well.
Accounting	Easy to medium	The bulk of the accounting can be handled by the blockchain itself
Party Information	Easy to Medium	Party information is generally ascertainable, each of the parties has a unique public address on the blockchain, and parties can verify personal information on the blockchain
Notices	Easy to Medium	Notices can easily be sent via a transaction between the parties, such as signing a message and giving the hash to the counterparty
Reporting	Easy to Medium	Reporting can be handled on-chain by utilizing a block explorer to track the number of uses by a public address
Grant	Medium to Hard	Grant conversion can be handled by tokenizing copyright and licenses. However, difficulty may arise if the grant language contains subjective (or requiring off-chain interaction) terms.
Dispute Resolution	Medium to Hard	Dispute resolution may occur online or offline. If offline, then it becomes harder to resolve because the parties may not know each other and if a dispute gets sent to a court of competent jurisdiction.
Remedies	Medium to Hard	Equitable remedies will be hard to enforce unless the dispute can be resolved on-chain. Certain remedies may also be unavailable depending on the jurisdictions of the parties. Liquidated Damages, Penalties, and other Fines are easier to implement because they are computed at the time of contracting.
Choice of Law	Easy to Medium	Choice of Law can be explicitly stated in the Ricardian contract.
Representations, Warranties & Indemnification	Medium to Hard	RWI is hard to enforce because of the pseudonymity of the parties, and the potentially large cost of conducting a background check on the parties.
Termination	Easy to Medium	Termination can be handled on-chain by codifying the termination events into the smart contract. By doing so, the smart contract will not be removed from the blockchain, but it will for all intents and purposes become inactive. Additionally, the cause for termination may be disputed through on-chain or online dispute resolution.
Signatures	Medium to Hard	Signatures can easily be handled with cryptographic signatures and public key infrastructure. However, the signature may not be valid under a jurisdiction's electronic signature laws and issues arise concerning the identity of the signatories.
Identity	Medium to Hard	The identity of the parties will be difficult to ascertain because blockchain public addresses are pseudonymous, unless the parties have made their identities known to each other. We expect the licensor (musician, rights holder, etc.) to make their identity public, while not requiring the counterparty to make their identity public because of the cost of KYC procedures.
Additional Agreements	Medium to Hard	Having the parties enter into additional agreements can be codified in the smart contract but faces "follow-on intent" complications as described by Giancaspro.[977]

Given some of the headaches of translating prose to software, we believe a middle ground approach such as a contract management platform that offers functionality with blockchain and other Web3 technologies (e.g., OpenLaw) would be the one of the best approaches for increasing adoption of Web3 technologies among legal professionals and music industry stakeholders.[978] Additionally, if the contract management platform allows the contracts made on the platform to integrate with DApps (built with smart contracts), then it becomes easier for musicians, other music industry stakeholders, and smart contract developers to build DApps using contracts that are legally-compliant while achieving transaction cost savings.[979]

8.3 Automated Music License Methods

The OpenLaw platform, as discussed in Part I, is a Ricardian Contract (RC) development and hosting platform that interacts with the Ethereum blockchain and associated ecosystem.[980] OpenLaw provides a public repository for storing and extending RC-Web3 Templates, and has its own markup language for writing RC-Web3 Templates.[981] On OpenLaw, a record of all signed and executed RC-Web3 Templates is stored on the Ethereum blockchain, excluding the rich text (the legal prose, user-defined variables and options, and party identification other than Ethereum public addresses drafted in the markup language) of the RC-Web3 Template.[982] This record includes all the required information for a transaction stored on the Ethereum blockchain, including the:

- public addresses (i.e., the proof that the parties exchanged cryptographic signatures) of the parties,
- timestamp of the transaction,
- Gas fees and Gas limit, and
- creation, interaction and/or execution of any smart contract functions (e.g., creating tokens, transferring tokens).[983]

We utilized OpenLaw to develop our automated music license standard form, aptly named the *Tokenized Music License*[984], an RC-Web3 Template standard form for music licensing in a Web3 technologies context. Additionally, we created a form and flow for the TML to guide users of the TML through the contracting process. The TML form and flow is designed to guide users through the contracting process by first providing contact information, then filling out the particulars of the TML, and finally ending with signatures.

Before using the OpenLaw platform, we read through the OpenLaw Docs to understand how:

- to design a template,
- to design a form and flow, and
- OpenLaw RCs can interact with the Ethereum blockchain (e.g., cryptographically signing transactions and recording transactions on the blockchain) and associated ecosystem (e.g., DApps and data oracles).[985]

We heavily referenced the First Draft, Sign & Store, Forms & Flows, and Token Forge pages.[986] From the PTD method, we relied on the MLR, MTR, MAR, DLP and P&S core design practices. We determined our MLR,

[978] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[979] Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0"; Bodó, Gervais, and Quintais, "Blockchain and smart contracts".
[980] *Overview | OpenLaw Docs*; Finck and Moscon, "Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0".
[981] *Overview | OpenLaw Docs*.
[982] Ibid.
[983] Ibid.
[984] The Tokenized Music License discussed in this report is Version 0.5 (V0.5), and a draft of V0.5 is included as an appendix to this report
[985] *Overview | OpenLaw Docs*.
[986] Ibid.

MTR, MAR from the Literature Review in Part 1.[987] For P&S considerations, we referred to COALA-IP's Licensing Protocol documentation and OpenLaw's documentation.[988] For DLP, we relied on our previous knowledge of intellectual property licensing and referred to two licenses:

1. ASCAP's Music-in-business Blanket License; and
2. Kadion Henry's Music License Agreement from Docracy.[989]

Lastly, we relied on two interviews, one with a music composer and the other with the Kleros team, to aid in tailoring our TML for our intended circumstances.

