

TOKENIZATION OF REAL ESTATE

Cross-Blockchain Infrastructure for Registration of Real Estate Deeds, Notarization and Digital Identity (eIDAS)

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Survey of failed projects

Estonian government does not use blockchain



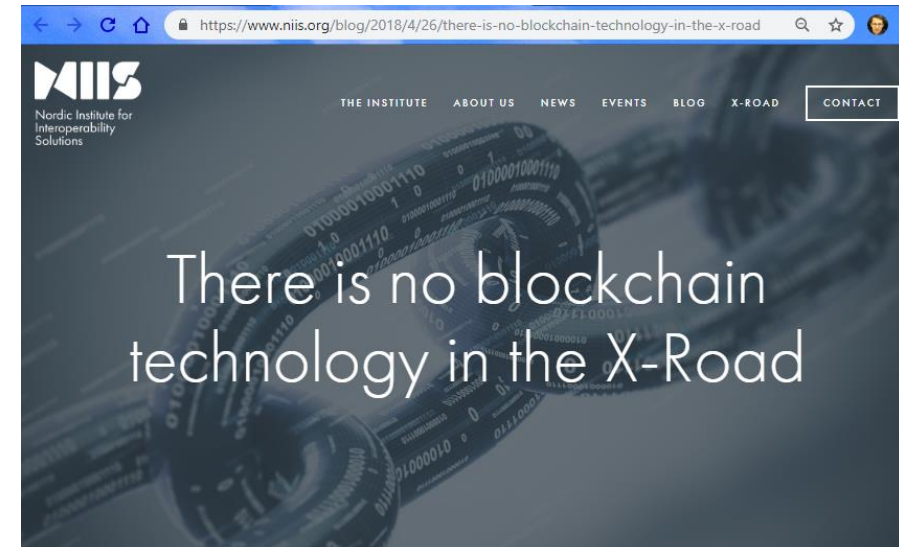
May 2018

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"X-Road is not based on blockchain technology" - The **Nordic Institute for Interoperability Solutions (NIIS)**, a joint organization founded by Estonian and Finnish governments responsible for the administration of X-Road development, has published a thorough article about the abuse of the word "blockchain". It has been one of the buzzwords of 2017 and became known after the success of Bitcoin and other cryptocurrencies which are based on its technology.

The blockchain is a decentralized and distributed database which is updated through a consensus protocol: every node has a full copy of the database and blocks stored in there are linked to each other using cryptographic hash functions. X-Road is the backbone of Estonian digital society and allows both public and private sector databases to exchange data. As written by Petteri Kivimäki in the article "the common factor between Blockchain and X-Road is that both are using cryptographic hash functions for linking data items to each other". Cryptographic hash functions existed before both systems were invented, so this doesn't mean that X-Road is based on blockchain technology.

This article was originally published by the Nordic Institute for Interoperability Solutions. Read the full article [here](#).



Petteri Kivimäki · April 26, 2018

Recently there have been multiple writings about the X-Road which have stated that the X-Road is a blockchain based technology or it utilizes blockchain internally. Are these claims true, is the X-Road based on blockchain? Let's take a look at the facts.

Blockchain

Blockchain is one of this year's buzzwords and one of the hottest technologies out there. Blockchain became known as the technology behind **bitcoin** - the first cryptocurrency launched in 2009. Since then its use has expanded to cover many different business areas and use cases in addition to cryptocurrencies.

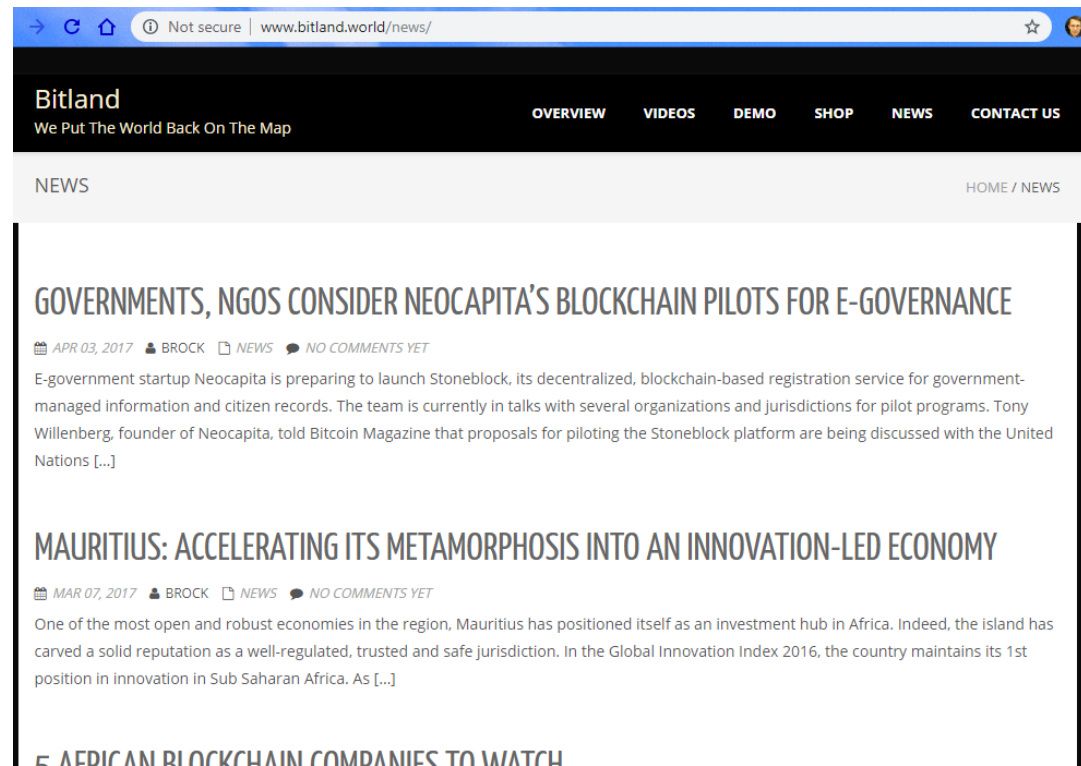
Honduras has never developed the land registry on blockchain

