Proof-of-Personhood: Redemocratizing Permissionless Cryptocurrencies

Maria Borge, Eleftherios Kokoris-Kogias, Philipp Jovanovic, Linus Gasser, Nicolas Gailly and Bryan Ford

EPFL

Talk overview

- **Problem**
- Proof of personhood (PoP)
- PoPCoin
- Conclusions

Problem

Control in current permissionless blockchain-based cryptocurrencies systems lies in hands of a small number of entities

Re-centralization

Permissionless cryptocurrencies

- Enable open participation
- Provide pseudonymity
- Avoid double spending attacks
- Extend the blockchain in a secure manner

Proof-of-Work

- Special purpose hardware
- Massive consumption of electricity
- Only entities with the resources are able to mine
- **Re-centralization!**

Proof-of-Stake

- Participants use **their** assets to create new assets
- Rich participants have an advantage, more assets implies faster creation of new assets
- Shareholder corporation that favors the rich

Goal

Create a **sybil attack resistant** cryptocurrency that ensures **fair** and **accessible** wealth creation process

Talk overview

- Problem
- **Proof of personhood (PoP)**
- PoPCoin
- Conclusions

Proof-of-Personhood (PoP)

Objective: Verify people, rather than identify them

How: Organizing a party and generate tokens

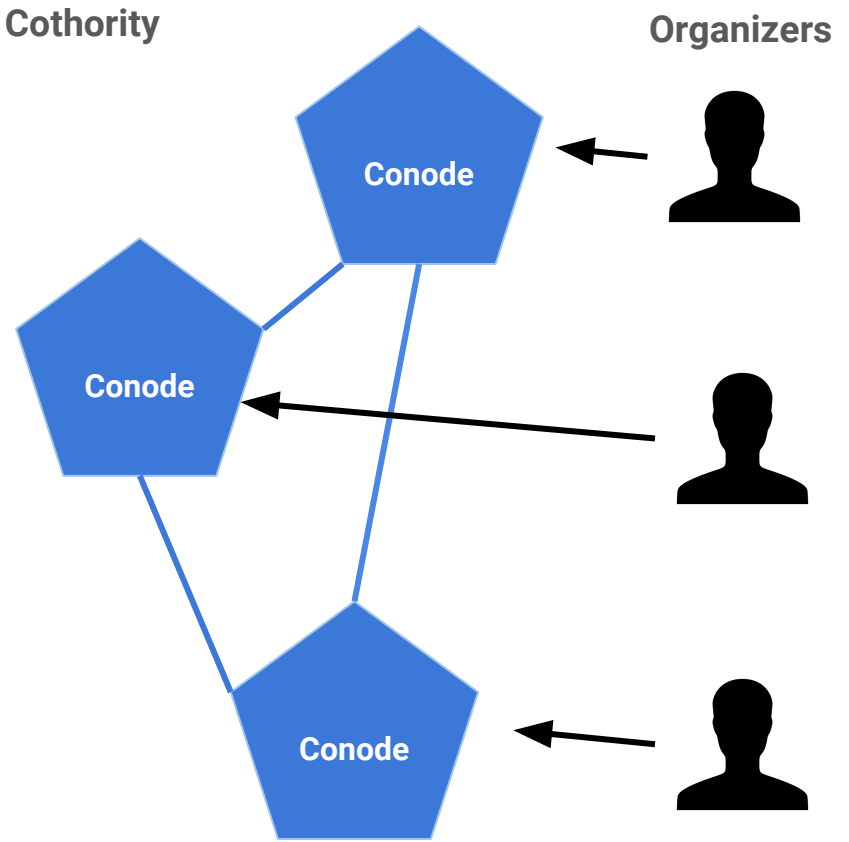
Proof-of-Personhood (PoP)