[987] Supra Section 1.
[988] Supra Section 1.
[989] Kadion Henry. *Music License Agreement*. URL: https://www.docracy.com/6931/music-license-agreement (visited on 12/10/2019); *ASCAP Music License Agreements and Reporting Forms*. en. URL: http://www.ascap.com/music-users/licensefinder (visited on 12/10/2019).

9 Discussion

9.1 Standard Form Design

We tailored the TML under the following circumstances:

- the licensor and licensee ("the parties") are very unlikely to have direct, one-on-one interactions;
- the parties are unlikely to be physically located in the same jurisdiction;
- the parties will have issues seeking legal recourse against each other;
- the licensor is seeking to offer non-exclusive licenses to the public;
- the licensor is likely a musician who is not connected with a record label;
- the licensor is unlikely to be a member of a CMO;
- the licensor is the holder of all rights under copyright of the musical work;
- the license should in the licensor's favor;
- the parties do not expect their transaction to be private;
- the parties have a basic understanding of Web3 technologies; and
- the parties have a basic understanding of copyright law.

In designing the TML, the major drafting decisions we made were:

- bundling all rights under copyright;
- tokenizing the licensor's rights under copyright ("copyright ownership");
- tokenizing the license grant to the licensee;
- requiring the licensee to obtain escrow from Kleros;
- requiring the parties to communicate through Status messenger;
- requiring the parties to accept Kleros Court as their only means for ADR;
- requiring the licensor to register with VerifiMedia to obtain an MVD-compliant digital file of the musical work;
- requiring the licensee to make a down payment in DAI;
- setting choice of law provisions for contract law, copyright law, and ADR; and
- adding recurring payments in Ether.

We decided to bundle all the rights under copyright the licensor may have together to try to avoid licensing coordination and fragmentation issues.[990] We decided to tokenize copyright ownership (i.e., make a digital representation of the licensor's copyright on the Ethereum blockchain) as an NFT and the license grant (i.e., make a digital representation of the licensee's license grant on the Ethereum blockchain) as an ERC-20 token. We chose to tokenize copyright ownership in the musical work as an NFT for two reasons:

- to track and assert copyright ownership to the musical work on-chain; and
- copyright ownership is a unique bundle of rights to a specific copyrighted work.

[990] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".

We chose to tokenize the license grant as an ERC-20 token for two reasons:

- to track the license grant under the licensor's copyright on-chain; and
- the license grant is on a non-exclusive basis (i.e., the license grant is not unique because anyone else can seek a license grant under the same terms).

Also, by tokenizing copyright ownership and the license grant, we hoped to address the licensing coordination discrepancy between off-chain and on-chain transactions.[991] Lastly, by tokenizing copyright ownership and the license grant, the parties can use their tokens to interact with the Ethereum blockchain ecosystem (e.g., other DApps and cryptocurrency exchanges).

We required the licensee to obtain escrow for the TML from Kleros. The escrow is for alleviating the harm from a breach of, or dispute under, the license for the benefit of the licensor. Additionally, by requiring on-chain escrow, we automated the acquisition and disposition of escrow, thus providing some cost-savings to the parties and keeping the interaction between the parties on-chain.

We required the parties to communicate with each other concerning notices via the Status messenger DApp, so that the parties could securely communicate with each other using their on-chain identities (i.e., public addresses).[992]

We required the parties to agree and acknowledge the Kleros Court as the only ADR measure under the TML. By doing so, we wanted to ensure the parties could adjudicate their dispute on-chain because of the difficulties of obtaining traditional legal recourse. Additionally, even after the resolution of the dispute in Kleros Court, the aggrieved party may still take their dispute to a court of competent jurisdiction.

We required the down payment to be priced in USD and made in DAI, a stablecoin that is pegged one-to-one with the US dollar (USD), developed by MakerDAO, a Decentralized Finance (DeFi) credit facility (Alternatively, the down payment could be made with a centralized stablecoin such as Coinbase's USD Coin (USDC), Paxos Standard Token (PAX), or Gemini Dollar (GUSD), especially given the recent DeFi hacks between February and May 2020).[993] By requiring the down payment in DAI, the parties (and especially the licensor) can have some assurance that the down payment amount will remain relatively stable given normal market conditions.

We required recurring payments so that the licensor can have a small but reliable revenue stream from the TML. Unfortunately, the standard recurring payment smart contract on OpenLaw only allowed for payments in ETH.[994] We decided not to cap miner fees to a specific amount, and that such fees are excluded from any required payment amount (i.e., the licensee cannot include the miner fees as part of the payment amount).

We included network congestion as an event under our Force Majeure clause so that the parties would not be punished for undue delay in carrying out their contractual obligations because the Ethereum blockchain network became so congested that miner fees became unreasonably too high or transactions could not be processed in a timely manner.

We included governing law (i.e., choice of law) clauses for contract law, copyright law, and ADR. For contract law, we thought the choice law should be left to the licensor to decide.[995] For copyright law, we prohibited the

[991] Ibid.

[992] Additionally, the parties can communicate via email.

[993] Celia Wan. *In a first, MakerDAO protocol to auction MKR tokens to cover $4M bad debt*. en. Mar. 2020. URL: https://www.theblockcrypto.com/post/58606/in-a-first-makerdao-protocol-to-auction-mkr-tokens-to-cover-4m-bad-debt (visited on 05/12/2020); Brady Dale and William Foxley. *DeFi Leader MakerDAO Weighs Emergency Shutdown Following ETH Price Drop*. en. Mar. 2020. URL: https://www.coindesk.com/defi-leader-makerdao-weighs-emergency-shutdown-following-eth-price-drop (visited on 05/12/2020); DeFi Saver. *Black Thursday at DeFi Saver*. en. Mar. 2020. URL: https://medium.com/defi-saver/black-thursday-at-defi-saver-3c35ea6cd0d0 (visited on 05/12/2020).

