Blockchain Summerschool 2019

Current State

- In the current era of music production, everything is digitized and released on digital platforms.
- Yet in Greenland the majority of sales still remain physical

- ≈ $45.000 Sales of CD’s per month
- ≈ $4.000 Sales of Digital services per month

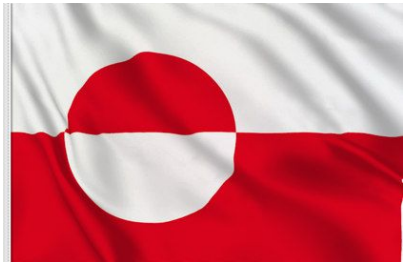
Image sources available on last slide

Why did it turn out this way?

iTunes enforces a price of $0.69-$1.29 per track

Spotify pays artist $0.006 per Minute listened

Population of Greenland ≈ 56000



=

Equaling the artist on Avg. earn $130, which is unsustainable

How can this situation be changed by Distributed Ledger Technology?

Approach

Economic Perspective

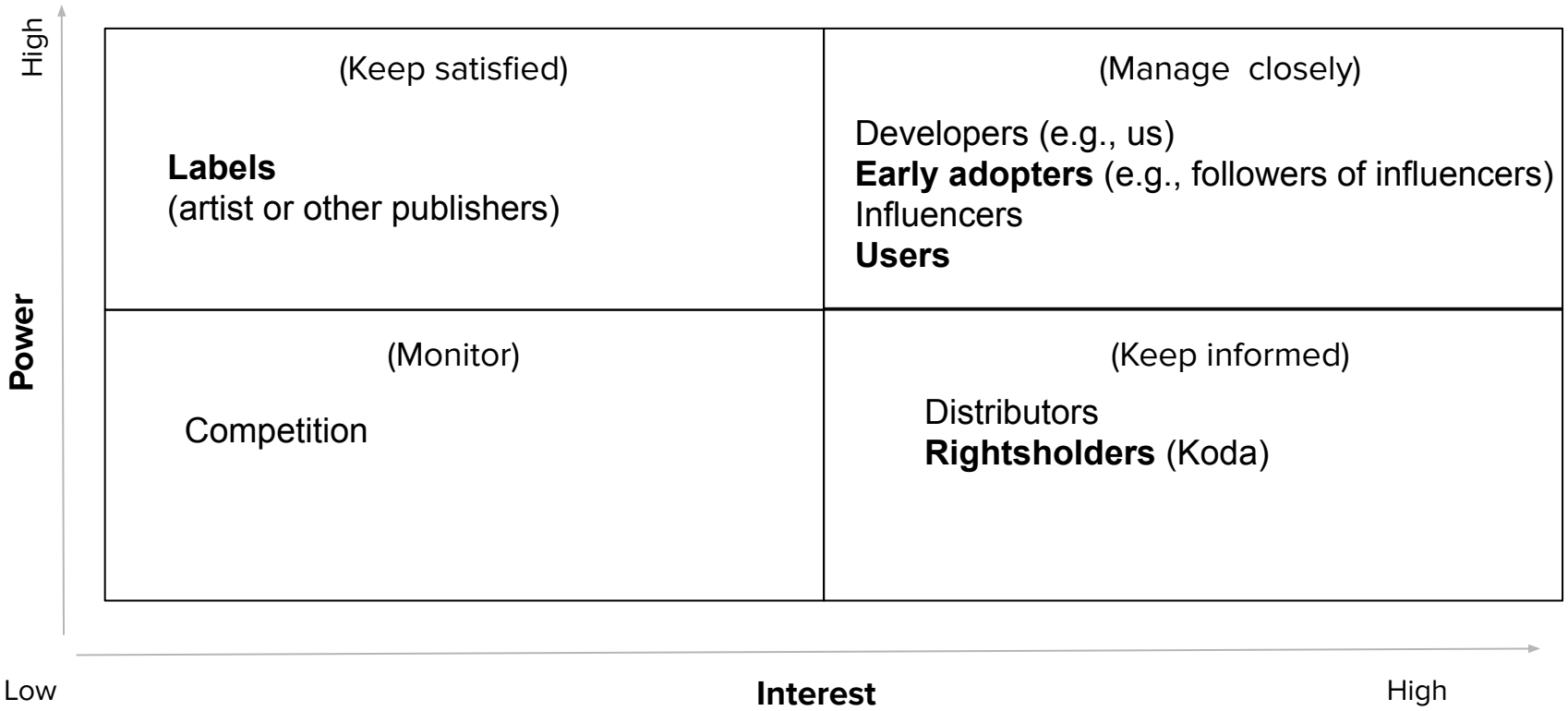
- Literature search with the focus on incentives and pricing strategies in the music industry for the generation of functional and non-functional requirements
- Conducted PEST analysis, SWOT analysis, and generated a business canvas [1]
- Derived requirements for the designs of a Decentralized Media Platform (DMP)