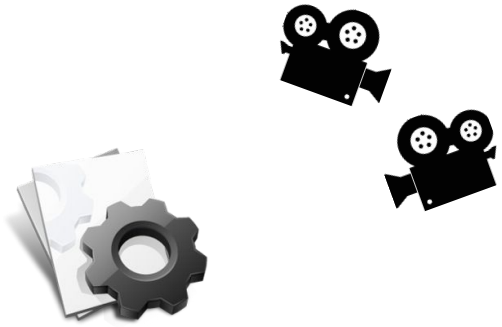
CoSi - Scalable collective signing

Cothority - Collective Authority

Linkable ring signatures - Anonymity and accountability in the same context

Pseudonym party - Setup





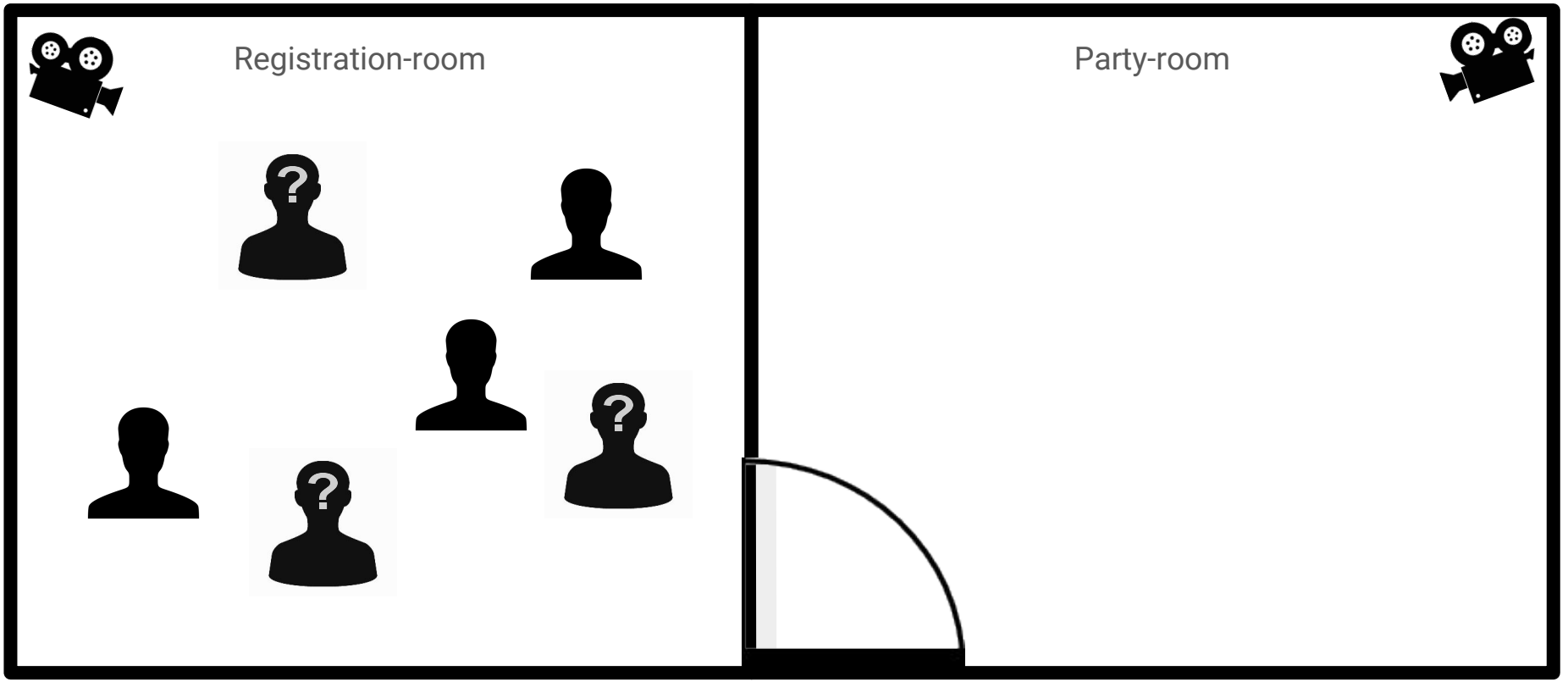
Configuration-file:
- Start, End
- Location, Use
- Expiration
- Organizers' public keys