Honduras	Land title registry project	Announced in 2015 and known as failure now
Kazakhstan	Announced that they will make the most favorable business climate for cryptocurrency and Financial technology(Fintech)	Announced in July 17, 2017
Russia	Blockchain based documents management system announced by Moscow government	Announced in 2016
	Russia's ministry of health is launching a blockchain pilot	Announced in Aug 10, 2017
Singapore	Cross-border interbank payments	A proof-of-concept project has been initiated in 2016.
Sweden	Trials of a blockchain smart contracts technology for land registry	Tested in early 2017

Sweden has never used Chromaway for real estate registry

- Chromapolis is a centralized DLT platform
- Whitepaper never aimed to introduce project in cadastral registry
- Demonstration (3 mon ago): centralized DLT with lab prototype app for deeds

Bitland has never run cadastral registry in Ghana



Cook county in Chicago (USA) never run estate registry

- Simulation of blockchain hashing (**velox.re**)
- Report (Recorder of Deeds)

Blockchain Pilot Program. Final Report. Mirkovic, John

Bitfury never “developed cadastral registry” on blockchain in **Georgia and Ukraine**

- Exomun is a centralized DLT
- Hash records

PERMISSIONED “BLOCKCHAIN”

Satoshi Nakamoto

“block chain”

=

Bitcoin et al

=

distributed, uncensored,
immutable, public

- Permissioned/centralized DLT

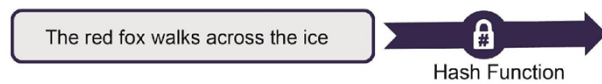
Hashing (Anchoring) on the Blockchain

User's Data

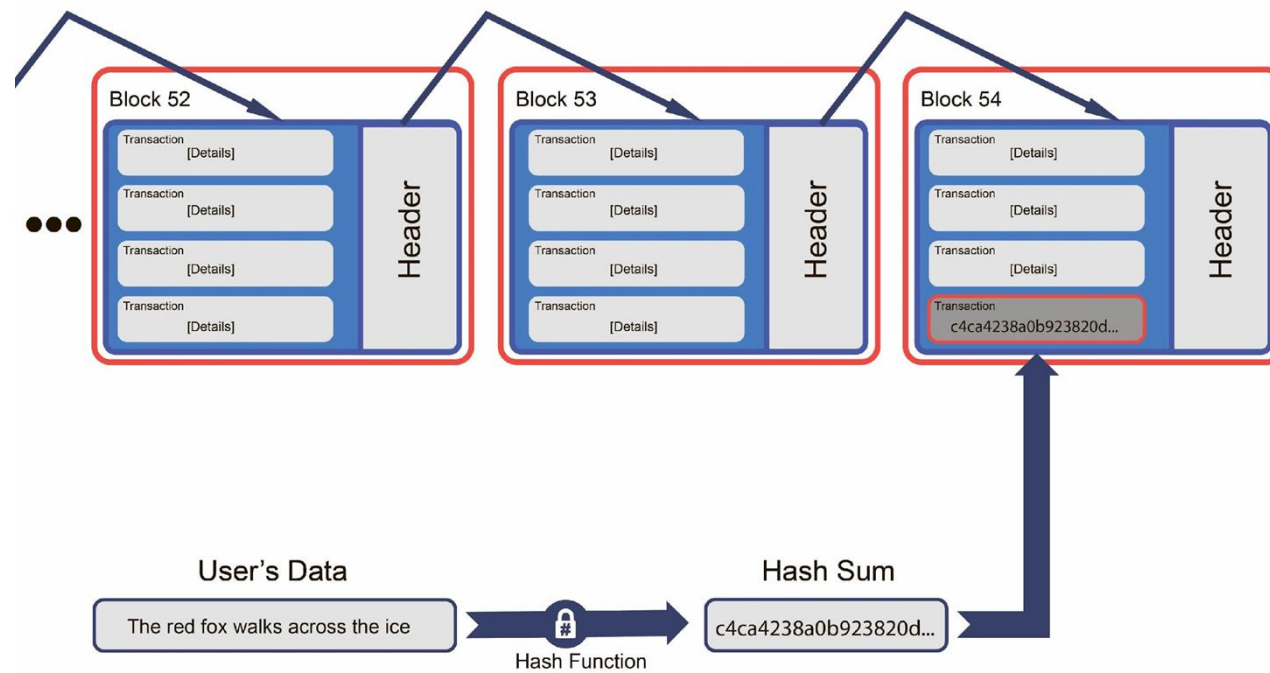
The red fox walks across the ice

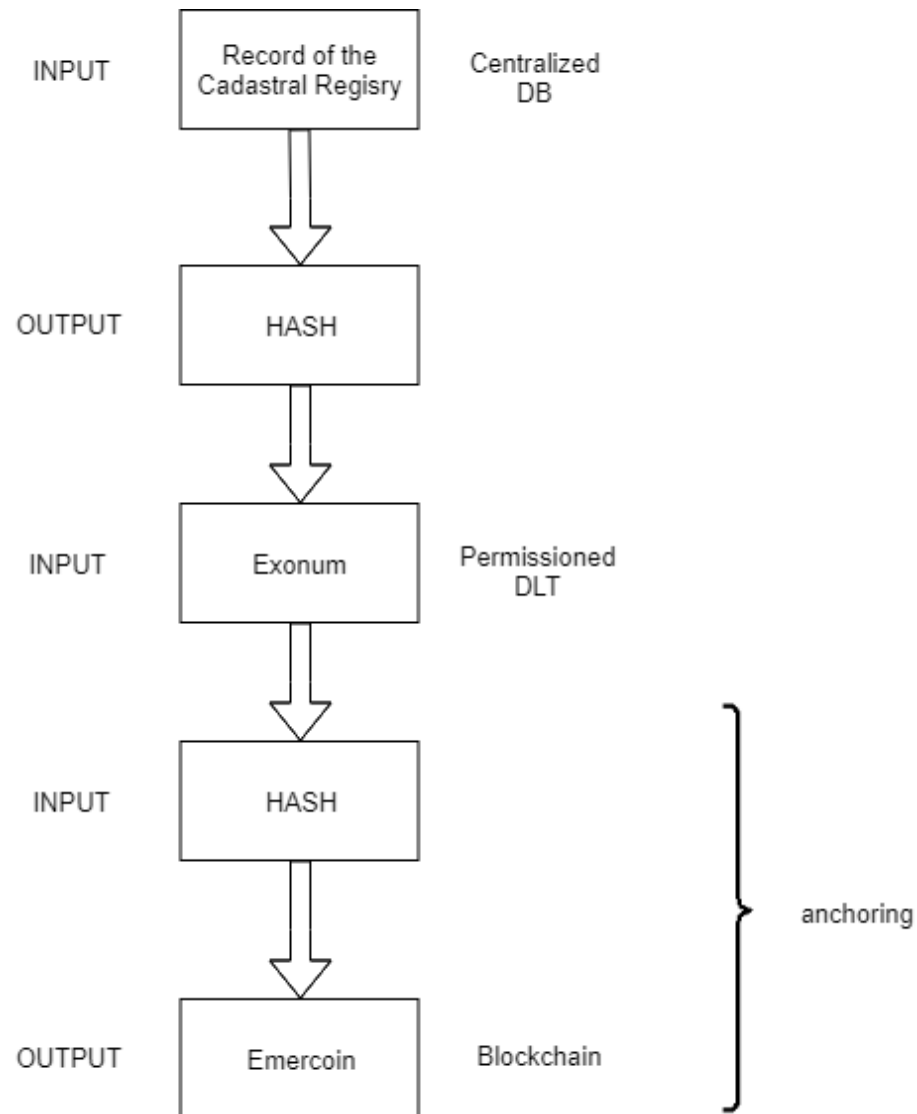


User's Data







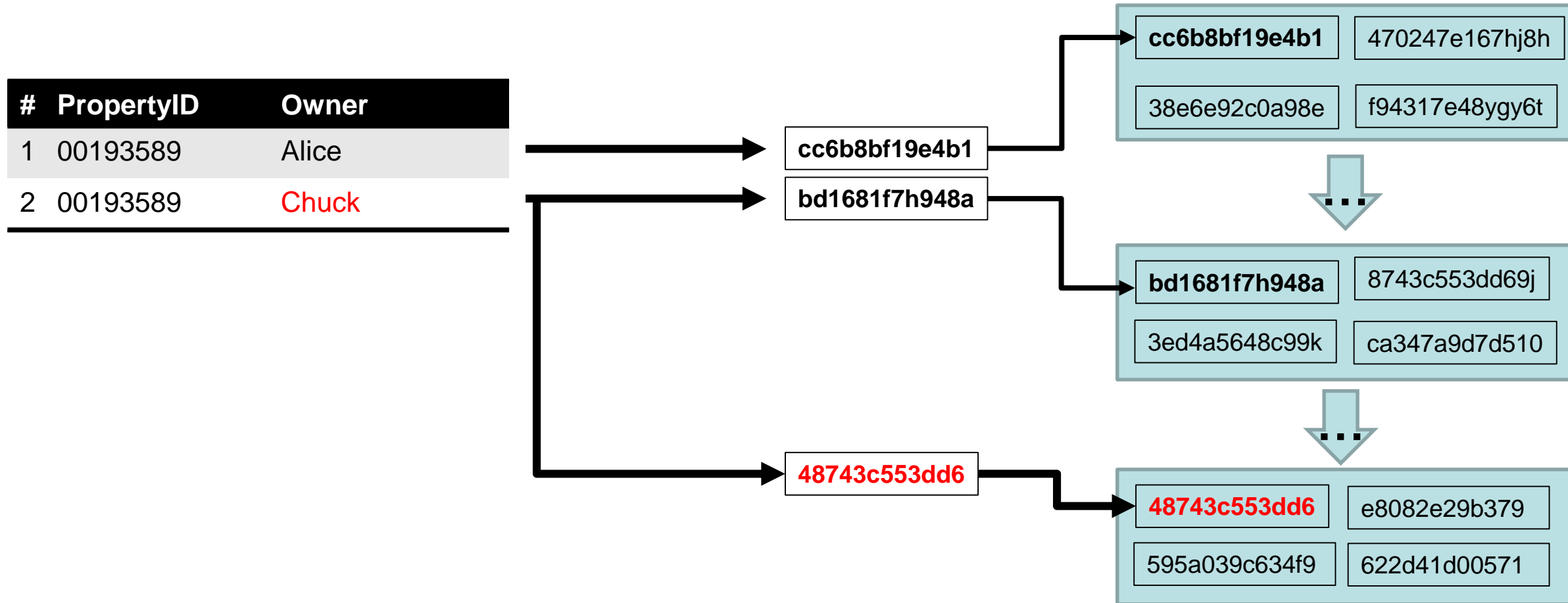


Exonum for Cadastral registry in Ukraine and Georgia

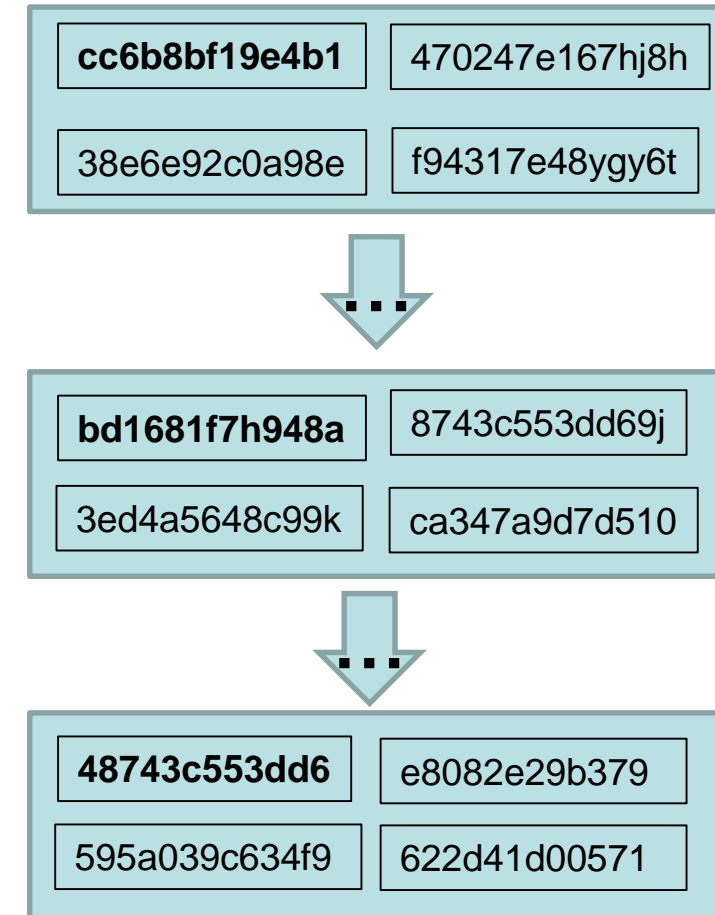
By Bitfury

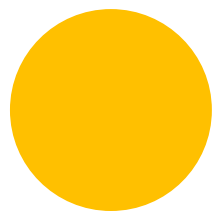
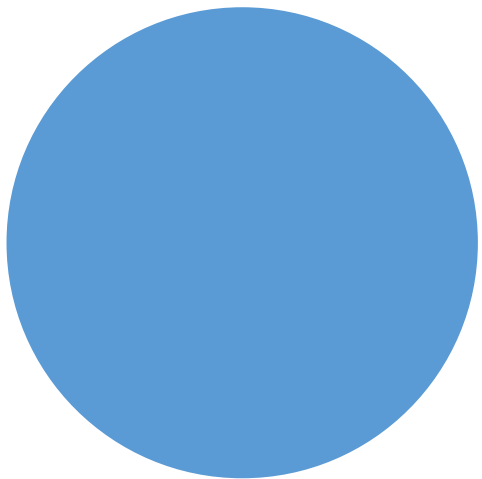


