

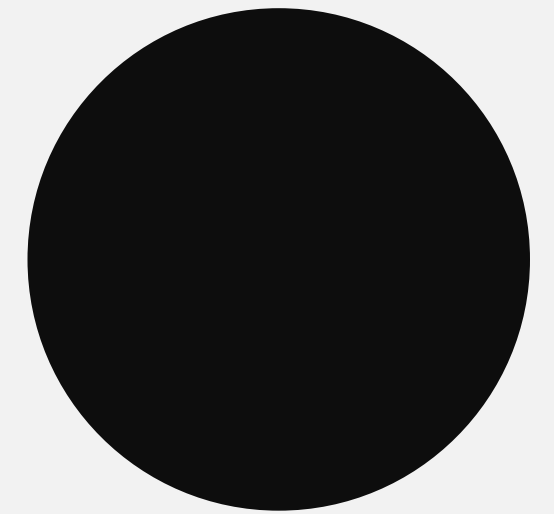
# **Distributed Ledger Technology Applications in the Recorded Music Industry: Analysis of Fairness and Transparency**

**Thesis Defence** for the obtainment of  
**Bachelor of Arts in International Business**  
at the **Hochschule für Technik und Wirtschaft Berlin**

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Supervised by: Prof. Dr. Stefan Wittenberg and Dr. Alla Petukhina





## RESEARCH QUESTION

Q.1

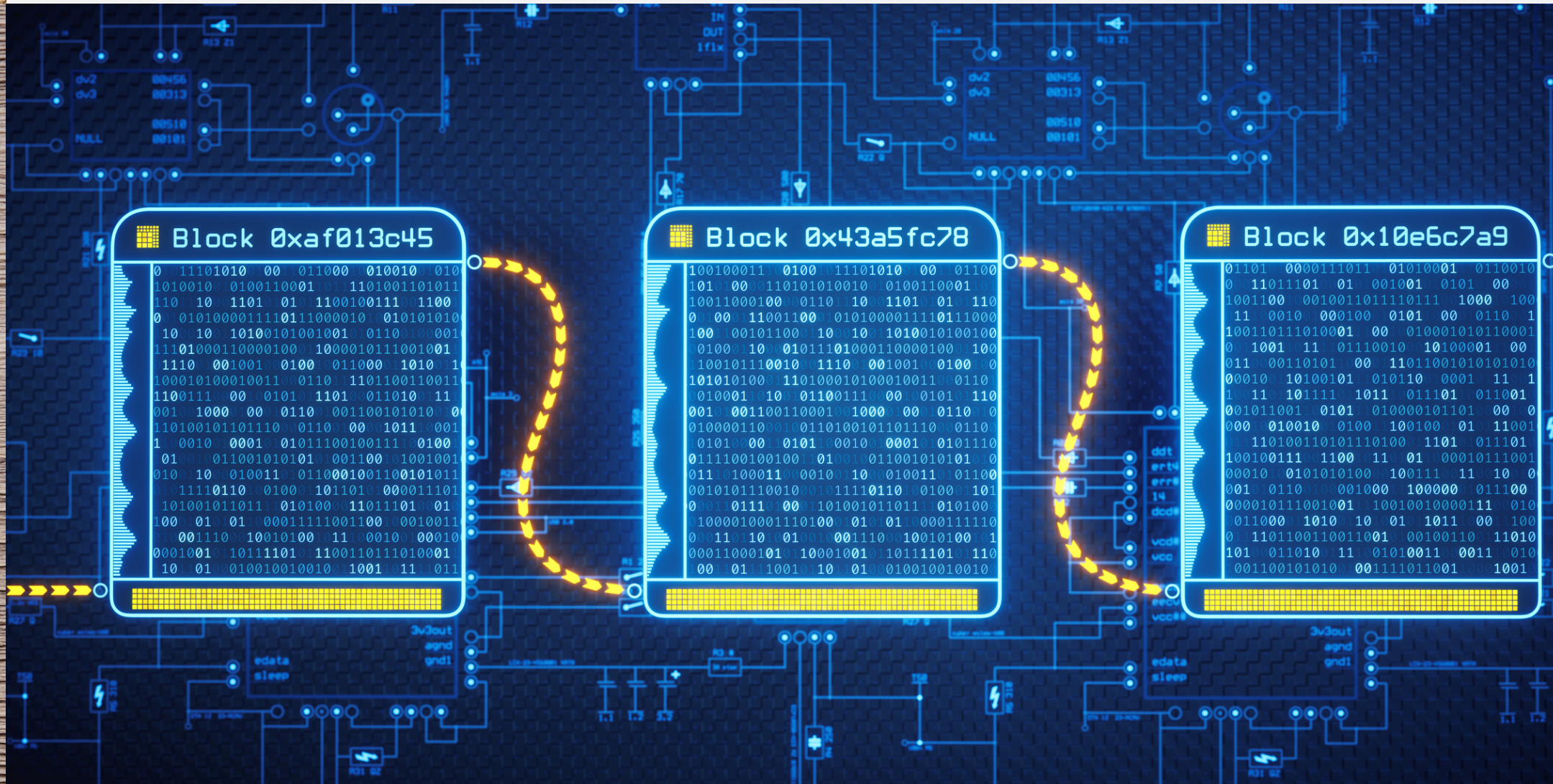
**Which** of the ideated DLT use cases for recorded music have been implemented?

Q.2

**How** are these applications implemented regarding the deployment attributes of DLT and the terms of service offering?

Q.3

Are these implementations **'fair and transparent'** as claimed?