Pseudonym party - Setup

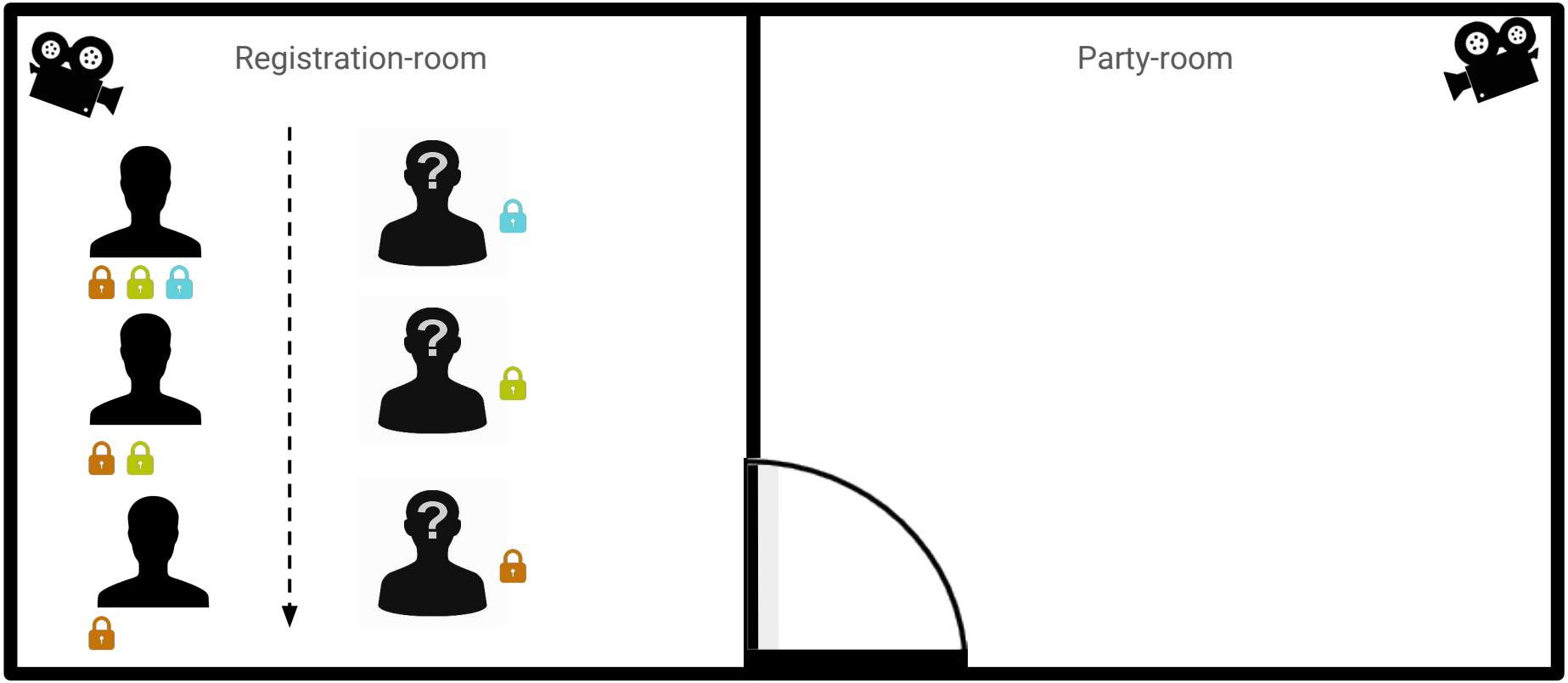
Configuration-file:
- Start, End
- Location, Use
- Expiration
- Organizers' public keys

Attendees	E Public keys	Private keys
		
		
		