Technical Perspective

- Design of a prototypical concept for a DMP based on the results of the literature search
- Implementation of the prototypical DMP concept and testing

[1] Otte, A. (2014). *37*. [online] Greenlandicpopularmusic.com. Available at: http://greenlandicpopularmusic.com/en/wp-content/uploads/sites/2/2013/12/The-Music-in-Greenland-and-Greenland-in-the-music-Andreas-Otte2.pdf [Accessed 14 Aug. 2019].

Background
Key stakeholders analysis



[2] Mendelow, A.L. (1981). 'Environmental Scanning - The Impact of the Stakeholder Concept,' ICIS 1981 Proceedings, 20.

Background
Stakeholder incentives

[Higher payouts]

[Better control]

[Emotional gains]

Rightsholders
(e.g., Koda, Universal, Warner,...)

Labels
(e.g., artists or other publishers)

Early adopters
(e.g., followers of influencers)

Users
(e.g., maybe you and me)

Internal stakeholders

External stakeholders

Background
Why Distributed Ledger Technology may help

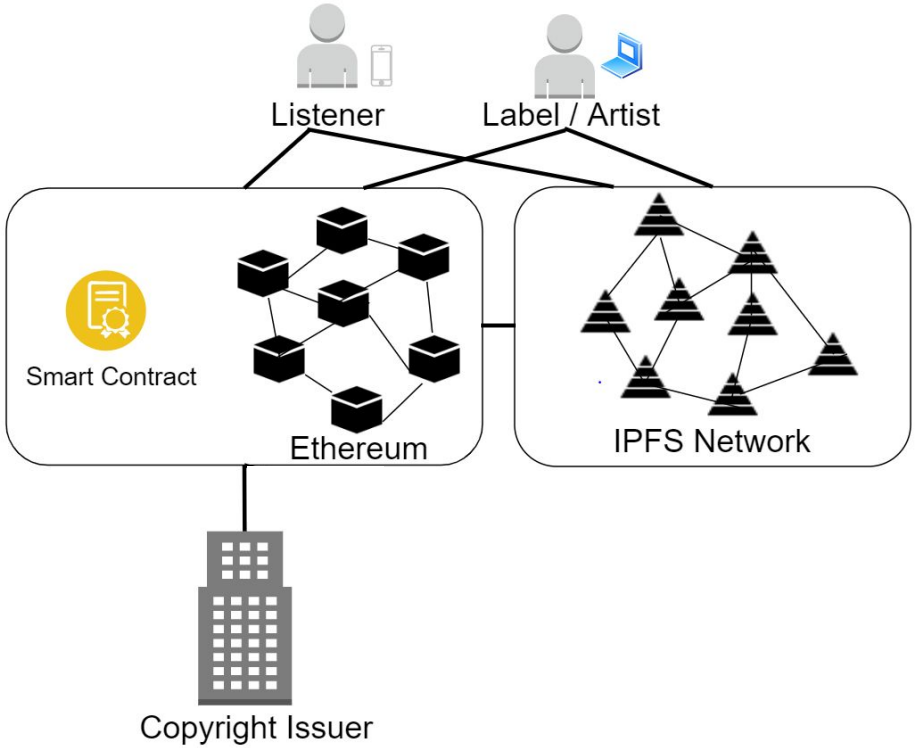
- **Distributed Ledger Technology (DLT)**
  - Decentralization and democratization of data and the underlying infrastructure
  - *Availability:* high probability that data can be reached [3]
  - *Integrity:* copyright registration and claiming [3]
  - *Transparency:* the use of data is traceable [3]