today's presentation outline

**Research Question**  
3 questions

02

**Results**  
developed typology and analysis

04



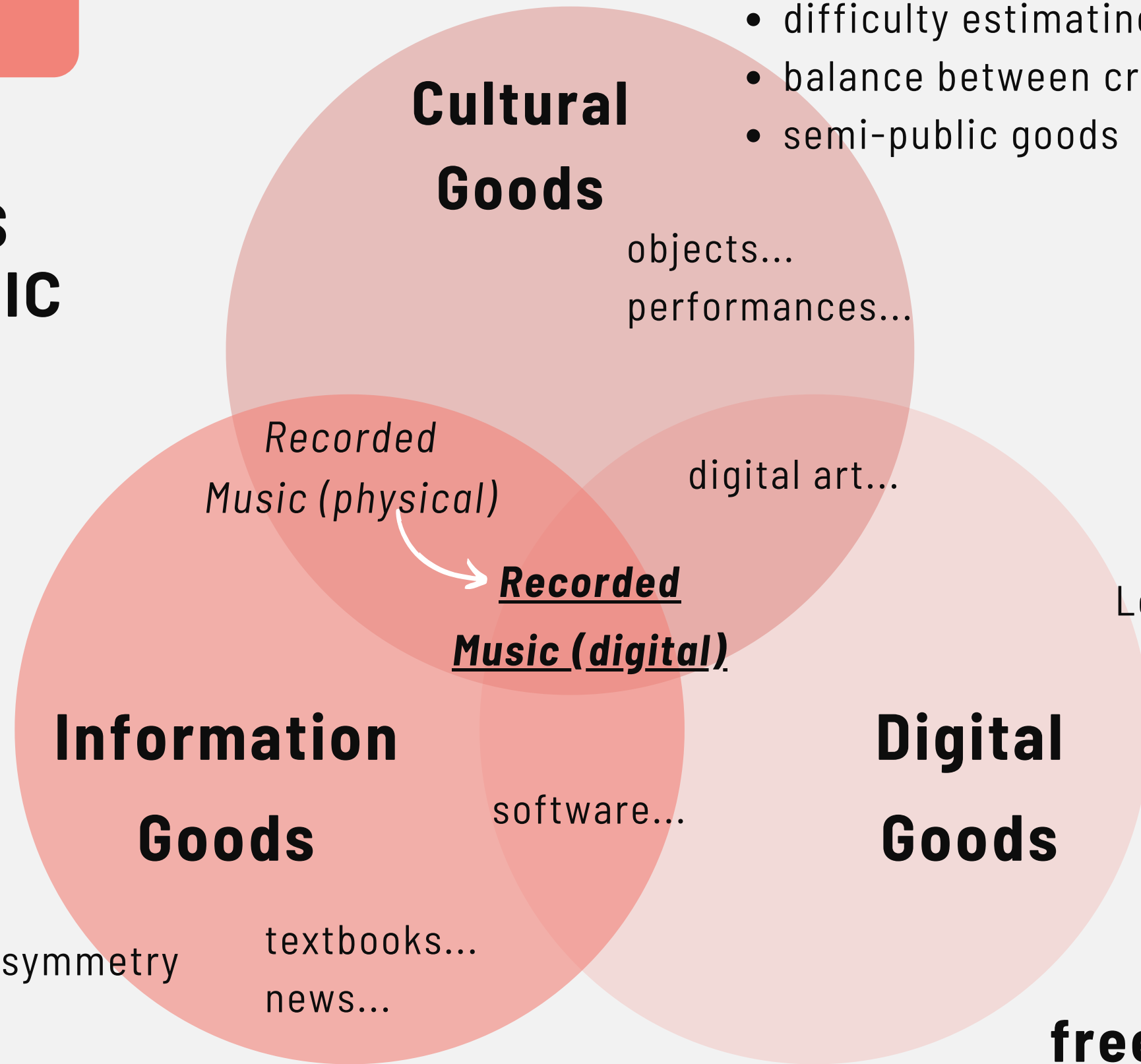
01 **Background & Framework**  
On recorded music and DLT

03 **Methodology**  
approach, sample collection,  
procedure of analysis

05 **Conclusion**  
findings, recommendations for  
further development

## ECONOMIC CHARACTERISTICS OF RECORDED MUSIC

- non-excludable
- non-rivalrous
- informational asymmetry in quality



- High production and low reproduction costs
- difficulty estimating success
- balance between creativity/commerce
- semi-public goods

- Lower costs for
- search
  - replication
  - transportation
  - tracking
  - verification

**free-rider problem (piracy)**  
**artificial scarcity**

**durability? Digital Rights Management?**

# Shift to Digital

Value Gap?

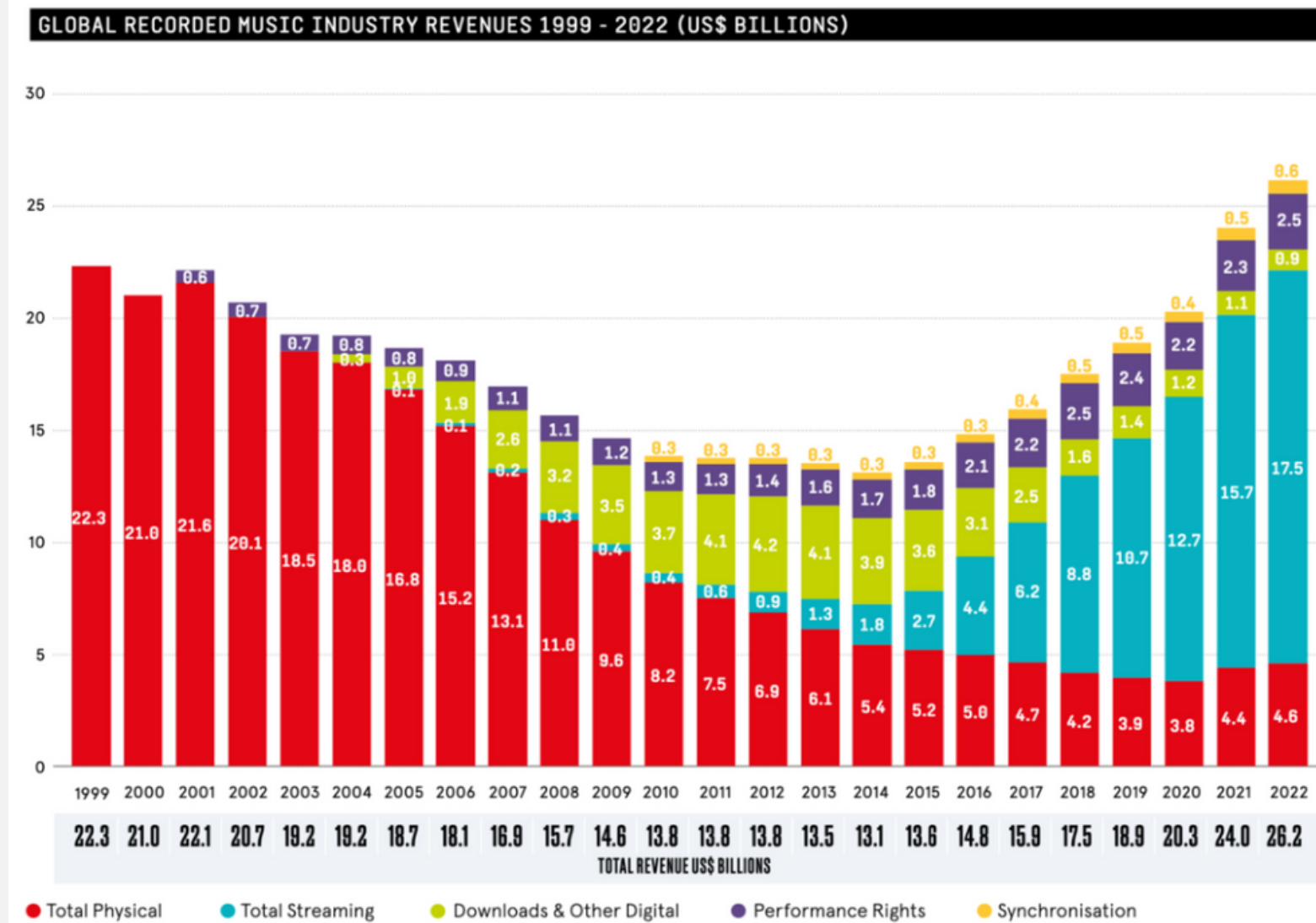


Figure 1: Global recorded music industry revenues (IFPI, 2023, p. 6)