Blockchain hashing for registries



Blockchain hashing for registries





Tokenization



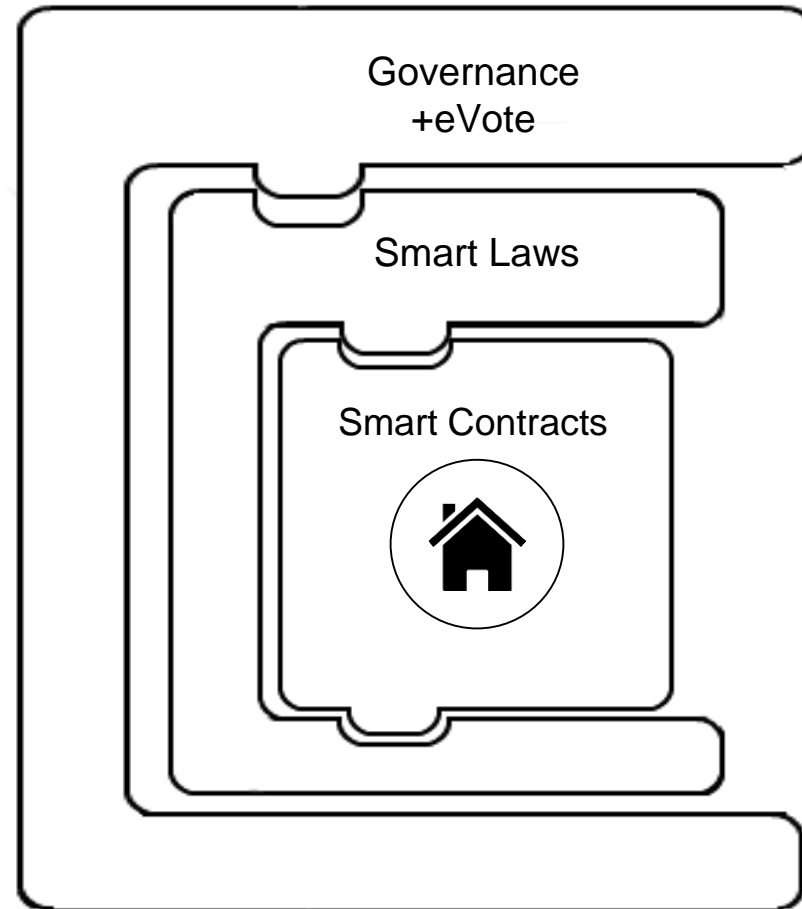
THE RIGHT TO CHOOSE

Conventional
centralized cadastre

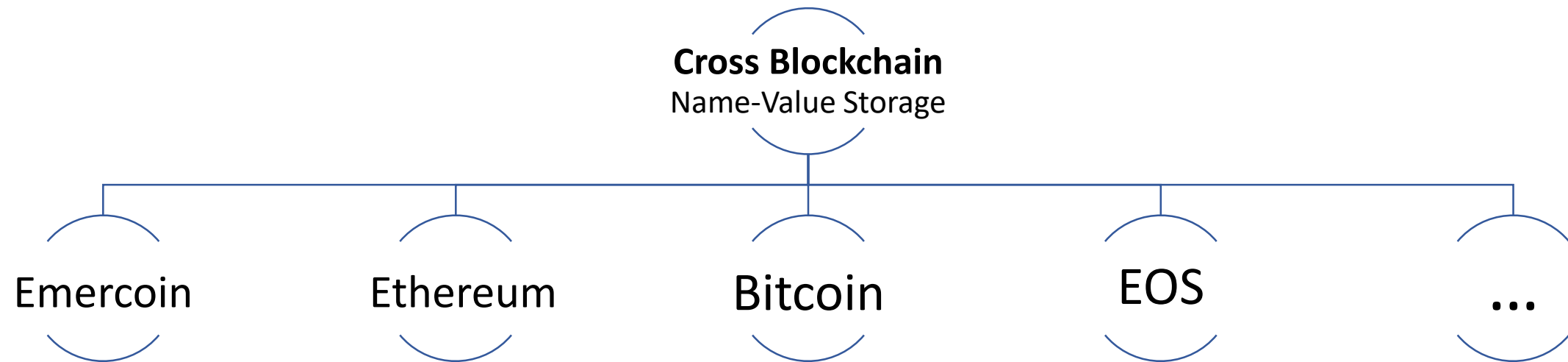
Blockchain



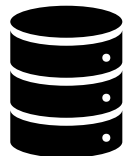
TITLE TOKEN



Cross blockchain infrastructure



CROSS-
BLOCKCHAIN DB
(Berkley DB)
key-value database



Name: Alice
Value: +61414739692

Name: www.bob.bit
Value: A(182.12.129.1)

Name: i4owdrc9rguiu
Value: 89hugyri8trdg

Name: Alice
Value: +34622609932

New Name

Name Update

CROSS - BLOCKCHAIN PROTOCOL

Block 71
Name: Alice
Value:
+61414739692

Block 72

Block 73

Block 74
Name: Alice
Value:
+34622609932

Block 74

Block 120

Block 121
Name: www.bob.bit
Value:
A(182.12.129.1)

