

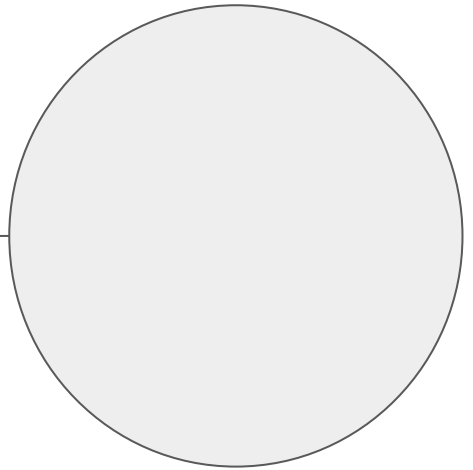
A Tale on Decentralizing an App: the Case of Copyright Management

A. Vitaletti and M.Zecchini

The purpose of Blockchains



Nothing

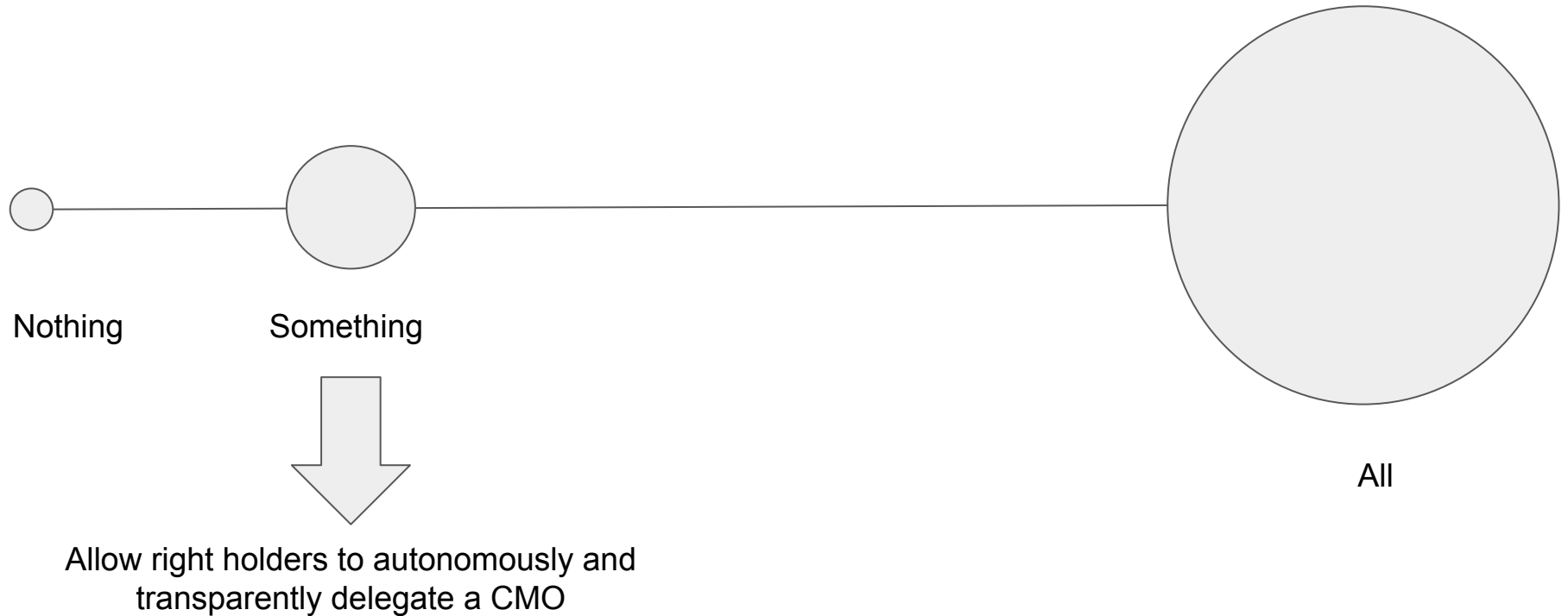


All

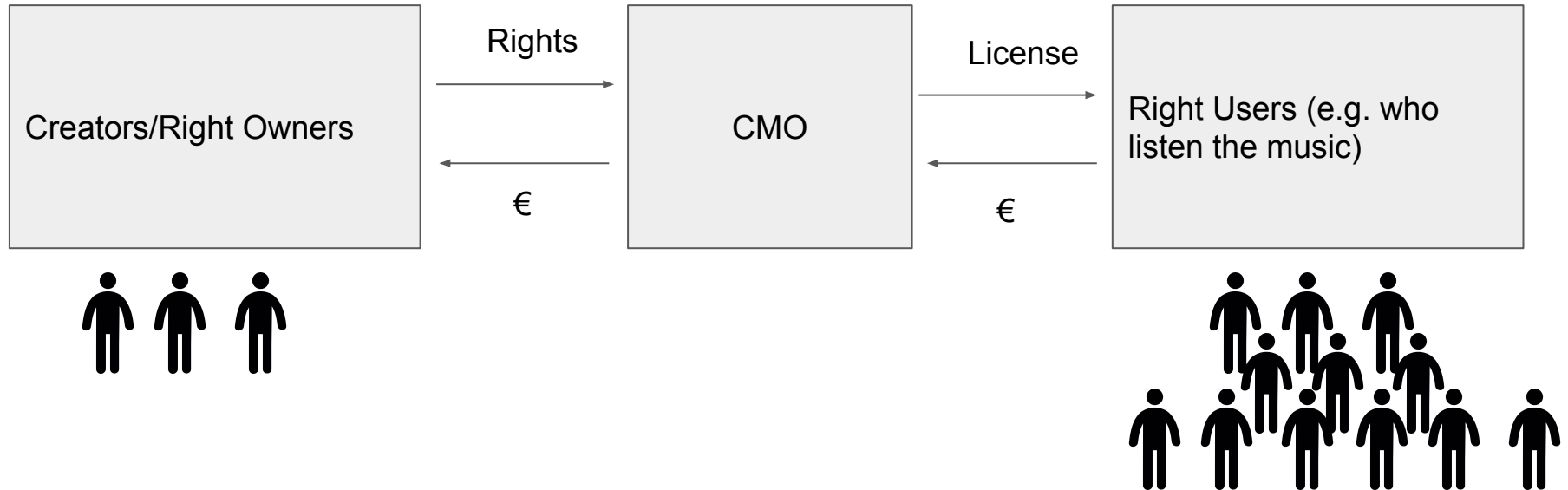
The purpose of Blockchains



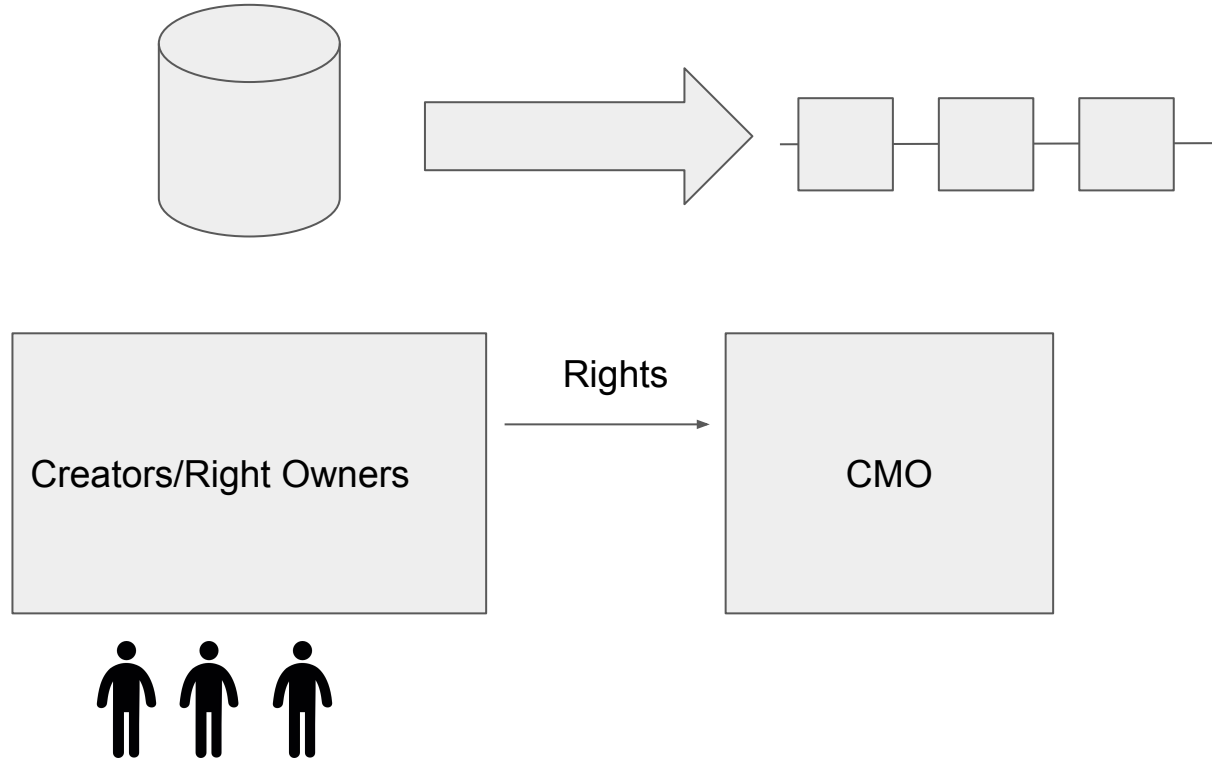
The purpose of Blockchains in Copyright Management