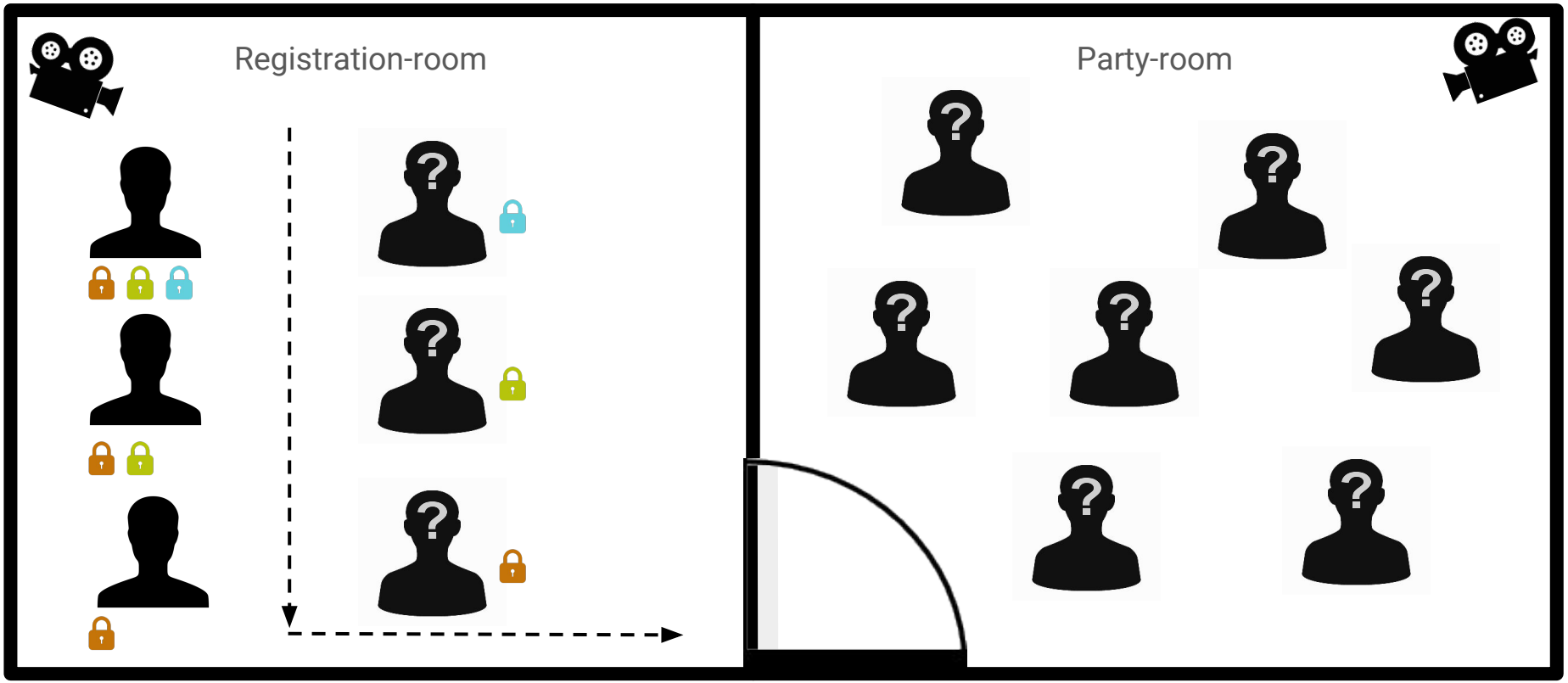
Pseudonym party



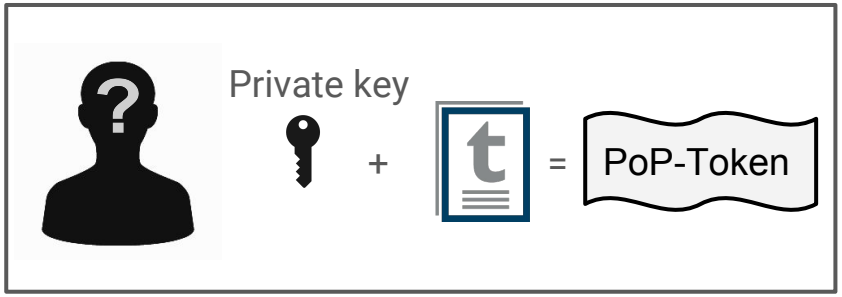
Pseudonym party - Barrier Point