- **Smart Contracts**
  - Tamper-resistant logic expressed in program code
  - Can increase the flexibility, reliability, and transparency in access management for data [4]

DLT is promising to operate a decentralized Music Distribution Platform (MDP)

[3] K. Yeow, A. Gani, R. W. Ahmad, J. J. P. C. Rodrigues, and K. Ko, “Decentralized Consensus for Edge-Centric Internet of Things: A Review, Taxonomy, and Research Issues,” IEEE Access, vol. 6, pp. 1513–1524, 2018.
[4] T. Mikula and R. H. Jacobsen, "Identity and Access Management with Blockchain in Electronic Healthcare Records," *2018 21st Euromicro Conference on Digital System Design (DSD)*, Prague, 2018, pp. 699-706.

Results
Entities and their relations



Copyright Issuer:
Trusted party responsible for copyright management approving authenticity of media files

Ethereum:
Blockchain

IPFS Network:
Distributed network for file storage based on an Interplanetary File Systems (IPFS)

Label/Artist:
Content provider for media files running IPFS nodes

Listener:
Consumer using a smartphone, Desktop, or browser application

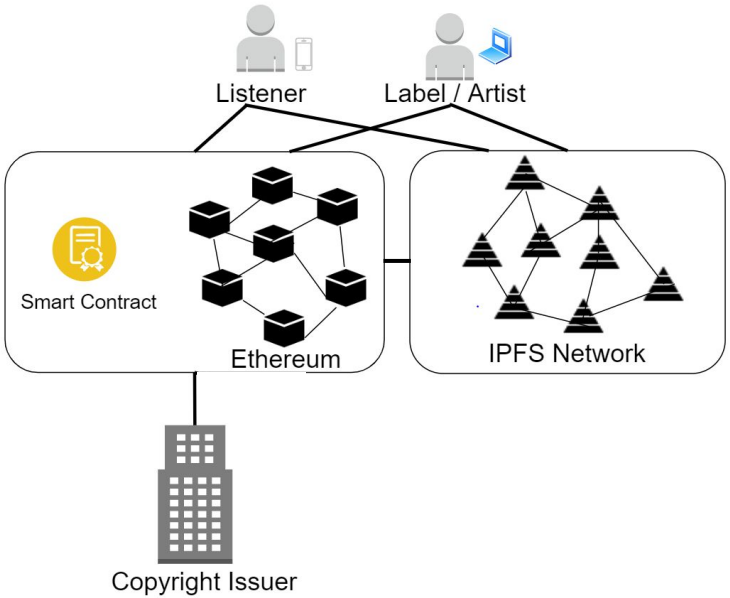
Results
Smart Contract Functionality

- **Registration of a new media file** including a media file's...
  - Hash value
  - Price
  - Artist address
  - Shareholder addresses (e.g., co-producer, distributors,...)
  - Shareholder fraction for payment
- **Management of approver (admin) accounts (e.g., copyright issuer)**
- **Pull payments** for shareholders (to prevent unbounded mass operations)
- **Permissioning for data file streaming**