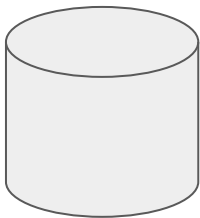
The Role of Collective Management Organization (CMO)



From a Centralised to a Decentralised Approach



The Interested Party Information (IPI)



Heading	Short description	Cardinality	Example
<i>base_no</i>	Interested Party (IP) base number, unique identifier of a right holder		I-001068130-6 identifying the rights holder
<i>name_no</i>	IP name number, additional identifier of a rights holder		00334284961 identifying a pseudonym of the rights holder
<i>name</i>	IP name		Rossi Mario
<i>cmo</i>	Collecting Society	~200	SIAE, SUISA
<i>cc</i>	Creation class	16	Musical Work, Dramatic work
<i>ro</i>	Role	34	Musical creator, Book publisher
<i>ri</i>	Right	26	Performing right, Re-transmission right,
<i>valid_from</i>	The date from which the right management is given to the collecting society		01.01.2017
<i>valid_to</i>	The date until which the right management is given to the collecting society		31.12.2017
<i>share</i>	The percentage of right the CMO is in charged to collect		100%, 75%, ...
<i>terr</i>	The territory in which the CMO is in charge of the right management	220	Italy, France, Europe, North America, World

Agreement: $\langle name_no, cmo, cc, ro, ri, share, terr, valid_from, valid_to \rangle$

On the Identity... assumption

The identity of the right holder (i.e. *name_no*)
is centralised and handled by the CMO

Why

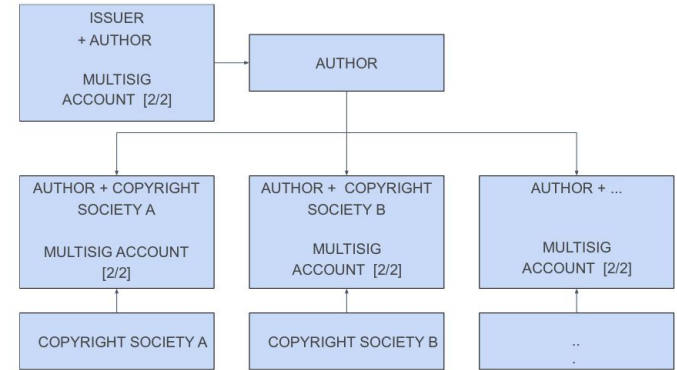
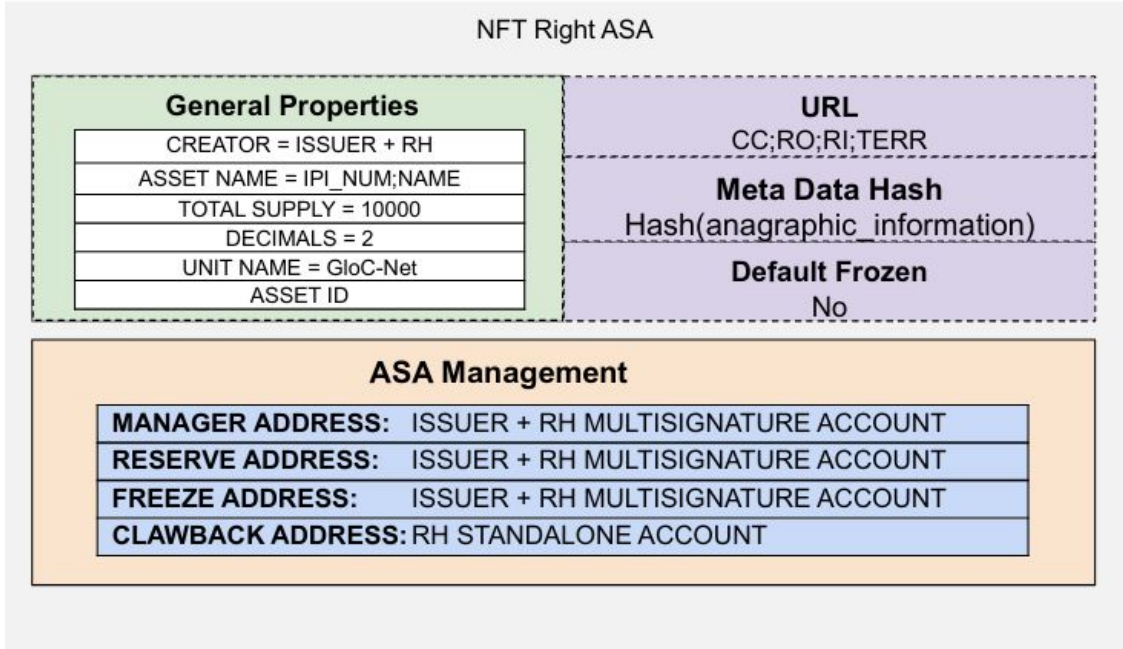
- Scalable
- Cost Effective