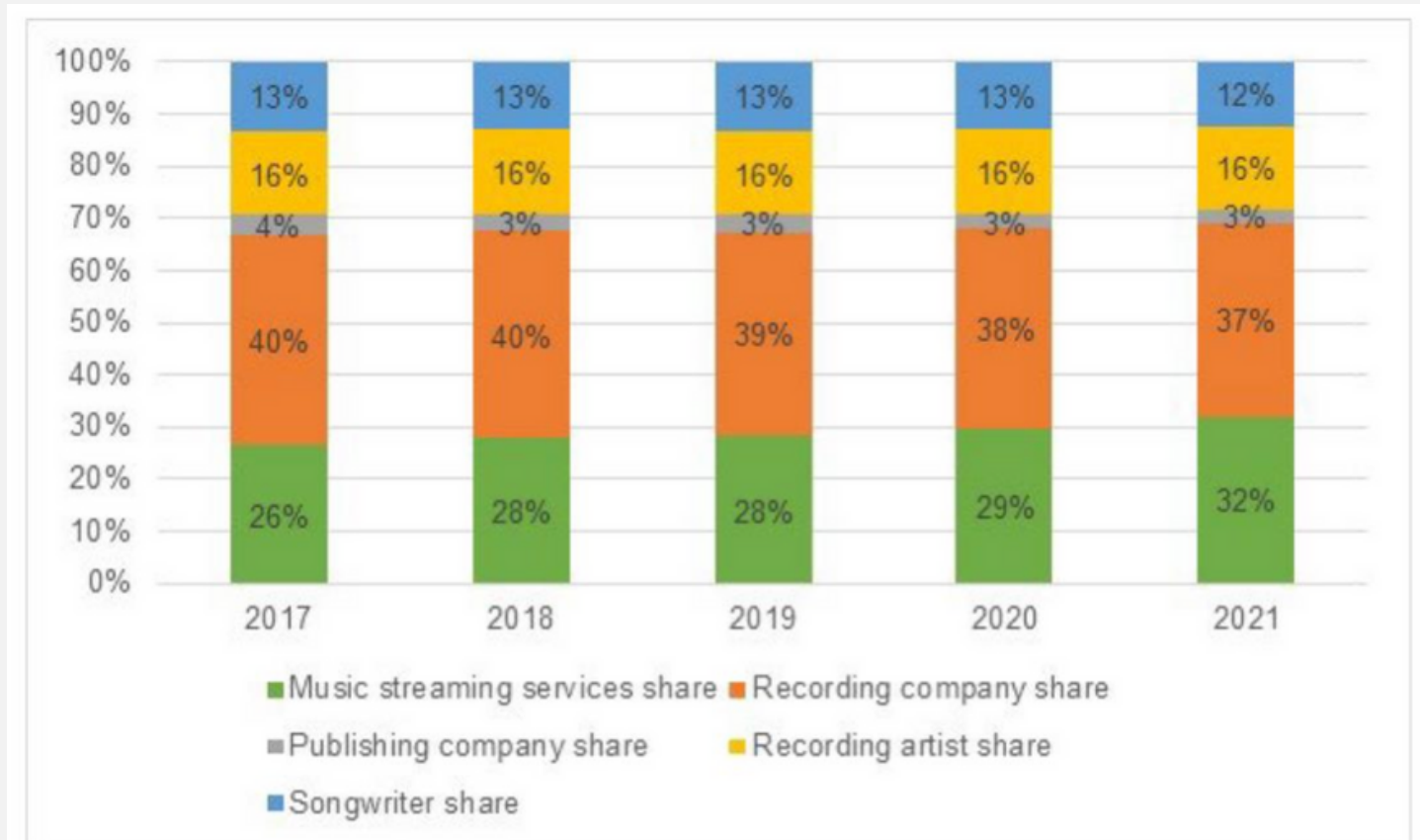


Figure 2: Distribution of streaming revenues in the UK (Source: CMA analysis of data from the largest music streaming services (Amazon, Apple and Spotify), the major music companies and some independent labels (Competition and Markets Authority, 2022, p. 65))

- **67% of total revenues derive from Streaming in 2022**
- **Less than 30% of revenues were distributed to artists**

current system relies on...

- **Copyright law**

- **no international copyright law**
- **slow to adapt to the digital environment**

- **Collection societies**

- **lacks a universal database, agreed framework**
- **slow and costly transfers**

- **Private ordering**

- **fills the gap between public regulation and private needs**
- **ex: Creative Commons / Terms of Service**
- **has pros (freedom) and cons (increasing control)**

**[the copyright regime is] “enormously bad at creating a ‘fair’ income distribution” (p.11)**

Use Case	Work	Rights	Granting Permission	Fee Determination	Obtainer	Collected and distributed by
Physical copies	SR	reproduction	voluntary	free market	(label pre-controls)	Distributor + label
	MW	mechanical	compulsory (statutory)	policy driven court rate	label	Harry Fox Agency
Terrestrial Radio	SR	none	unnecessary	no fee	-	-
	MW	performance	(blanket by PROs)	free market (court rate cap)	radio stations	PROs (ASCAP, BMI, SESAC)
Digital Radio	SR	performance	compulsory (statutory)	market-mimicking court rate	digital radio stations	SoundExchange
	MW	performance	(blanket by PROs)	free market (court rate cap)	digital radio stations	PROs (ASCAP, BMI, SESAC)
Downloads	SR	reproduction	voluntary	free market	DSPs	Aggregator + label
	MW	mechanical	compulsory (blanket) / direct	market-mimicking court rate	DSPs	MLC / Publisher
on-demand Streaming	SR	reproduction	voluntary	free market	DSPs	Aggregator + label
	MW	mechanical	compulsory (blanket) / direct	market-mimicking court rate	DSPs	MLC / Publisher
	MW	performance	(blanket by PROs)	free market / court rate	DSPs	PROs (ASCAP, BMI, SESAC)
UGC	SR	synchronization	voluntary	free market	(user)	platforms + labels
	MW	synchronization	voluntary	free market	(user)	platforms + publishers

Table 1: Music licensing by use case in the United States (table prepared by author based on Noti-Victor (2020))

The problems so far outlined can be summarized as follows:

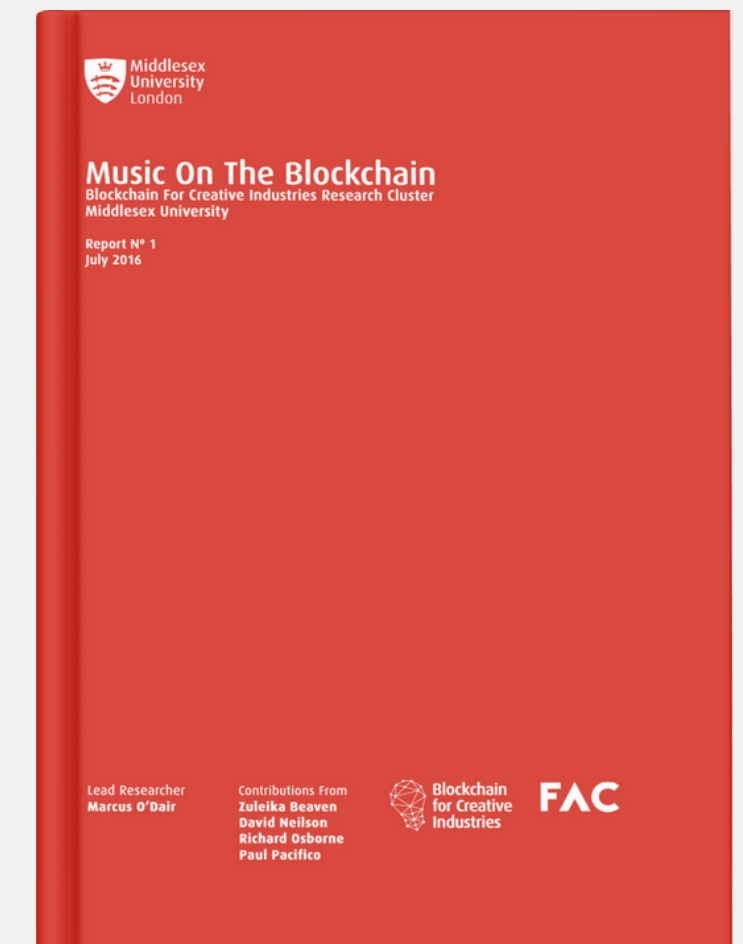
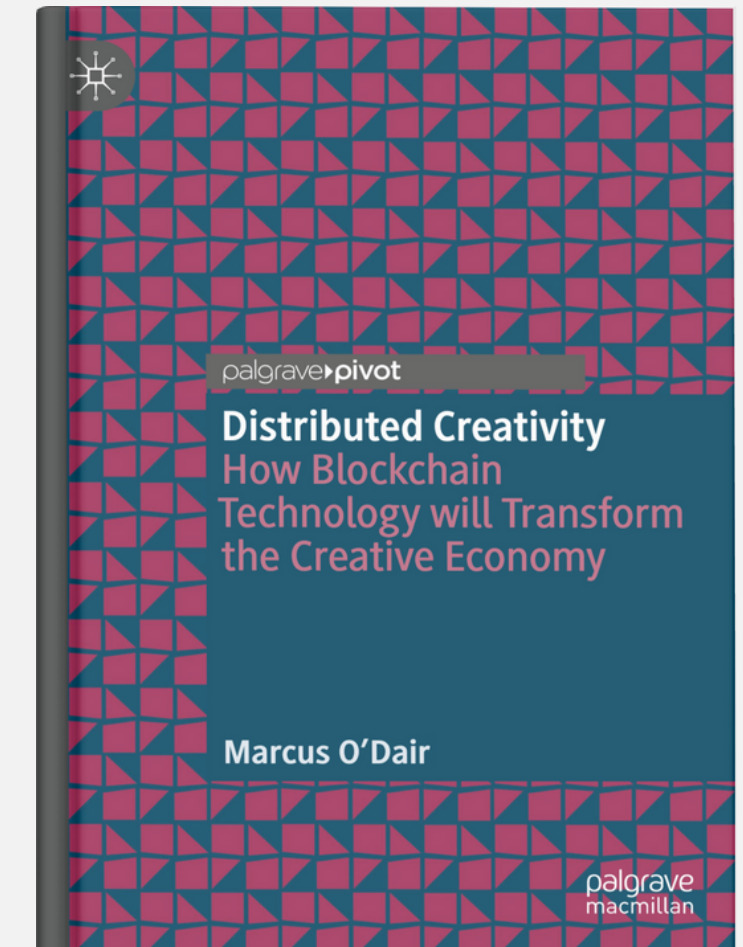
- an inability to create **artificial scarcity** in the digital domain making recorded music nearly free.
- the lack of a transparent and fair **mechanism** to intermedicate creators and listeners in the new digital formats.
- difficulties in creating a comprehensive central **database** to locate rightsholders.
- dependency on multiple **middlemen** each with monopoly powers that distort equitable remuneration and dissemination.



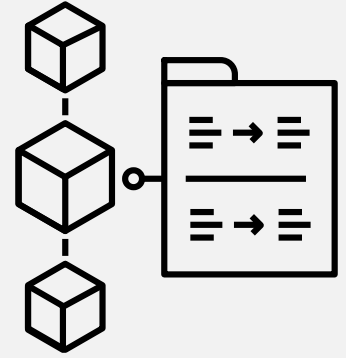
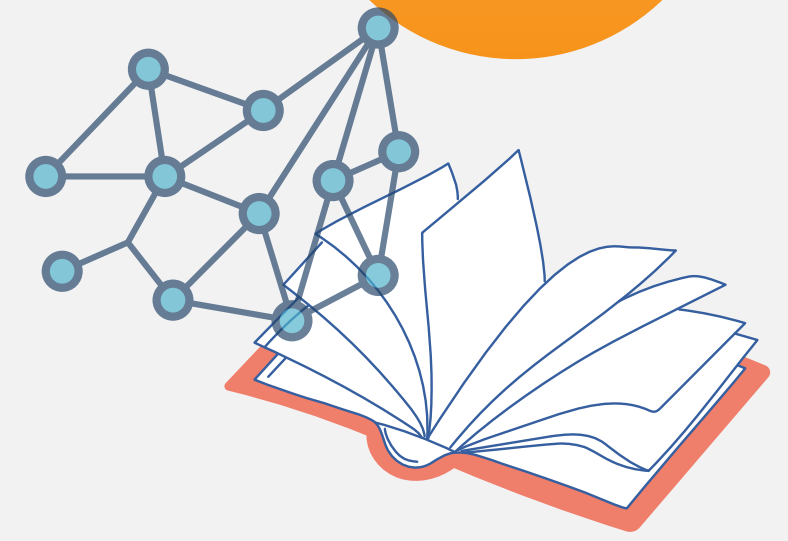
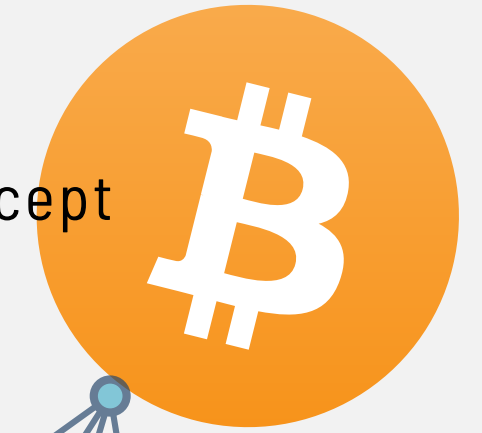
# Proposals to utilize Blockchain

as the new royalty distribution mechanism

1. assist the creation of a shared music database
2. allow frictionless royalty payments,
3. increase transparency and control for creators
4. create new ways to access capital

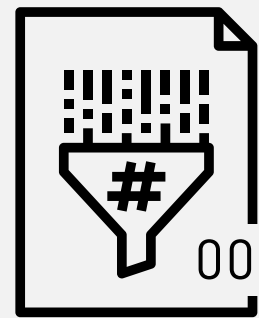


"Proof of Work"  
Bitcoin as the originating concept



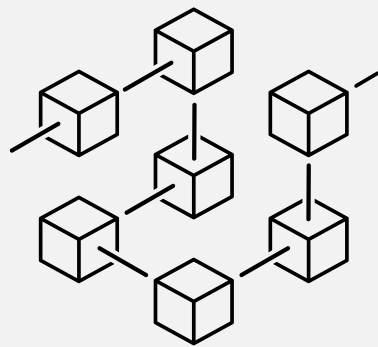
each block contains the previous block's hash and a