Block 122
Name:
i4owdrc9rguiu
Value: 89hugyri8trdg

Block 123

Block 124

Block 125

Block 897

Block 898

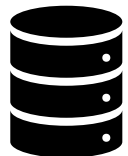
Block 899

Block 900

Block 901

Block 902

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Block 123

Block 124

Block 125

Block 897

Block 898

Block 899

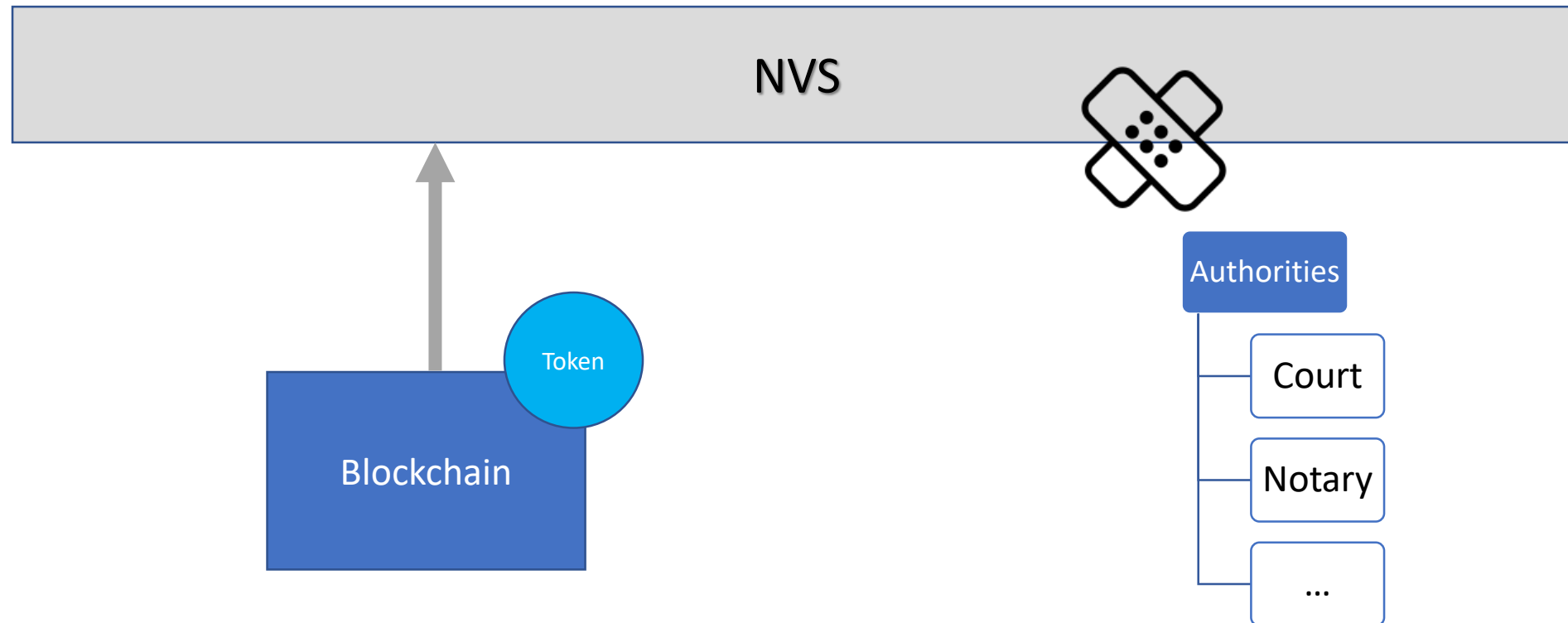
Block 900

Block 901

Block 902

Immutability is not a problem anymore

Name	Value
47:14:1203001:814	Alice Bob



Advantages of Cross-Blockchain Protocol

- Multiple blockchain in the bundle
 - Technological neutrality
 - Free competition of technologies
 - Right to choose
 - Scalability, price volatility
- Transfer tokens from one blockchain to another (no intermediary)
- Smart Laws
 - Enforceability (inheritance, lost keys, crimes & litigation, etc.)
 - Sustainable governance
 - Hardforks
- Allows centralized forms of governance



Digital Identity



Asymmetric cryptography

PRIVATE KEY



- Digital signature

PUBLIC KEY



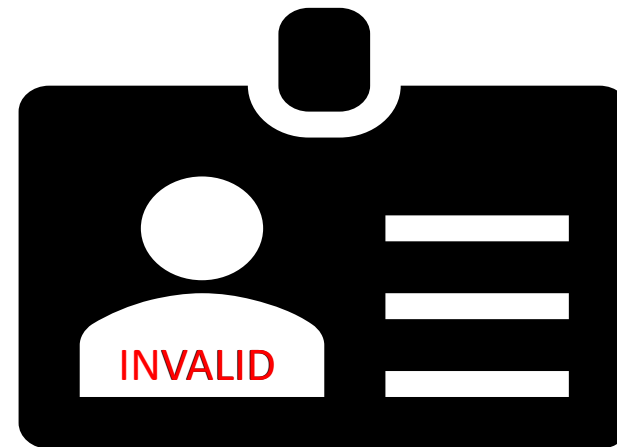
- Digital identity

PKI

CERTIFICATE AUTHORITIES “CA”
TRUST SERVICE PROVIDER “TSP”