What is the best we can achieve with platform(s)?

The solution has been developed with ASA (Algorand Standard Assets)

Stateful smart contracts, have been announced and released in the final stage of the project and open new possibilities.

Reference Solution



Token generation is centralised: CMOs verifies off-chain that ASAs are well-formed (no duplicates) and, ultimately, issues the new ASA representing the artistic right.

Dispute resolution

First in chain wins!

NEWS

MAR 24, 2021

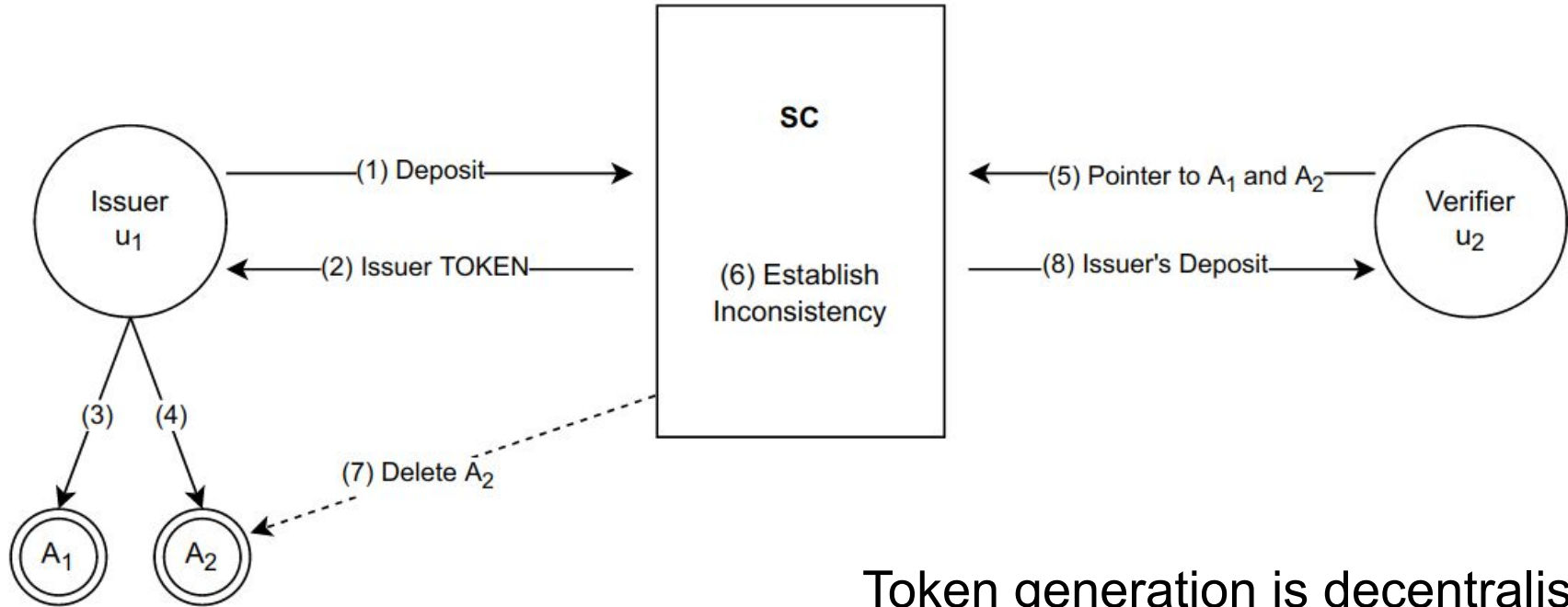
SIAE, Italy's largest collective management organisation, represents authors' rights as digital assets managed on the Algorand blockchain