# Digest of transactions



# Hashing algorithm

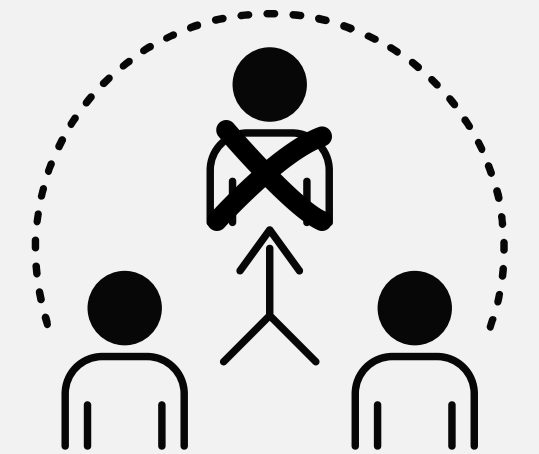
000000000014b4fa690c..... finding a 'nonce' requires computing power



making it prohibitively expensive to alter history, creating an

# Immutable chain of records

Immutability, transparency, trustless cooperation and decentralization





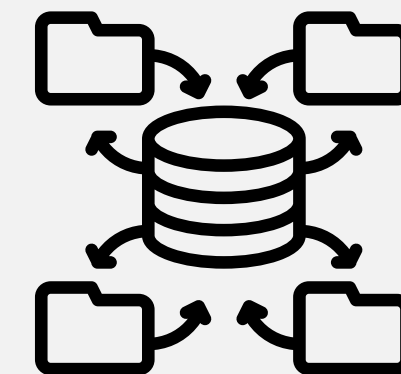
# Smart contracts

"if this then that" event handling



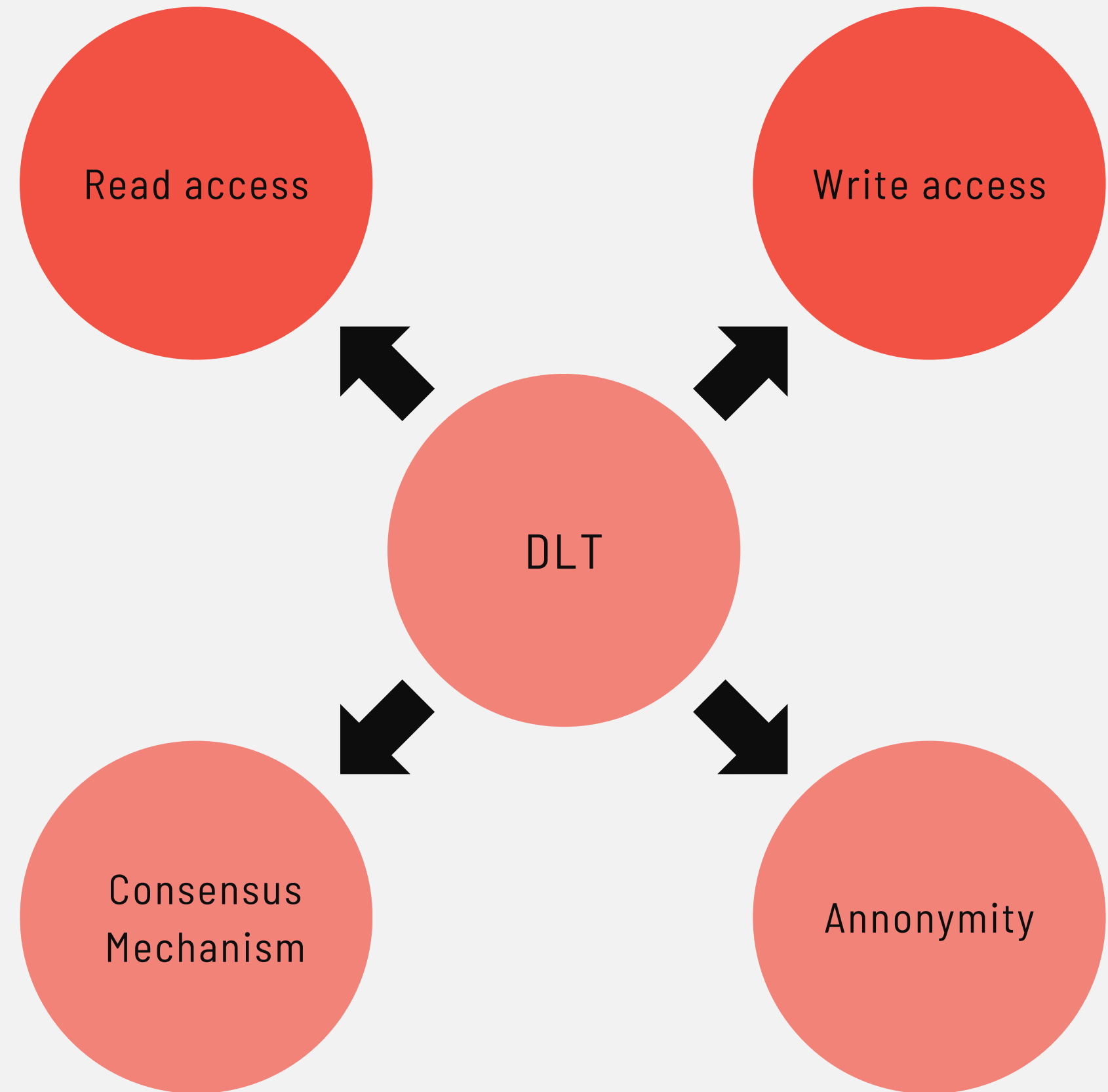
# Data exchange

- "Oracles" pushing data into smart contracts
- referrencing files on external locations such as "IPFS"



### VARIATIONS IN GOVERNANCE

- Private or Public??  
.....
- Permissioned or Un-permissioned?  
.....
- Pseudonymous? Anonymous? Known?  
.....
- Proof of Work / Proof of Stake  
Practical Byzantine Fault Tolerance  
Self-developed



# Dapp Architecture

**direct interaction?  
delegated?**

# Native Assets & Tokenized Assets

**intrinsic?  
arbitrary?**

Application Area	Use case		Blockchain Governance	Read Access		Write Access		Consensus Mechanism			Anonymmity level			event handling	data exchange	encryption	history retention
				Private	Public	Permissi oned	Un-perm issioned	PoW / PoS	PBFT	self develop ed	Anonym ous	Pseudon ymous	Identifia ble				
Financial Transactions	1	Anonymous cryptocurrencies	decentralized		x		x	x				x		none		totally encrypted	
	2	Cryptocurrencies, Wealth Storage, Micropayments	decentralized		x		x	x				x				unencrypted	
	3	Interorganizational cross-border and micro-financial transactions	hybrid	x			x		x				x			partially encrypted	
	4	Centrally issued financial instruments	centralized	x			x			x			x				
Enforcement / Smart contracts	5	Enforcements between individuals	decentralized		x		x	x				x		custom	transaction logs	unencrypted	whole
	6	Interorganizational Enforcements	hybrid	x			x		x				x			partially encrypted	
	7	Centrally issued enforcements	centralized	x			x			x			x				
Asset Management / Data Management	8	Authentication and ownership, audit trails, access management	decentralized		x		x	x				x		built in event		unencrypted	
	9	Interorganizational asset management	hybrid	x			x		x				x			partially encrypted	
	10	Enterprise asset management	centralized	x			x			x			x				
Storage	11	Decentralized storage	decentralized		x		x	x				x				totally encrypted	
Communication	12	Messaging	decentralized		x		x	x				x		content		unencrypted	recent
	13	IoT communication	decentralized		x		x	x				x					
Ranking	14	Reputation & rating	decentralized		x		x	x				x		transaction logs			