Discussion

Principle Findings

- The internal stakeholders (e.g., artists, labels,...) are highly incentivized to run a MDP based on DLT
- µRaiden and IPFS are still in their infancy and should be further investigated (e.g., in terms of customization and integration)
- DLT to decrease the power of intermediaries (e.g., Deezer or Spotify) allowing for self-defined payment strategies for artists and labels
- The presented system could be applicable to other media files



Contributions

- Initial investigation of the motivators and demotivators of the stakeholders for the use of such DPM
- Start of a first iteration of a Design Science Research[4, 5] project

[4] Hevner, March, Park, and Ram, “Design Science in Information Systems Research,” MIS Quarterly, vol. 28, no. 1, p. 75, 2004.
[5] V. Vaishnavi and B. Kuechler, Design Science Research in Information Systems. 2004.

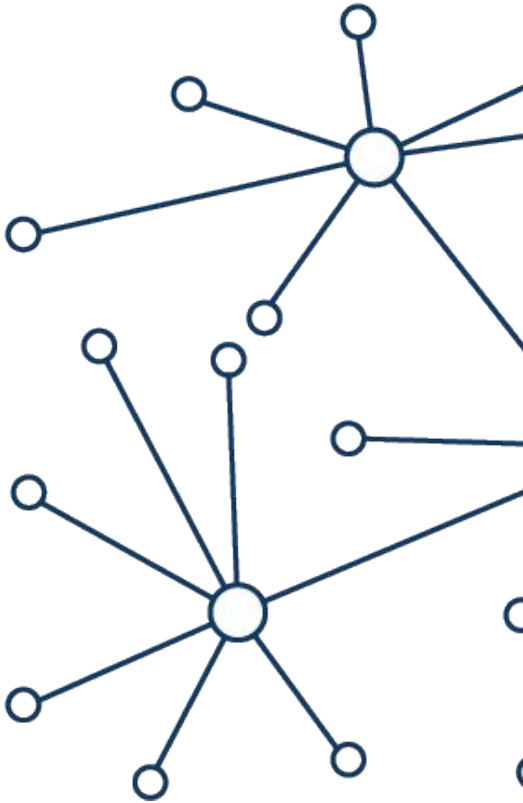
Limitation and Future Work

Limitation

- Partial implementation of the conceptualized architecture (e.g., IPFS is not included)
- Brief and unstructured literature search for the requirements analysis

Future Work

- Full implementation of the proposed DMP architecture in order to finalize the feasibility study and to present a proof of concept
- Further iterations concerning the proposed DMP architecture in the course of a design science research project in order to to derive design patterns for the design of general DMPs [4, 5]



[4] Hevner, March, Park, and Ram, “Design Science in Information Systems Research,” MIS Quarterly, vol. 28, no. 1, p. 75, 2004.
[5] V. Vaishnavi and B. Kuechler, Design Science Research in Information Systems. 2004.

Do you have questions?

Mikkel H. Johansen
IT University of Copenhagen, Denmark

Kevin Lang
IT University of Copenhagen, Denmark

Anders M
DIKU, Denmark

Niclas Kannengießer
Karlsruhe Institute of Technology, Germany

Dominique F.N. Chancelier
DIKU, Denmark

Christian Handest
DIKU, Denmark

Rasmus Suhr Mogensen
Aalborg University, Denmark

BackUp

Background
Interplanetary File Systems (IPFS)

- Open source framework for providing highly configurable and reliable decentralized storage [6]
- No reliance on centralized infrastructure
- Can tailor potential music storage to location and listeners comparable to Content Delivery Networks (CDN) [5]
  - Beneficial for emerging or remote area market such as Greenland
  - Potential for future user support of storage and distribution through incentives similar to Filecoin, Siacoin, or Storj

[5] IEEE Standard for Content Delivery Protocols of Next Generation Service Overlay Network," in IEEE Std 1903.1-2017 , vol., no., pp.1-71, 25 May 2018
[6] Q. Zheng, Y. Li, P. Chen and X. Dong, "An Innovative IPFS-Based Storage Model for Blockchain," *2018 IEEE/WIC/ACM International Conference on Web Intelligence (WI)*, Santiago, 2018, pp. 704-708.