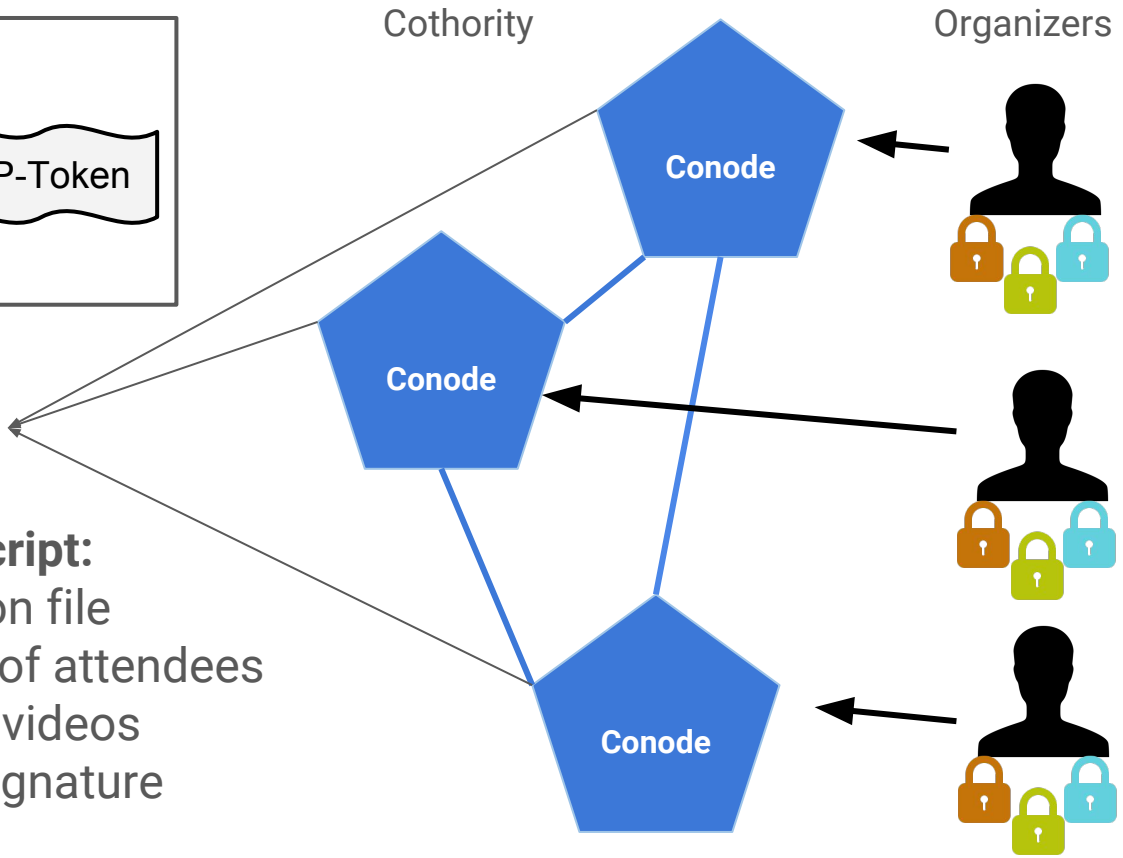
Pseudonym party



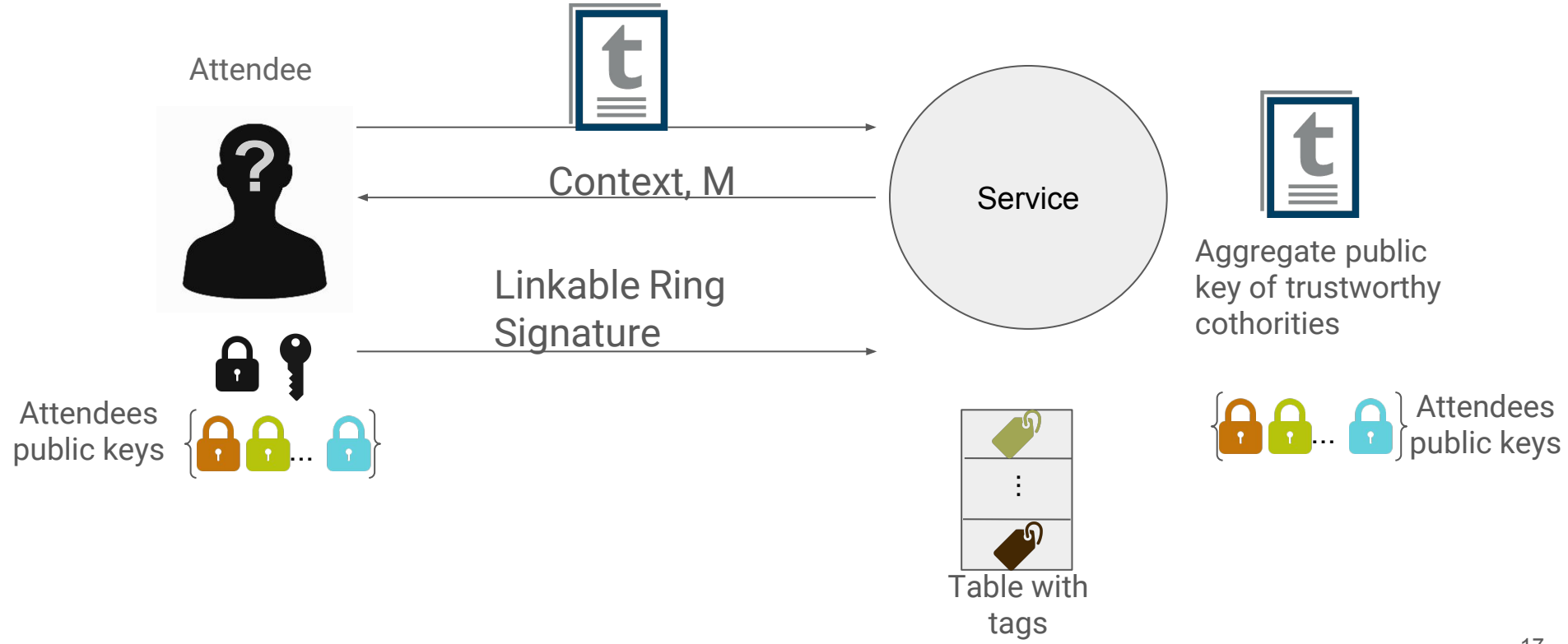
Pseudonym party - Termination / Finalization