[994] *Overview | OpenLaw Docs*.

[995] Though, we are considering adding default governing law options for contract law, such as the State of New York, in an updated version of the TML.

licensor from asserting any rights under copyright against the licensee other than those available under international copyright treaties.[996] For ADR, we chose the UNCITRAL model law on international commercial arbitration as the governing law.

Additionally, our design of the TML addressed the following concerns from the Literature Review in Part I[997]:

- Follow-on intent;
- Contractual capacity;
- Governing law;
- Electronic Transactions and Signatures;
- File formats for the musical work;
- Online dispute resolution; and
- Representing copyright on a blockchain.[998]

We addressed contractual capacity by explicitly stating in the Representations and Warranties section that the parties have the contractual capacity to enter into the agreement. We addressed follow-on intent by including a follow-on intent section where the parties expressly acknowledge that their intent to contract is carried over in the execution of any smart contracts embedded in the license. We addressed awareness of RCs, cryptographic systems, and Web3 technologies in the Recitals section by explicitly stating that the parties were aware of these risks.

We addressed the digital file format concerns by requiring the licensor to complete the registration process with Verifi Media to obtain a metadata bundle for the musical work, and give the licensee a copy of the musical work as digital audio file in the ".bc" file format so that the specific copy can be tracked.[999] Additionally, we included an anti-circumvention clause prohibiting the licensee from circumventing the protections of the metadata bundle.[1000]

We addressed the validity of electronic signatures in the licensee's or licensor's jurisdiction by requiring the parties to take any and all necessary steps to execute the TML, including providing a written signature if need be.

We required that the TML should still be enforceable even if the licensee's jurisdiction does not recognize a signed and executed TML as valid. Though, this may be stretching enforceability and we caution the use of this clause.[1001]

We required the licensor to add ISRC- or ISWC-required information for the musical work to the TML. Even if the licensor does not have an ISRC or ISWC for the musical work (the licensor can submit N/A for this section), we thought it would still be valuable to require such information in the TML because it would:

- provide industry-standard metadata on the musical work, and
- be easier for music industry stakeholders to track transactions involving the musical work.

[996] We were also considering limiting the governing law for copyright to only those international copyright treaties (not as adopted in the domestic nation's laws) that have been adopted in their jurisdiction
[997] Some of these concerns were addressed previously when we discussed our major design decisions.
[998] Supra Section 1.
[999] This can be done in a more secure manner by having the licensor store the ".bc" formatted digital audio file on the IPFS, and using an access control smart contract to provide access to the licensee upon checking if the licensee has a license grant token.
[1000] Though, this may be unnecessary because of the WIPO Copyright Treaty (WCT).
[1001] Bodó, Gervais, and Quintais, "Blockchain and smart contracts".

Though, unfortunately, providing such information does not grant an ISRC or ISWC to the musical work.

We included a privacy law provision to address when it was appropriate to process the personal data of the licensor, licensee, or both parties if one or both parties' personal data is subjected to a privacy law or regulation, such as the GDPR. Specifically, our provision addressed whether there was a lawful basis for processing the licensee's personal data on the Ethereum blockchain if the licensee is an EU resident such that the GDPR would apply.

Our dispute resolution provision requires all disputes arising from, or related to, the license to be adjudicated in a Kleros Court (specifically, the E-commerce subcourt), with three (3) jurors, and the licensee must cover the Kleros deposit fee for arbitration.

We believe the TML satisfies the requirements of UETA and E-sign because the parties:

- have the intent to sign,
- are consenting to doing business electronically,
- are associating their signature (here being their cryptographic signatures via their public-private keys) with the TML on the Ethereum blockchain, and
- the record is retained on the Ethereum blockchain.

We also believe that the TML helps address the licensing costs and issues mentioned in the Music Licensing Primer.[1002] First, the TML helps address transaction costs (specifically negotiation, enforcement and matching costs) because the TML is pre-negotiated (terms of use and pricing), the embedded smart contracts execute and enforce the terms of the TML[1003], any disputes arising between the parties can be addressed in Kleros Court[1004]), the executed TML is recorded on the Ethereum blockchain (and the tokens refer to the TML), and it is easier for musicians to find potential licensees in an international market.[1005] Second, the TML helps address membership costs by enabling musicians to directly license their works to an international market of potential licensees with the guaranties provided by Web3 technologies, thereby reducing the need to join a CMO, pay membership fees to CMOs, share revenue with CMOs, and license works on a collective basis.[1006] Third, the TML helps address multi-territorial issues by pre-determining the choice of law for copyright and ADR (specifically, restricting the choice of law to international treaties and rules), allowing the licensor to determine the jurisdiction for contract, and the TML is not restricted to any single territory. Fourth, the TML helps address contract management issues by retaining a record of the executed TML on the Ethereum blockchain (and the tokens refer to the TML), making the contracting process easier with the TML form and flow, and making the TML publicly accessible on OpenLaw for any potential licensee to review.[1007]

OpenLaw also provides an option for private instances (private repositories to keep templates and agreements shielded from other users) which can address music industry stakeholder concerns about keeping their transactions confidential even when using blockchain and smart contracts.[1008] We chose not to exercise this option because our TML is a standard form that is meant to be accessible and modifiable by anyone who is seeking to license musical works in a Web3 technologies context. Additionally, our TML can be modified to provide more transactional privacy (e.g., by removing the legend in the copyright and license grant tokens, or by using the TML in a private instance) if the parties desire more privacy.