Table 4: Taxonomy of blockchain applications (table prepared by author based on Labazova et. al 2019, and Labazova et. al 2021)

# Use cases for music?

**Intellectual Property Management**

**New monetization models**

# Problems identified in application to music

- scalability (volume + size)
- off-chain integration, ineffective DRM
- garbage-in garbage-out (integrity of data)
- legal considerations (open-ended, non-binary terms)
- cultural differences in finance / music
- hype - gap in ideation and reality



## RESEARCH QUESTION

Q.1

**Which** of the ideated DLT use cases for recorded music have been implemented?

Q.2

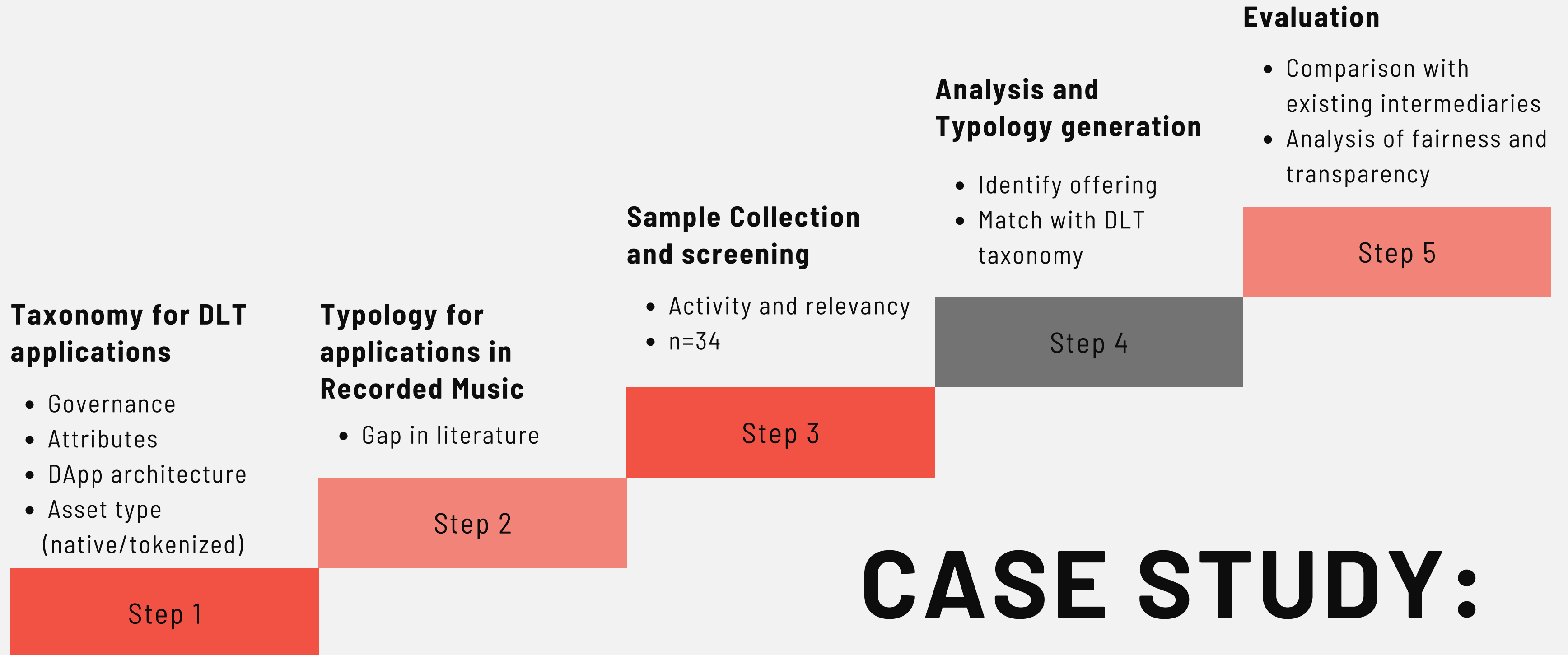
**How** are these applications implemented regarding the deployment attributes of DLT and the terms of service offering?

Q.3

Are these implementations '**fair and transparent**' as claimed?