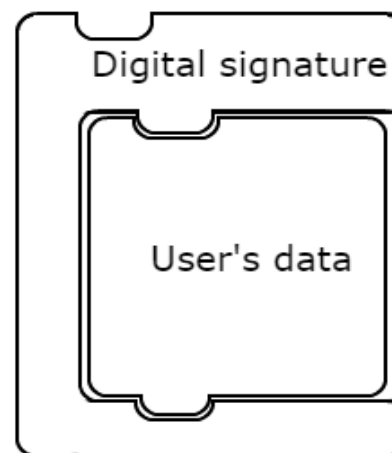
PUBLIC KEY

Cert.x.509

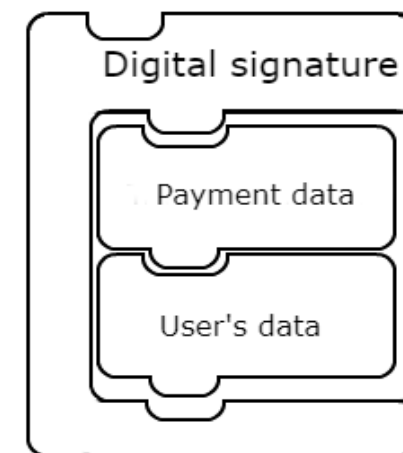


Asymmetric cryptography

Traditinoal singing



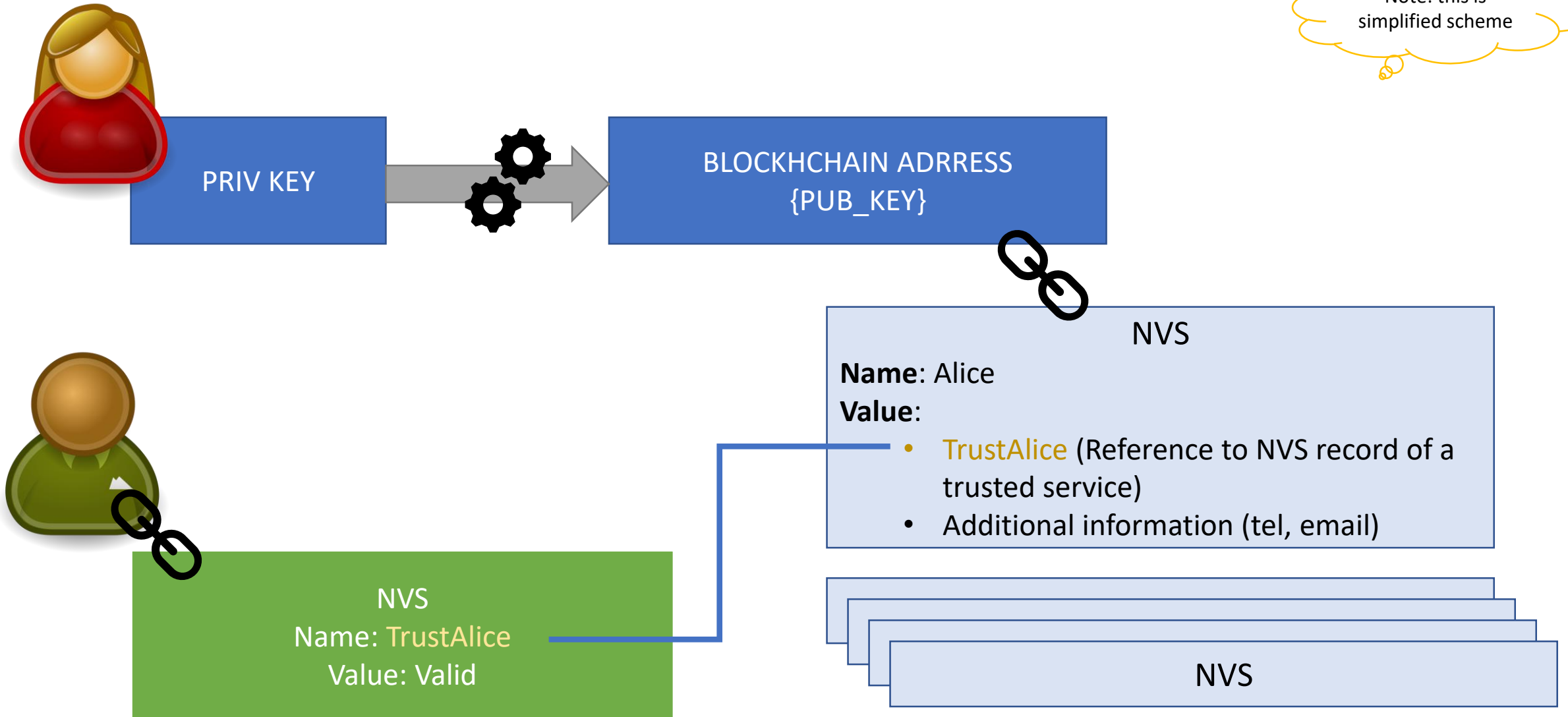
Blockchain

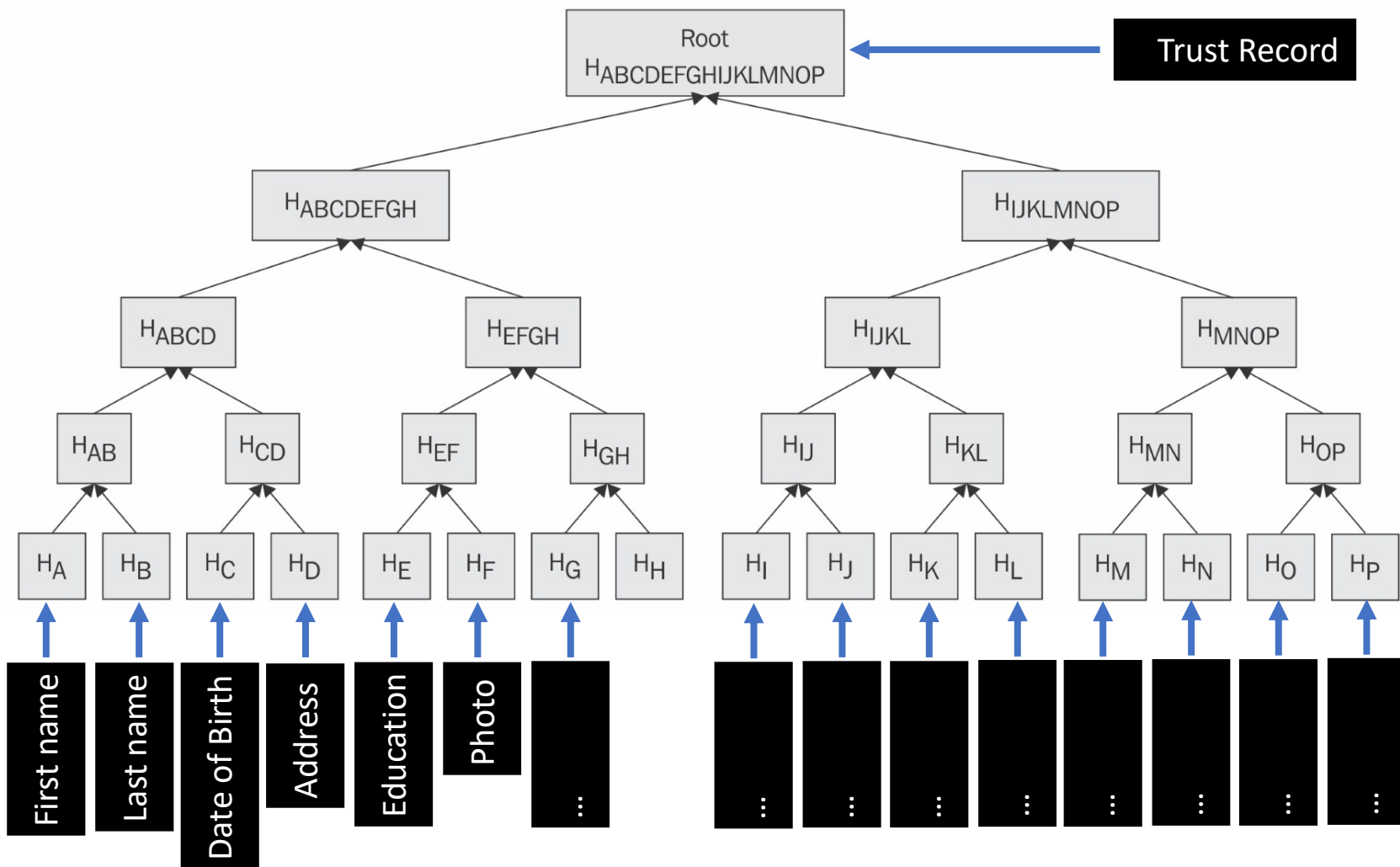


2018 Oleksii Konashevych

Identity and Trusted services

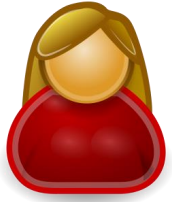
Note: this is simplified scheme





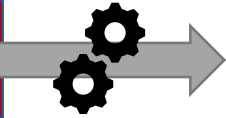
Merkle tree
for selective disclosure

Land Title - Trusted Record



Alice [title owner]