By: Società Italiana degli Autori ed Editori (SIAE)

SIAE launches more than 4 million NFTs on Algorand for 95,000+ creators

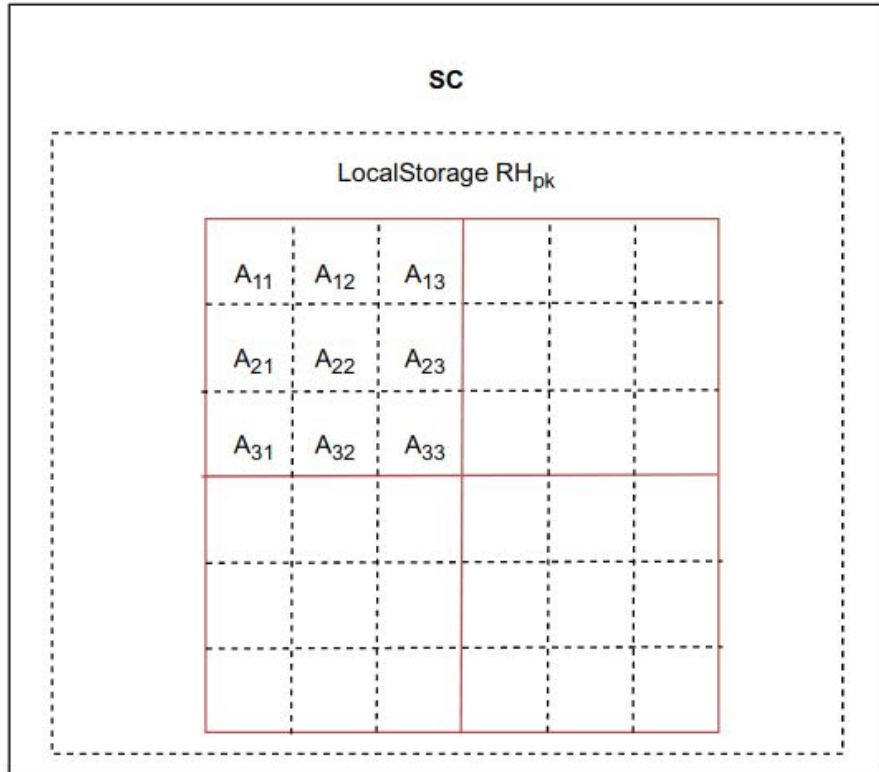
Rome, 24th March 2021- Società Italiana degli Autori ed Editori (SIAE), the Italian major copyright collecting agency founded in 1882, and Algorand, a leading blockchain platform accelerating the convergence of decentralized and traditional finance, announce the first major milestone of a project to create a blockchain-based open platform that allows transparent and efficient management of authors' rights.