[1002] 4

[1003] However, this is debatable because the musical work does not automatically become available to the licensee upon signing. Though, this can be addressed by integrating the license with a DApp that fits such purposes.

[1004] Which is an easier option for the parties in a mass contracting context.

[1005] Bodó, Gervais, and Quintais, "Blockchain and smart contracts"; Handke and Towse, "Economics of Copyright Collecting Societies"; Towse, "The Economic Effects of Digitization on the Administration of Musical Copyrights".

[1006] Handke and Towse, "Economics of Copyright Collecting Societies".

[1007] *Top 8 Challenges in Contract Management*.

[1008] Torbensen and Ciriello, "TUNING INTO BLOCKCHAIN".

Our TML could work well with COALA-IP's licensing protocol because each transaction with the TML is hashed on the Ethereum blockchain, and this hash can be used in an IPLD or JSON-LD format to refer to the TML and if possible, associate it with the digital audio file's hash on the IPFS (which would be a Content Identifier (CID)).[1009] The TML could be described by COALA-IP's IP licensing protocol with the following models:

- Place,
- Party,
- Creation,
- Right, and
- Assertion.[1010]

Place could aid in determining the territory where the copyrighted work was created.[1011] Party could be used for the Licensor to provide personally identifiable information.[1012] Creation could be used to describe the copyrighted work and any copies of the copyrighted work.[1013] Right could be used to describe the nature of the transaction involving the TML.[1014] Lastly, Assertion could be used as a failsafe for notifying third-parties about the licensor's claim as an author or rightsholder of the copyrighted work, and thus it may be challenged in the future.[1015]

We defined the following terms in the TML:

- 51% attack;
- Cryptographic Signature;
- DAI stablecoin;
- Network Congestion;
- Non-fungible Token;
- DApp;
- Fungible Token;
- Moral Rights;
- Blockchain;
- Blockchain Platform;
- Smart Contract;
- Token Transfer;
- Kleros Escrow; and
- Kleros Court.

Most of the terms we defined are generally applicable to any RC-Web3 Template.

A concern we noted that could arise from RC-Web3 Templates is jurisdiction shopping. We became primarily concerned with jurisdiction shopping (generally for favorable laws) where the parties (more often than not, the licensor) will seek to find jurisdiction(s) with the most favorable legal frameworks and venues (primarily online) to themselves, and thereby avoid scrutiny from their own jurisdiction's legal system.

[1009] *COALAIP/specs*.
[1010] Ibid.
[1011] Ibid.
[1012] Ibid.
[1013] Ibid.
[1014] Ibid.
[1015] Ibid.

9.2 Research Limitations

Unfortunately, time constraints prevented us from fully exploring automated legal applications of music licenses could not cover everything we wanted to consider as we were working on this report (which also makes this list a good starting point for future research).

Specifically, we did not have enough time to fully investigate:

- Creating an OpenLaw-integrated DApp;
- Connecting an OpenLaw Agreement with a Chainlink data oracle (i.e., embedding a Chainlink smart contract connected to an external data feed in our license);
- Developing a Semantic Web music license;
- Developing an RC-Web3 Template that interacts with the Semantic Web;
- Developing an RC-Web3 Template pursuant to COALA-IP's Licensing Protocol documentation;
- Determining RC-Web3 Template compliance with non-GDPR privacy laws and regulations;
- Creating a RC-Web3 Template for compulsory licensing;
- Having legal practitioners, music industry stakeholders, and technologists test and critique the PTD method and the TML;
- Practicing the TT and AT core design practices with the TML;
- Determining the interaction between national and international arbitration rules and procedures in an online context;
- Developing an access control smart contract to control access to the digital music file in the ".bc" format stored on a distributed data storage solution such as the IPFS, and embedding this smart contract in the TML;
- Discussing the ADR rules and procedures in the USA, EU, and international contexts in greater detail;
- Discussing Chainlink's data oracle network and services;
- How independent labels would design an automated music license;
- Developing an access control smart contract for transferring or possibly burning the copyright and license grant tokens that could be controlled by the Kleros Court in resolving a dispute;
- Determining an appropriate international standard for contract law in a RC-Web3 Template context;
- Investigating remedies available under other areas of law such as tort law;
- Investigating further how the TML can be used in conjunction with COALA-IP's IP licensing protocol to secure the TML across multiple ledgers and the web, especially regarding user extensions to the IP licensing protocol;
- Incorporating other legal technology products with OpenLaw templates and forms; and
- Explicitly adding a termination smart contract to the license.

9.3 Future Research Areas

For future research in this research topic, we recommend investigating the following areas:

- Connecting an OpenLaw RC-Web3 Template with a Chainlink data oracle (i.e., embedding a Chainlink smart contract connected to an external data feed in a Ricardian Contract);
- Creating a music licensing DApp that is legally compliant;
- Dynamic pricing of musical works via token bonding curves (aka automated market makers);
- Determining Ricardian Contract compliance with GDPR and other data privacy laws and regulations;
- Use of decentralized identifiers (DID) and self-sovereign identity (SSID) platforms such as uPort for identifying the parties to an agreement;
- Comparing blockchain's usability for copyright transfers to copyright licenses;
- How to apply zero-knowledge proofs (ZKP) to provide transactional privacy for RC-Web3 Templates;
- How a Decentralized (or Distributed) Autonomous Organization (DAO) such as DAOrecords[1016] could act as a CMO for licensing musical works via RC-Web3 Templates while remaining accountable to its members; and
- Further exploring how token engineering can be applied to the music industry.

[1016] *Introducing DAOrecords – DAOrecords*. en-US. URL: https://www.daorecords.org/about-us/ (visited on 06/02/2020).