**Methodology**

approach, sample collection,  
procedure of analysis



# CASE STUDY: GAPS & HOLES

## Methodology

approach, sample collection,  
procedure of analysis

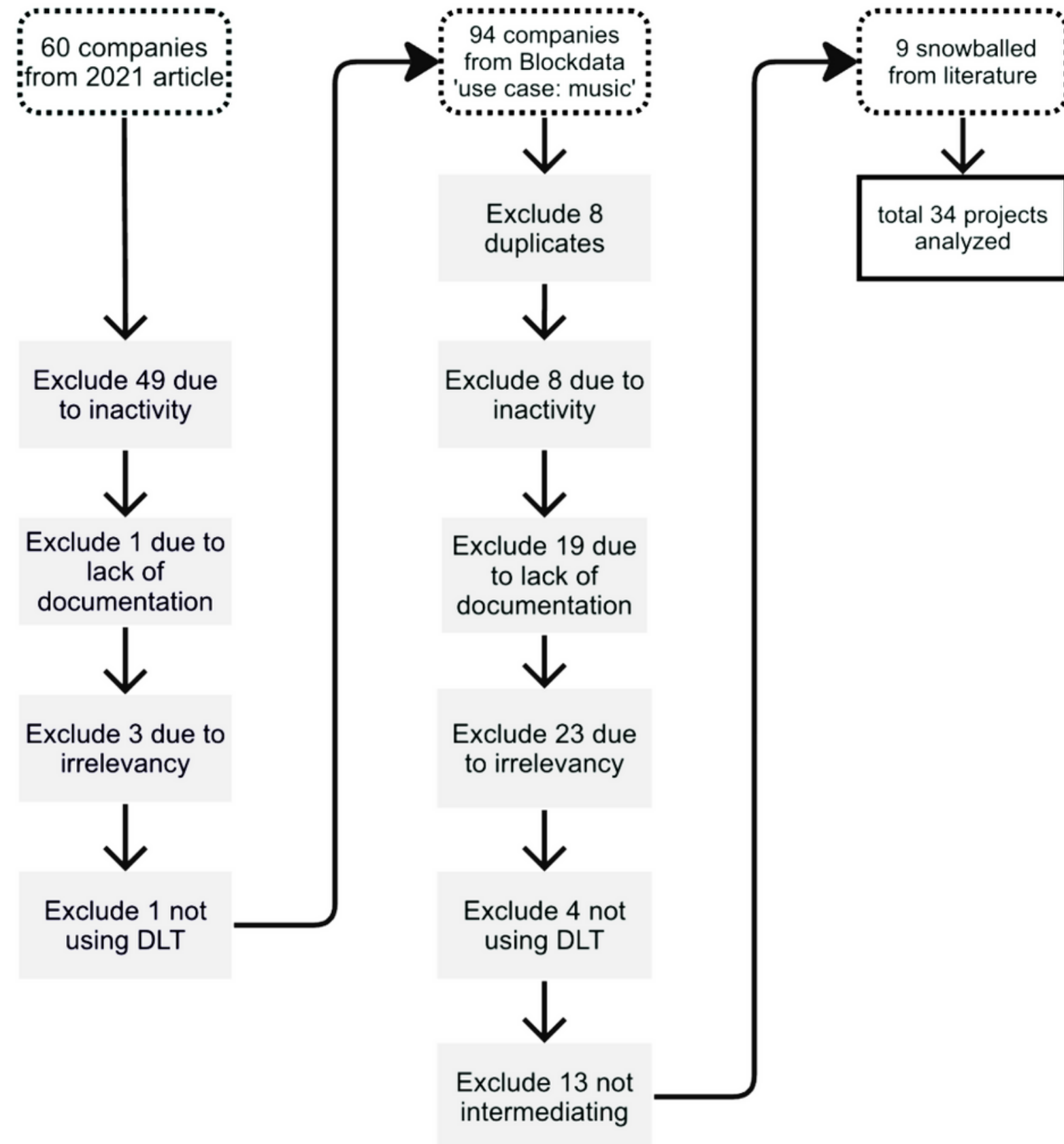


Figure 4: Sample collection and screening procedure

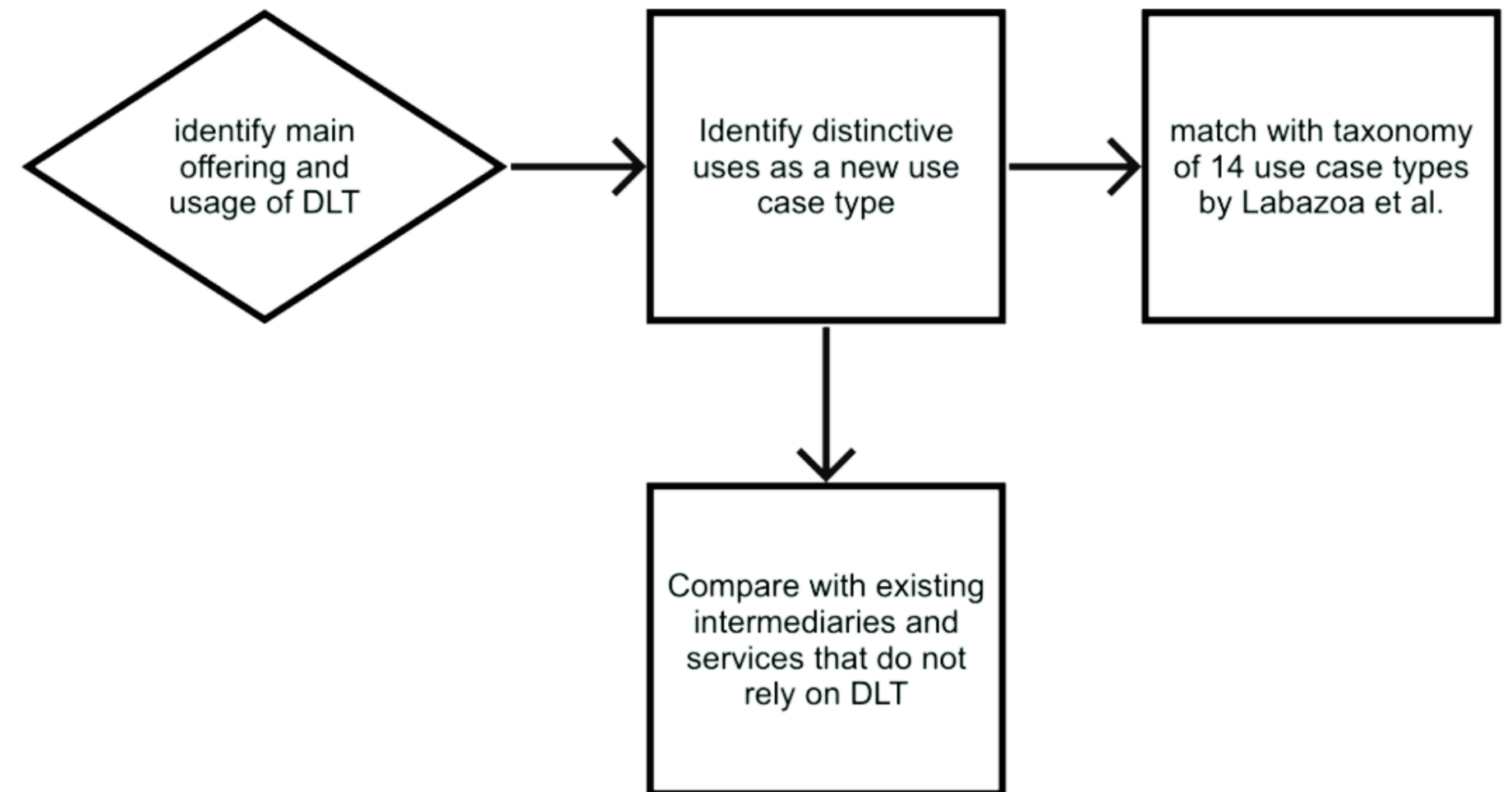


Figure 5: Process for typology development and analysis of identified use case types