Party Transcript:
-Configuration file
-Public keys of attendees
-Hash-file of videos
-Collective signature



Usage of PoP-Tokens



Talk overview

- Problem
- Proof of personhood (PoP)
- **PoPCoin**
- Conclusions

PoPCoin

- **Open membership**: Proof-of-Personhood
- **Fairness**: Randhound
- **Consensus**: Byzcoin

PoPCoin - Implementation - Setup

1. Set of organizers throw a pseudonym party to create PoP-tokens

2. Attendees authenticate their PoP-tokens

3. If successfully authenticated attendee deposits a public key, to identify as a minter

4. The set of public keys form a **minting-pool**

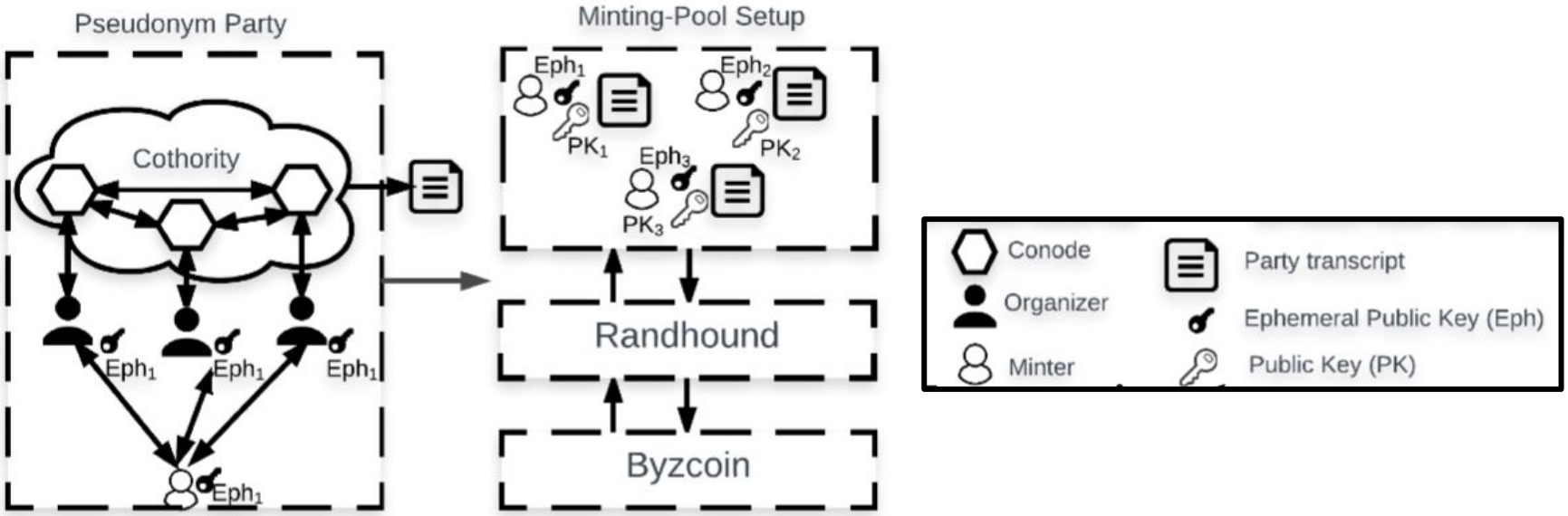
PoPCoin - Implementation - Minting

1. Minters part of the minting-pool are eligible to create new blocks

2. Last N miners run RandHound, to select the next minter allowed to create next block

3. The process repeats every M minutes, if minter fails a new one is selected

PoPCoin - Overview



PoPCoin - Deployment

Local cryptocurrency

Challenges

We propose a cryptocurrency that builds on:

- Proof-of-Personhood
- Randhound
- Byzcoin

Related Work

We propose a cryptocurrency that builds on:

- Proof-of-Personhood
- Randhound
- Byzcoin

Thank you!

Questions?