Conclusion

In Part 1, we stated that our research questions in this report were:

1. What are the transactional costs of music licensing?
2. What are the perceived benefits of automating music licensing via smart contracts?
3. What are the legal and technical implications of automating music licensing?
4. How are current decentralized streaming and multimedia content handling licensing?
5. What are the current barriers to automating music licensing?
6. What are the gaps in knowledge or know-how for automating music licensing?
7. What web protocols exist, if any, for licensing intellectual property?
8. What are the licensing models available for musical works?
9. What are the legal boundaries affecting music licensing in an international context
10. Can we conceptualize an automated music licensing framework(s)?
11. What are the consideration in translating legal language into programming language
12. What is the state of literature in this area?
13. Should rights under copyright, if tokenized on a blockchain, be tokenized as fungible or non-fungible tokens?

Throughout the course of this report, we were able to answer or address all of them. In our Literature Review, we mapped the current state of the literature on automated legal applications in music licensing from four perspectives:

1. Music Business Perspective
2. Legal Perspective
3. Automation Perspective
4. Value Web Perspective

Each perspective discussed the wide and varying impacts of blockchain in the music industry and how each impact is different depending on the perspective. The music business perspective discussed that blockchain could lead to the development of a musician-centered ecosystem, but with concerns of getting buy-in from current industry stakeholders because of a lack of privacy over deal making and legal clarification of copyright and contract law on the blockchain. The legal perspective discussed the various legal issues that arise with blockchain for music including contract law, electronic signatures and transactions law, evidence, and copyright law. In each discussion of a legal concept, it was interesting to see how each area interacted with each other, and that many unexpected legal issues can arise with a blockchain. The automation perspective discussed the four automation approaches for music licensing that utilized blockchain and smart contracts (for issuing, purchasing, enforcing and tracking music licenses), the Semantic Web (for tracking musical works across the web and associated licenses), metadata (to track specific copies of a digital music file with watermarks while tracking transactions associated with said digital music files on the blockchain), and Ricardian Contracts (combining legal prose with programmable software components so that parties can securely sign and execute contractual documents through software and securely connect those agreements with external systems). The value web perspective discussed how value flows in the music industry have led to issues of transparency and unnecessary complexity, and a mapping of the value web of the music industry and stakeholders.

Then we moved on to provide a legal frameworks primer on copyright law, contract law, electronic transactions and signatures law, from a USA, EU, and international (copyright only) perspective. Before moving onto our technology primer, we provided a music licensing primer to discuss various aspects of licensing musical works.

Lastly, we provided a technology primer to discuss the relevant technologies (with an emphasis on Web3 technologies) for automating music licensing to conclude Part I.

In Part II, we discussed our motivation for developing a practical application of Web3 technologies to music licensing, the Terms of Service (ToS) of decentralized media platforms in the blockchain industry and whether any of the ToS gave users the option to license their works, and which specific licenses they could choose. In our review, the majority of ToS did not give users much flexibility in licensing their works on the decentralized media platforms. Only LBRY and Creativechain gave users the option of associating more than one license (though only for distribution of creative works) with their works uploaded to the platform. Thus, we see that there is a need for greater licensing options for creatives on decentralized media platforms to exploit the value of their creative works.

Then we moved on to discuss our licensing method, Practical Tokenized Drafting (PTD), and how we developed our Tokenized Music License (TML) on the OpenLaw platform. We developed the PTD method and provided commentary on our TML to provide guidance to drafters in developing their own RC-Web3 Templates, and so that others could review and expand upon our approach. Lastly, we discussed how we designed the TML to overcome the concerns and issues mentioned in the Literature Review in Part I. Lastly, we discussed the limitations on our research and future areas for research on automated music licensing.

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Appendix

Tokenized Music License V0.5

[[Musician Logo]]

This Tokenized Music License Agreement ("Agreement") is entered between [[Rightsholder Name]] ("Licensor"), [[Licensor Ethereum Address]] and [[User Name]] ("Licensee"), [[Licensee Ethereum Address]] as of [[Signing Date]]

1. Purpose and Background

[[Rightsholder Name]] is a rightsholder in the [[musicalwork]], which is a musical composition sound recording, and intends to offer and execute mechanical, synchornization, performance, and other licenses via Web3 Technologies.

[[Rightsholder Name]] is a rightsholder in the [[musicalwork]] and intends to license the [[musicalwork]] to [[User Name]].

[[User Name]] intends to accept licenses that are partially or fully executed with Web3 Technologies.

[[Rightsholder Name]] and [[User Name]] both beleive that usage of Web3 technologies will smooth the contractual performance of both parties and lead to increased efficiencies in the licensing process that make up for any risks invovled with Web3 Technologies.

Now Therefore, in consideration of the terms set forth in this Agreement and other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, the parties agree as follows:

2. Definitions

- **Web3 Technologies** means technologies utilized for Web 3.0 such as blockchain, smart contracts, distributed data storage, data oracles, linked data, the semantic web, Ricardian contracts, and other similar and purpose-oriented technologies.
- **Down Payment** means the first payment made in conjunction with the execution of this Agreement.
- **Morally Rephrensible Content** means any harassing, abusive, tortious, threatening, harmful, invasive of another's privacy, vulgar, defamatory, false, intentionally misleading, trade libelous, pornographic, obscene, patently offensive (e.g., material that promotes racism, bigotry, hatred, or physical harm of any kind against any group or individual) or otherwise objectionable material of any kind or nature or which is harmful to minors in any way, or similar content.
- **51% attack** means an attack on a blockchain P2P network where one party has fifty-one percent or greater control of the hash rate of a blockchain P2P network, such that said party may double spend cryptocurrency and/or tokens or conduct other fradulent acts under the color of the majority.
- **Cryptographic Signature** means an electronic signature that is executed through the use of cryptography
- **DAI stablecoin** means Dai, an algorithmic stablecoin developed by MakerDAO that is pegged to the US Dollar
- **Network Congestion** means when a blockchain network is flooded with more transactions than usual such that the Network Fee price is higher than the average Network Fee price.
- **Network Fee** means any fees associated with storing transactions on a blockchain such as miner fees, Ethereum Virtual Machine operations fees, and other similar fees.