Optimistic Solution



Token generation is decentralised

By Design: basic



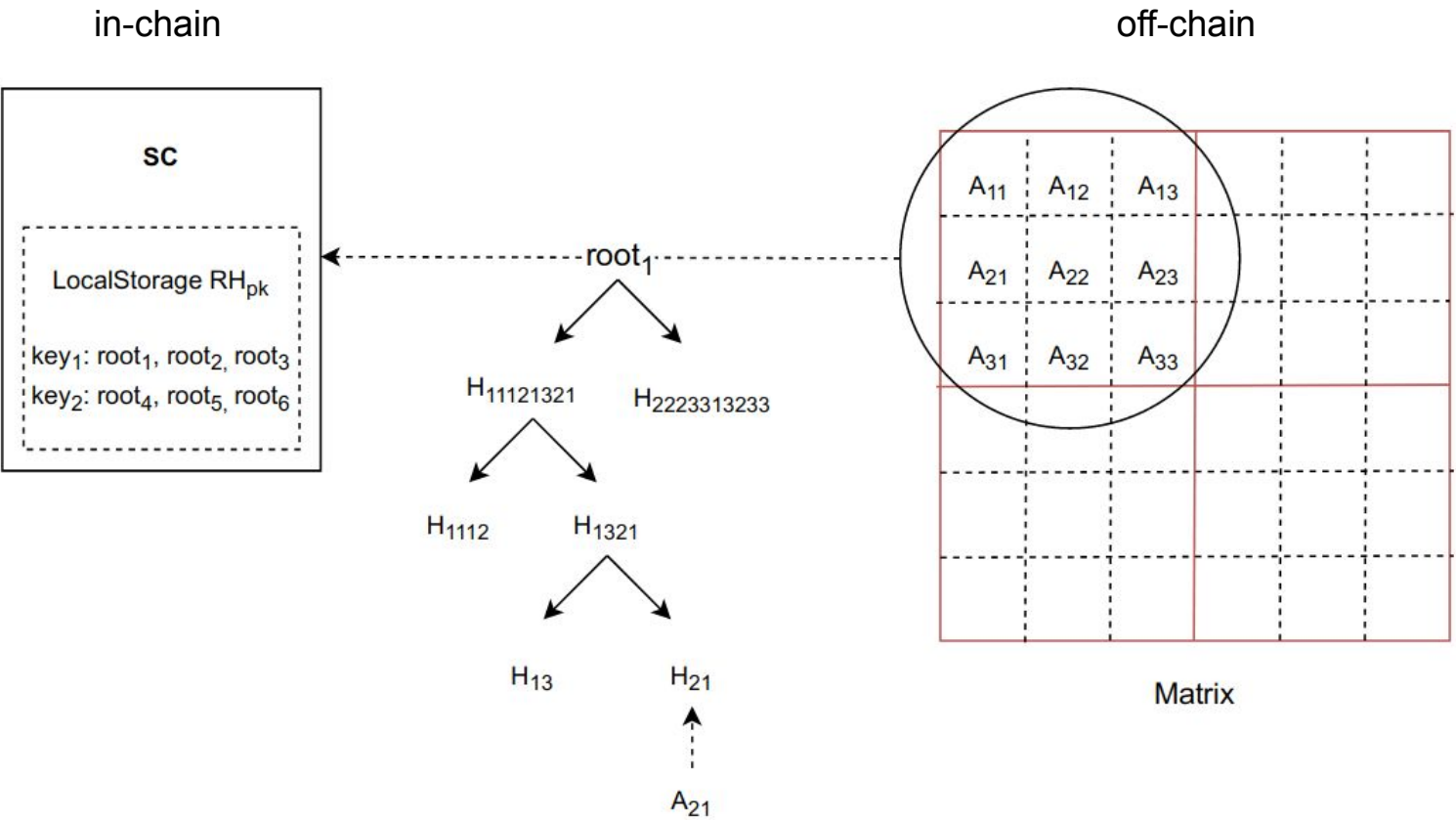
- $A = \langle cc, ro, ri, terr \rangle$
- constraints: local storage can host 16 local variables, each 128 bytes long and structured as key/value

$$16 \times 128 \times 8$$

VS

$$16 \times 34 \times 26 \times 200$$

By Design: Advanced



Reference Solution	Optimistic Solution	BitMatrix Solution	MerkleTree Solution
+ easy to implement	+ easy to implement	+ easy to implement	- moderate to implement
- no on-chain lookup to the state of the system	+ efficient on-chain lookup to the state of the system (single transaction)	+ efficient on-chain lookup to the state of the system (single transaction)	+ efficient on-chain lookup to the state of the system (constant number of transactions)
	- no double-spending prevention by design	+ double-spending prevention by design	+ double-spending prevention by design
		- limited storage space (~16k elements)	+ larger storage space (~1.5M elements)
			- Not unbounded storage space

Are there other competitive platforms in terms of costs/latency allowing to verify snarks in smart contracts?