Lean Canvas Model

Problems
- Subscription service challenges
- Pricing and fees
- Knowledge of market

Solution
- SMFs
- Market analysis
- Smart Contracts
- User application

Unique Advantage
- Monopoly

Customer Segments
- Greenlandians
  - 15-69
- Early adopters

Key Metrics
- User application
- SMFs
- Proofer
- Smart Contract

Unique Value Proposition

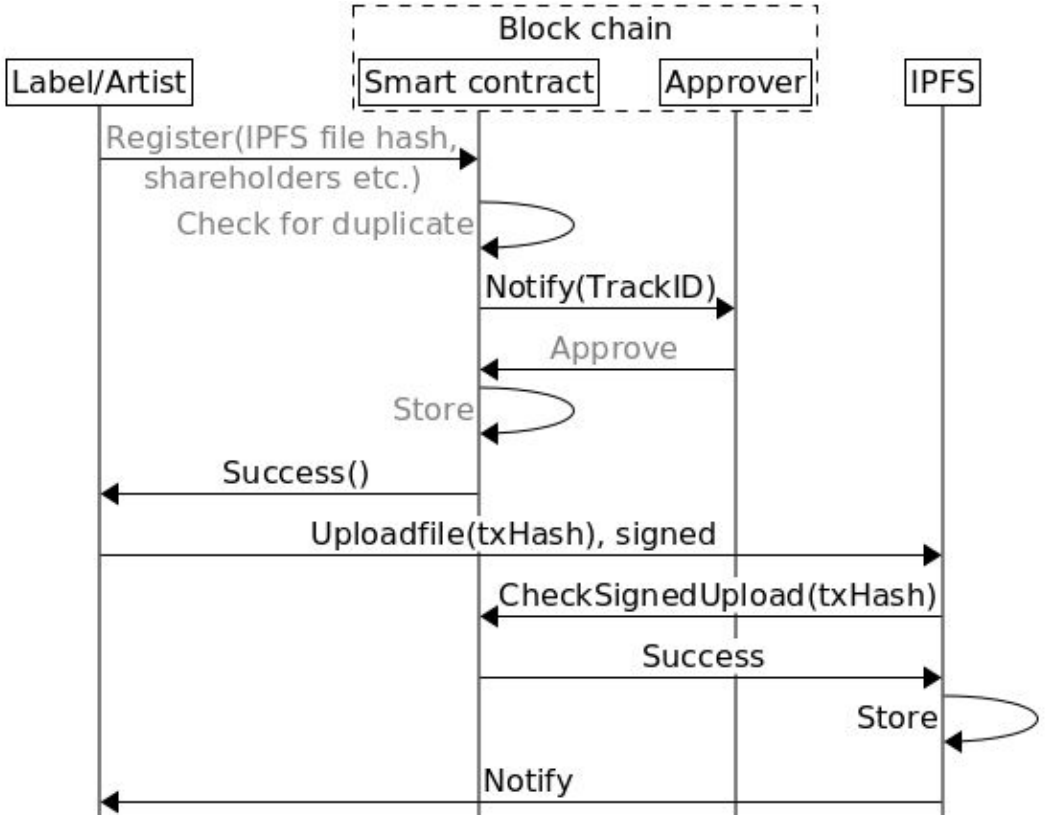
Tribalism
+
Self-righteousness

Channels
- Influencers
- User Application

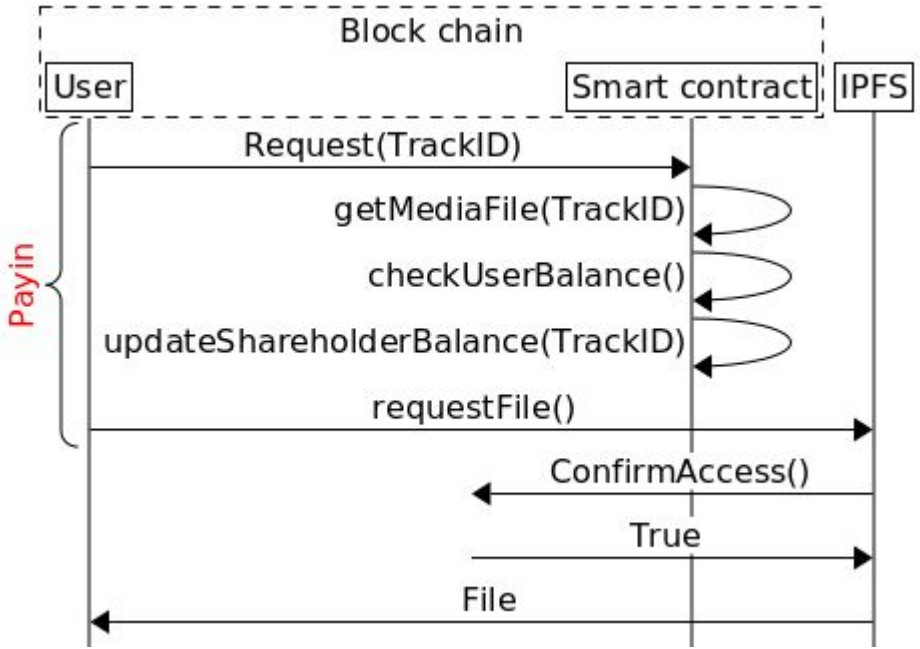
Cost Structure
- Customer acquisition costs
- Startup costs
- Operation costs

Revenue Stream
- Smart contracts

Exemplary process: registration of a new song