- **Non-fungible Token** means a token that is created in accordance with the Ethereum Resolution for Comments 721 (ERC-721) standard.
- **DApp** means software applications that run on peer-to-peer (P2P) computer networks, including blockchain P2P networks.
- **Fungible Token** means a token that is created in accordance with the Ethereum Resolution for Comments 20 (ERC-20) standard.
- **Blockchain** means an append-only database that is secured by a peer-to-peer (p2p) network of computers, regardless of whether the blockchain is public or private.
- **Blockchain Platform** means a protocol or DApp that interacts with the Blockchain at the application layer.
- **Smart Contract** means executable code stored on a blockchain to facilitate agreements among two or more parties that will automatically execute based on a set of predefined conditions
- **Token Transfer** means a transfer of Non-fungible Tokens or Fungible Tokens, as they exist now and hereafter, between the parties.
- **Kleros Escrow** means the escrow service provided by Cooperative Kleros.
- **Kleros Court** means the alternative dispute resolution protocol and platform provided by Cooperative Kleros.
- **Ethereum** means the Ethereum Blockchain, Ethereum Virtual Machine (EVM), and Ethereum peer-to-peer (P2P) networks
- **Crypto51** means the crypto51.app website, PoW 51% Attack Cost table, and the accompanying documentation to calculate the PoW 51% Attack Cost.
- **Ether (ETH)** means the native cryptocurrency on the Ethereum Blockchain
- **Rinkeby Network** means the Rinkeby network, a test peer-to-peer (P2P) network on the Ethereum blockchain
- **Main Network** means the Main network (mainnet), the main peer-to-peer (P2P) network on the Ethereum blockchain.

3. Rights Granted

(a) Grant

(i) [[Rightsholder Name]] grants to [[User Name]] the following licenses, subject to the limiations contained in Section 3.b:

(1) a worldwide, non-exclusive license to:

- (a) make or cause to make copies or re-recordings of [[musicalwork]] in any medium including but not limited to vinyl, CD-ROMs, and print;

- (b) to perform or cause to perform [[musicalwork]] accompanied by or in synchronization with visual images;

- (c) perform publicly or cause to perform pubicly [[musicalwork]];

- (d) mix, adapt, transform, or make a derivative of [[musicalwork]]; and

- (e) perform [[musicalwork]] by means of digital audio transmission.

(ii) [[Rightsholder Name]], pursuant to the Grant under this license, shall issue a Non-fungible Token (NFT) to [[Rightsholder Name]], to memorialize [[Rightsholder Name]]'s copyright on the Ethereum Blockchain, pursuant to , a Smart Contract on the Ethereum Rinkeby network embedded in this Agreement, to [[Rightsholder Name]], and , a Fungible Token to memorialize [[User Name]] license grant in [[musicalwork]], on the Ethereum Blockchain.

(iii) [[Rightsholder Name]], pursuant to the Grant under this license, shall issue a Fungible Token to [[User Name]], to memorialize [[User Name]] license grant in [[musicalwork]], on the Ethereum Blockchain, pursuant to , a Smart Contract on the Ethereum Rinkeby network embedded in this Agreement.

[[Rights Tokenization]]
Copyright NFT
MCR
1
This Token represents the Licensor's copyright in the musical work. All ERC-20 Tokens issued to Licensee are made pursuant to this Token.
58e63f03944644b884c8722679ea3e6b182af6c7

Tokenholder: [[Licensee Ethereum Address]]

[[License Tokenization]]
[[Token Name]]
MCL
100
This Token represents the Licensee's Agreement with the Licensor regarding the musical work. This ERC-20 Token(s) is issued pursuant to this Agreement and NFT. If at anytime these tokens are transferred, this Agreement will automatically terminate.
58e63f03944644b884c8722679ea3e6b182af6c7
Should be a non-markup version of the license

(b) Limitations

(i) All rights not expressly granted herein, including but not limited to rights in future media and technology, are hereby reserved to the [[Rightsholder Name]].

(ii) [[User Name]] shall embed the [[musicalwork]] only in mediums where end users are unable to extract the [[musicalwork]] and/or end users cannot use the [[musicalwork]] in any shape or form without the medium.

(iii) [[User Name]] shall only use [[musicalwork]] in a format that preserves the metadata of [[musicalwork]], such as dotBlockchain's ".bc" file format.

(iv) [[User Name]] shall not claim any ownership interest in the [[musicalwork]].

(v) [[User Name]] shall not make or cause to make copies of the [[musicalwork]] except as authorized under this Agreement.

(vi) [[User Name]] shall not use [[musicalwork]] in association with any Morally Rephrensible Content.

(vii) [[User Name]] shall not upload or store [[musicalwork]] on a blockchain or DApp that has a peer-to-peer network whose one hour cost of a 51% Attack is less than $10.000.00, as determined by Crypto51.

(viii) [[User Name]] shall not assign, transfer, or sublicense any license, fully or partially, under this Agreement via the transfer of (s) to a third party that would violate this Agreement or the laws, regulations, or rules of [[User Name]]'s jurisdiction or the third party's jurisdiction.

(ix) [[User Name]] shall only assign, transfer, or sublicense any license, fully or partially, under this Agreement via the transfer of (s) to a third party.

(x) [[User Name]] shall not use the [[musicalwork]] in any manner that violates the copyright laws, regulations or rules of their jurisdiction.