PRIV KEY



ADDRESS
{PUB_KEY}



NVS

Name: [cadastre number]
Value:

- [TrustThisTitle] (Reference to Bob's NVS record)
- Additional information



Bob [town's clerk]

PRIV KEY



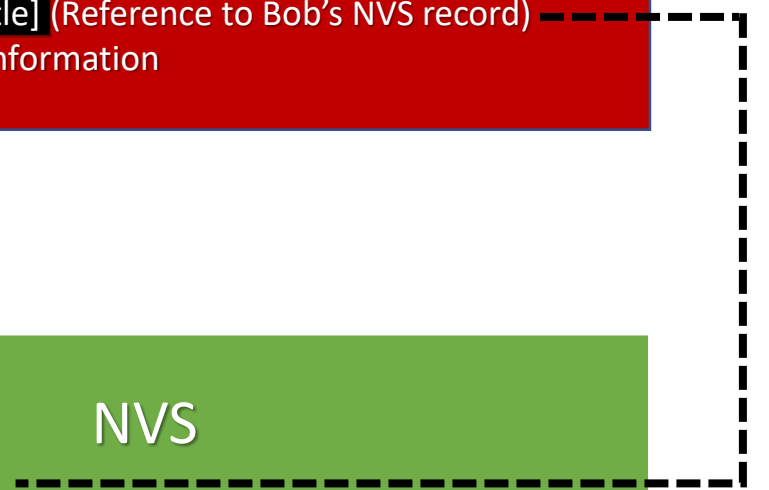
ADDRESS
{PUB_KEY}



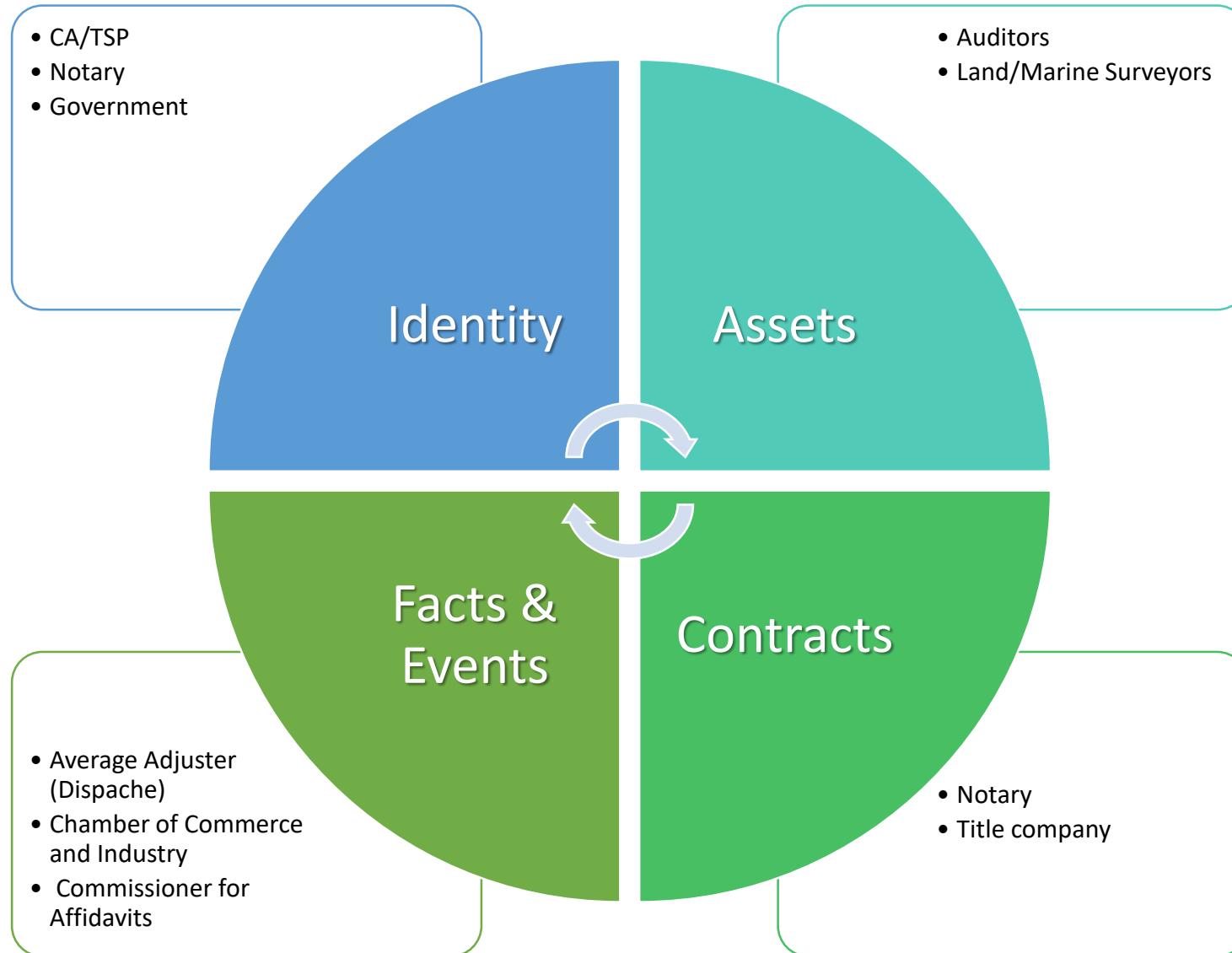
NVS

Name: [TrustThisTitle]
Value:

- Valid
- Additional information



ECOSYSTEM OF TRUST



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- Youtube channel: **Blockchain State**