Exemplary process: retrieve media file



Stakeholder payout

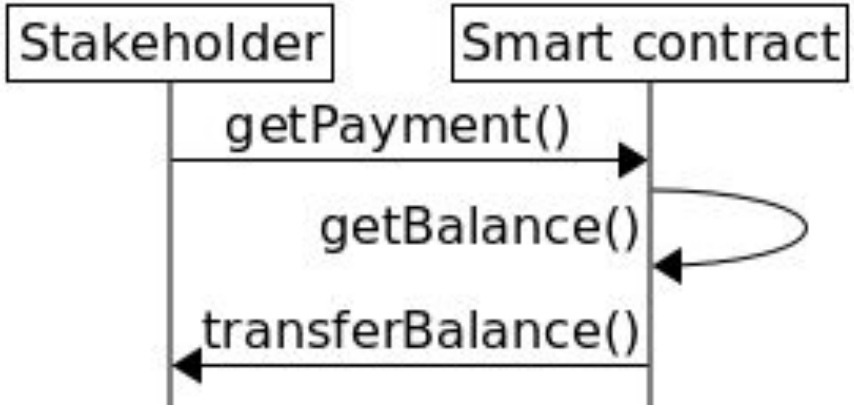


Image sources

- https://azcd.harveynorman.com.au/media/catalog/product/cache/21/image/992x558/9df78eab33525d08d6e5fb8d27136e95/1/_/1_13980.jpg
- https://www.airgreenland.com/media/120234/Musik0.jpg
- https://www.flagsonline.it/uploads/2016-6-6/420-272/greenland.jpg
- http://www.dannybryant.com/wp-content/uploads/2014/08/itunes-logo.jpg
- https://cdn.vox-cdn.com/thumbor/T152X1BzY5uOydFQ2-BRko0esGs=/0x0:660x440/1220x813/filters:focal(278x168:382x272):format(webp)/cdn.vox-cdn.com/uploads/chorus_image/image/56048083/spotifylogo.0.jpg