(xi) [[Rightsholder Name]] shall send [[User Name]] notice of any transfer of at least [[NFTtsfr]] before transferring to any third party.

4. Storage

(a) A copy of this Agreement will be processed and stored on the Ethereum Blockchain on either the main network or one of the test networks.

5. Blockchain Platforms

(a) [[User Name]] may reference this Agreement on any Blockchain Platform, which may be accomplished via a DApp, subject to the terms of this Agreement.

6. Waiver of Moral Rights

(a) [[Rightsholder Name]] irrevocably waives all moral rights with respect to the use of [[musicalwork]] pursuant to this Agreement unless doing so would be inconsistent with the laws, regulations and rules of the jurisdiction where the copyright in the [[musicalwork]] was created.

(b) If this waiver is not permitted by applicable law, [[Rightsholder Name]] hereby agrees not to enforce such moral rights against [[User Name]] and its permitted successors, licensees, transferees, and assigns.

7. Royalties

In consideration of the licenses granted herein, [[User Name]] agrees to pay [[Rightsholder]] the Down Payment and all applicable license fees as set forth in this Agreement.

(a) Down Payment

(i) [[User Name]] shall make a non-refundable, Down Payment of 100 DAI (~$100.00) to [[Rightsholder Name]] as of the [[Signing Date]] of this Agreement, pursuant to , a Smart Contract on the Ethereum Main Network embedded in this Agreement.

(b) Future Royalties

[[End Date]]

Future Date: [[Future Date]]

(i) [[User Name]] shall pay a recurring license fee of [[Recurfee]] Ether (ETH) to [[Rightsholder Name]] every [[Recurtime]], from the [[Signing Date]] to the Future Date: [[Future Date]], pursuant to , a Smart Contract on the Ethereum Main Network embedded in this Agreement.

(c) Escrow

(i) [[User Name]] shall deposit $[[Escrowamount]].00 worth of Ether with the Kleros Escrow service, in case of a dispute arising between the parties, and explicitly referencing that escrow is sought after pursuant to this Agreement for the benefit of [[Rightsholder Name]].

1

(d) Delinquency

(i) In the event [[User Name]] shall be delinquent on any payment of licensee fees due to [[Rightsholder Name]] by [[Delinquencytime]], [[Rightsholder]] may elect to liquidate [[Escrowamount]] by notifying [[User Name]] of the failure of payment, and contacting Kleros Escrow service about electing to liquidate the [[Escrowamount]].

8. Reporting

(a) [[User Name]] shall include an acknowledgement of this Agreement in each and every use of [[musicalwork]] under this Agreement.

(b) [[User Name]] shall furnish reports to Licensor upon entering into this Agreement and on or before January 31st of each succeeding year, on forms supplied free of charge by SOCIETY

(c) [[User Name]] shall furnish reports to Licensor on or before December 31st of each year, that shall describe in detail the following particulars:

(i) each and every use of [[musicalwork]];

(ii) each location or venue where [[musicalwork]] was used;

(iii) each and every platform where [[musicalwork]] was uploaded or stored; and

(iv) the number of plays [[User Name]] has recevied for any and all uses of [[musicalwork]].

(d) [[Rightsholder Name]] shall have the right to examine [[User Name]]'s books and records to such extent as may be necessary to verify the reports required by this Agreement.

9. Term

[[LengthDate]]

Term Date: [[TermDate]]

(a) The term of this agreement shall be for Term Date: [[TermDate]], and shall be renewed every Term Date: [[TermDate]], subject to [[Rightsholder Name]] sole approval.

10. Termination

(a) Upon any breach or default by [[User Name]] of any term or condition herein, [[Rightsholder Name]] may terminate this Agreement by giving [[User Name]] written notice to cure such breach or default in [[GracePeriod]], and in the event that such breach or default has not been cured within the [[GracePeriod]], this Agreement shall terminate upon the expiration of the [[GracePeriod]] without further notice or action from [[Rightsholder Name]].

(b) [[User Name]] may terminate this Agreement by sending notice to [[Rightsholder Name]] one week before terminating this Agreement if, at any time on or after the [[Signing Date]], [[User Name]] becomes aware of any reason why entering into this Agreement was violative of any applicable laws, rules, regulations or third party agreements. In such notice, [[User Name]] must particularly describe the reasons why [[User Name]] entering into this Agreement was violative of any applicable laws, rules, regulations or third party agreements, with such reasons being confirmed or determined by a competent attorney in [[User Name]]'s jurisdiction.

11. Notices

(a) The parties shall send all notices required under this Agreement through the use of electronic transmission via messaging DApps on the Ethereum blockchain, with [[Rightsholder Name]] identified by [[Licensor Ethereum Address]], and [[User Name]] identified by [[Licensee Ethereum Address]]. The following non-exclusive messenger DApps may be utilized for notifications:

(i) Status Messenger.

(b) Notwithstanding (a), [[Rightsholder Name]] and [[User Name]] may send notices via email at the following email addresses:

(i) [[Rightsholder Name]] email: ; and

(ii) [[User Name]] email: .

12. Representations and Warranties

(a) [[Rightsholder Name]] represents and warrants that:

(i) [[Rightsholder Name]] owns and controls the rights granted herein in the [[musicalwork]];

(ii) [[Rightsholder Name]] owns and controls the [[Licensor Ethereum Address]];

(iii) [[Rightsholder Name]] is either the author of, or a rightsholder in, the [[musicalwork]];

(iv) [[Rightsholder Name]] has the contractual capacity under their jurisdiction to enter into this Agreement.