**Which** of the ideated DLT use cases for recorded music have been implemented?

# 8 Use Case Types

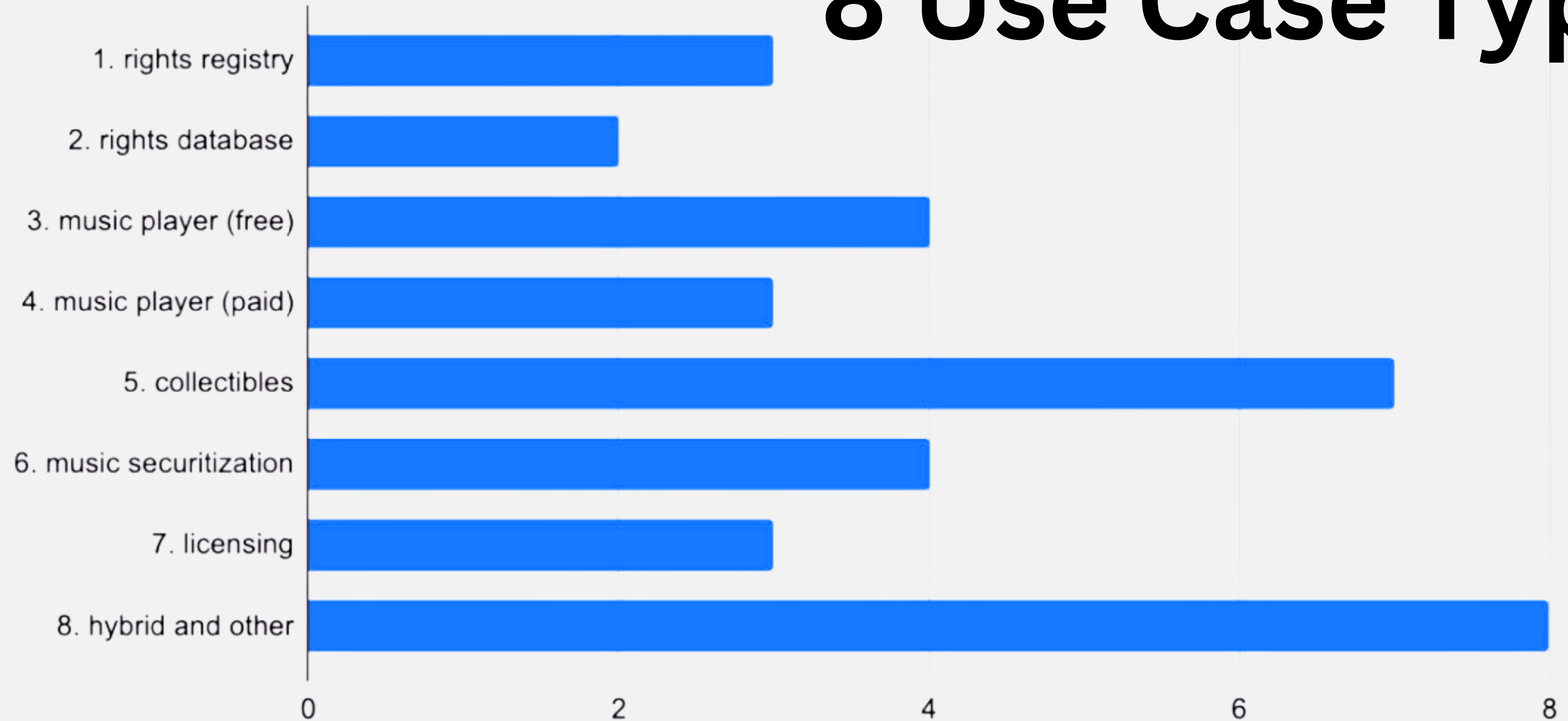


Figure 6: Distribution of analyzed use case types (n=34)

**Q.2**

**How** are these applications implemented regarding the deployment attributes of DLT and the terms of service offering?

following slides...

# 1. Rights Registry

use:	<b>verify the existence of a file via hashing and time-stamping</b>
replaces:	private copyright registry (poor man's copyright)
DLT function:	<ul style="list-style-type: none"><li>• 'audit trails'</li><li>• public/unpermissioned chain (decentralized)</li><li>• delegated interaction</li></ul>
comments:	weak rationale (added benefits due to CS's institutional trust) proof of anteriority, <del>provenance</del> , may or may not be accepted by court
analysis:	known hashing algorithms and public chain contribute to stable proof limited improvements for fairness and transparency

## 2. Rights Database

use:	<b>allow data consolidation for major rights holders (details were undisclosed)</b>
replaces:	Global Repertoire Database (idea)
DLT function:	<ul style="list-style-type: none"><li>• 'enterprise/inter-organizational asset management'</li><li>• centralized or hybrid governance structure (private/permissioned)</li></ul>
comments:	litigation or incentive driven industry initiative? reliance on institutions and intermediaries will remain
analysis:	unclear whether efficiency savings will be passed on to creators

# 3. Music Player (free)

use:	<b>decentrally hosted content with ability to receive tips</b>
replaces:	online platforms allowing uploads, ex: 'Soundcloud'
DLT function:	<ul style="list-style-type: none"><li>• 'cryptocurrency micropayments', 'decentralized storage'</li><li>• decentralized structure blockchains</li><li>• native and tokenized assets</li></ul>
comments:	wide potential reach, tipping as the only income source piracy concerns increase due to decentralized hosting
analysis:	contribution to fair/transparent outcomes is questionable



# 4. Music Player (paid)

use:	<b>centrally hosted content with royalty payment scheme supported by DLT</b>
replaces:	Streaming services
DLT function:	<ul style="list-style-type: none"><li>• 'cryptocurrency micropayments', 'centrally issued enforcements'</li><li>• centralized and delegated</li><li>• payouts in fiat currency and tokenized assets</li></ul>
comments:	prematurely developed royalty rates are unclear, some takes fees from artists
analysis:	no effect for transparency, unfair terms for rates and licensing conditions

# 5. Collectibles

use:	<b>allows sales of unique and digitally scarce collectibles as NFTs</b>
replaces:	new scheme but comparable to merchandise sales some allow gated content access comparable to DL sales
DLT function:	<ul style="list-style-type: none"><li>• 'authentication and ownership', 'access management'</li><li>• public/unpermissioned (decentralized)</li><li>• mostly delegated, reliance on web interface &amp; off-chain storage</li><li>• tokenized assets</li></ul>
comments:	vetting required, price manipulation in collectibles economy
analysis:	risk with regards to reputation, questionable business model transparency effects are limited to extent of sales of NFT

# 6. Music Securitization

use:	<b>allows sales of royalty claims represented as NFTs</b>
replaces:	'Bowie bonds' or music royalty backed securities
DLT function:	<ul style="list-style-type: none"><li>• 'authentication and ownership'</li><li>• generally same functions as 5. collectables with added service</li><li>• reliance on service provider for royalty distribution (non-DLT)</li></ul>
comments:	interesting use case: combination of deFi loans for decreased payout time
analysis:	risks regarding securities regulation, and continuity of platforms deals were undisclosed and difficult to evaluate fairness

# 7.Licensing

use:

**allows sales of licensing permissions represented as NFTs**

replaces:

music licensing platforms ex: Songtradr, and licensing agencies

DLT function:

- 'authentication and ownership'
- generally same functions as 5. collectables with added service

comments:

requires vetting of rights introducing point of centralization  
no enforcement measures when music is used off-chain  
interesting use case: Arpegi Labs - tracking from inception to reuse

analysis:

lower commissions may contribute to fairness  
usage tracking is limited to on-chain activity, limited transparency effect

# 8. Hybrid and other

use:	<b>various schemes envisioned that rely on a token economy</b>
replaces:	entire value chain (labels, streaming services, collection societies)
DLT function:	<ul style="list-style-type: none"><li>• combination of various functions</li><li>• all cases were premature, partially operational</li><li>• tokenized assets through ICOs</li></ul>
comments:	'super distribution' model - cultural credibility? unreliable ICO environment and arbitrary token values potentials for a co-owned platform and commons economy
analysis:	lack of fairness and transparency

## Discussion & Conclusion

findings, recommendations for further development

Q.3

Are these implementations **'fair and transparent'** as claimed?

**Incremental / Radical**

**On/Off-chain integration**

**New DLT intermediaries**

**Token regulations**

contribution??	fairness	transparency
1. rights registry	△	△
2. rights database	?	?
3. music player (free)	×	△
4. music player (paid)	×	×
5. collectibles	×	△
6. music securitization	?	△
7. licensing	×	△
8. hybrid and other	×	×



# Thank you

## Questions and feedback welcomed

\*This presentation is intended to supplement the defence process of the thesis as prepared and submitted by the student.

All sources are referenced in the original paper, and therefore is not doubly cited in these slides. Please refer to the original thesis in the title page for the complete bibliography.