(b) [[User Name]] represents and warrants that:

(i) [[User Name]] solely owns and controls [[Licensee Ethereum Address]];

(ii) [[User Name]] shall not interfere with [[Rightsholder Name]]'s relationships with other licensees regarding usage of the [[musicalwork]];

(iii) [[User Name]] entering into this Agreement does not violate any agreement between [[User Name]] and a third party;

(iv) [[User Name]] has the contractual capacity under their jurisdiction to enter into this Agreement;

(v) [[User Name]] entering into this Agreement does not violate any applicable law, rules or regulations in [[User Name]]'s jurisdiction; and

(vi) [[User Name]] is fully aware that the Smart Contracts embedded in this Agreement may or may not have been through a security audit.

13. Indemnification

(a) [[User Name]] agrees to indemnify, save and hold harmless, and to defend [[Rightsholder Name]] from and against all claims, demands and suits that are made or brought against [[Rightsholder Name]] with respect to [[User Name]]'s use of [[musicalwork]]. [[User Name]] and [[Rightsholder Name]] agree to give each other immediate notice of any such claim, demand or suit and agree to immediately deliver to each other all papers pertaining to it. [[Rightsholder Name]] shall have full charge of the defense of any such claim, demand or suit and [[User Name]] shall cooperate fully with [[Rightsholder Name]] in such defense. [[User Name]], however, shall have the right to engage counsel of its own, at its own expense, who may participate in the defense of any such action. [[Rightsholder Name]]'s liability under this Paragraph shall be strictly limited to the amount of license fees actually paid by [[User Name]] to [[Rightsholder Name]] under this Agreement for the calendar year in which the usage of [[musicalwork]], which are the subject of the claim, demand or suit occurred.

14. Miscellaeneous

(a) Severability. If any term, clause or provision of these Terms is held unlawful, void or unenforceable, then that term, clause or provision will be severable from this Agreement and will not affect the validity or enforceability of any remaining part of that term, clause or provision, or any other term, clause or provision of this Agreement.

(b) Survivability. Any rights or obligations that, by their nature, should survive termination of this Agreement, shall survive termination of this Agreement.

(c) Waiver. No Waiver of any of the provisions in this Agreement shall be effective unless set forth in writing and signed by the waiving party. No failure to exercise or delay in exercise of any right, remedy, privilege, or power under this Agreement shall be construed as a Waiver. Nor will any single or partial exercise of any right, remedy, power, or privilege hereunder preclude any other or further exercise thereof or the exercise of any other right, remedy, power, or privilege.

(d) Entire Agreement. This Agreement, including and together with any related attachments, constitutes the entire agreement of the parties and supersedes all prior agreements and understandings, representations, and warranties between the parties relating to the subject matter contained herein.

(e) Copyright Choice of Law. The copyrightable subject matter of this Agreement shall be interpreted and construed in accordance with the Berne Convention for the Protection of Literary and Artistic Works as amended in 1979, and any future amendments after the [[Signing date]].

(f) Contract Choice of Law. The subject matter of this Agreement that may be classified as contract law shall be interpreted and construed in accordance with the laws of [[Rightsholder Name]]'s jurisidiction.

(g) Smart Contract failure. [[User Name]] shall hold [[Rightsholder Name]] harmless for any and all malfunctions of the Smart Contracts embedded in this Agreement.

(h) Network Fees. [[Rightsholder Name]] is not responsible, nor is required to reimburse [[User Name]] for any and all Network Fees that [[User Name]] incurs in signing and executing this Agreement.

(i) Dispute Resolution. In the event of a dispute between the parties arising under this Agreement, the parties agree to arbitrate their dispute on Kleros Court. The parties agree that Kleros Court is an appropriate tribunal under Article 20 of the United Nations Commission On International Trade Law's (UNCITRAL) Model Law on International Commercial Arbitration as adopted in 2006, and agree to abide by the Kleros Court rules and procedures under Article 19 of the UNCITRAL's Model Law on International Commercial Arbitration as adopted in 2006. [[User Name]] is required to pay any and all fees, including deposit fees, that arise before, during, and after the dispute is arbitrated on Kleros Court.

(j) Cryptographic Signature. The parties agree that a cryptographic signature satisfies the electronic signatures laws and regulations of their respective jurisdictions.

(k) Follow-on intent. [[User Name]] agrees to execute and deliver any additional documents and instruments, and to perform any additional acts as may be necessary or appropriate to effectuate, carry out and perform all of the terms, provisions and conditions of this Agreement and the transactions contemplated thereto.

(l) Amendment. [[Rightsholder Name]] may amend this Agreement from time to time by sending notice to [[User Name]] describing the amendment at least ten (10) days before the amendment shall take effect.

(m) Force Majeure. Neither party shall be held liable for any delay or failure in performance of any part of this Agreement from any cause beyond its control and without its fault or negligence, such as Acts of God, changes to current laws and regulations, fires, explosions, floods, unusually severe weather conditions, inability to secure products or services of other persons or transportation facilities, or acts or omissions of transportation or telecommunications common carriers.

(n) File format. [[Rightsholder Name]] shall contact Verifi Media and complete any steps necessary to transform [[musicalwork]] into a ".bc" file format. [[Rightsholder Name]] shall not deliver the [[musicalwork]] to [[User Name]] unless and until [[Rightsholder Name]] has a copy of the [[musicalwork]] registered with Verifi Media and in a ".bc" file format.

15. Signatures

[[Rightsholder Name]]

_____

[[User Name]]

_____

16. Exhibits

(a) Exhibit A

(i) Metadata descirption of [[musicalwork]]

(1) This metadata description of [[musicalwork]] complies with one of the following digital music supply chain standards:

- (a) a) International Standward Work Code (ISWC) if [[musicalwork]] is a composition; or

- (b) b) International Standard Recording Code (ISRC) if [[musicalwork]] is a sound recording.