Architecting a scalable e-election system using Blockchain

Ioan-Mihail STAN | Ilie-Constantin BARAC | Daniel ROSNER

speaker

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Global Context

2020-2021 health crisis – SARS-COV-2*

- 79 countries and territories postponed the elections
- 142 countries and territories decided to hold elections enforcing various risk mitigation measures
- elector turnout declined in 58 countries

Accelerated digital transformation around the world

- focus on reducing the time to market
- reuse of mature technologies in 3rd party workflows

* https://www.idea.int/news-media/multimedia-reports/global-overview-covid-19-impact-elections

Implementations

Security Analysis of the Estonian Internet Voting System

Drew Springall[†] Travis Finkenauer[†] Zakir Durumeric[†]
Jason Kitcat[‡] Harri Hursti Margaret MacAlpine J. Alex Halderman[†]
[†]University of Michigan, Ann Arbor, MI, U.S.A.
[‡]Open Rights Group, U.K.

For additional materials and contact information, visit estoniaevoting.org.

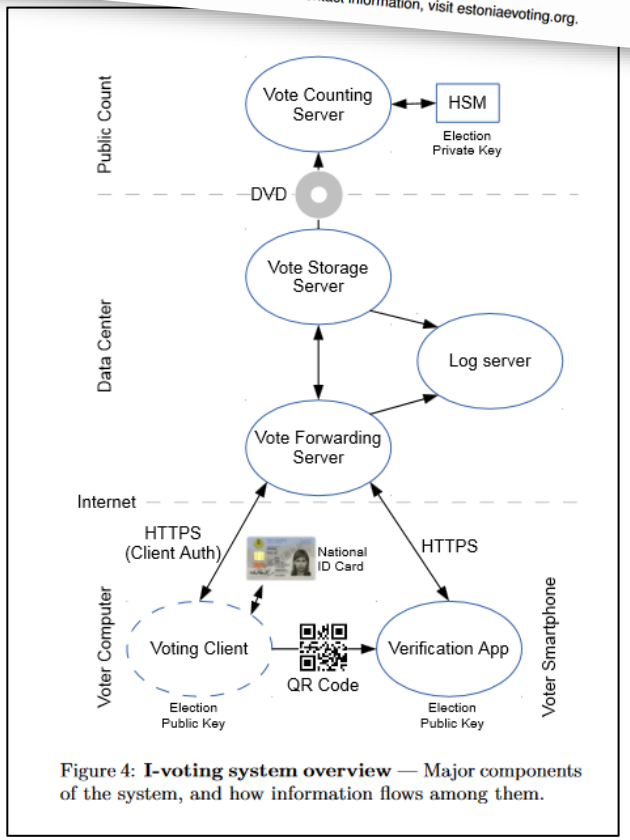
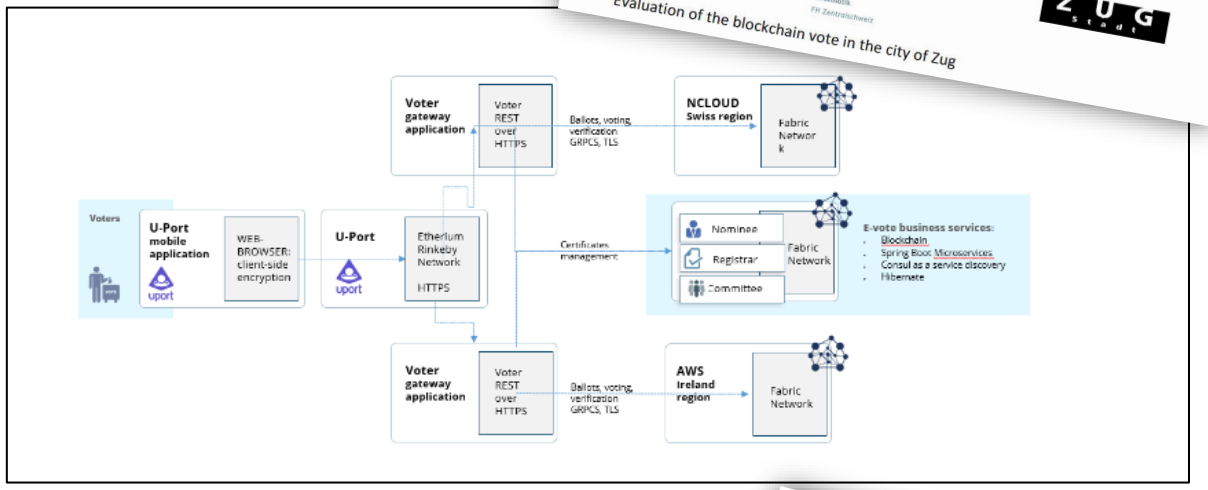
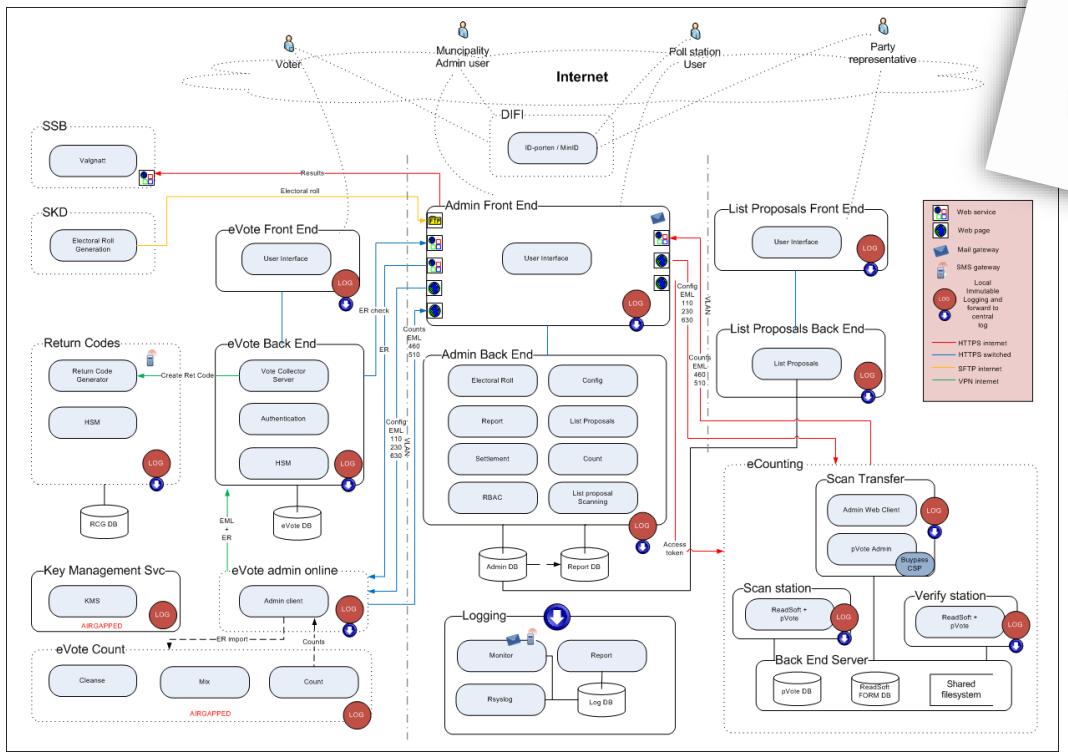


Figure 4: **I-voting system overview** — Major components of the system, and how information flows among them.

Evaluation of the blockchain vote in the city of Zug





Norway

E-vote 2011
System Architecture
Overview, Interfaces and Deployment

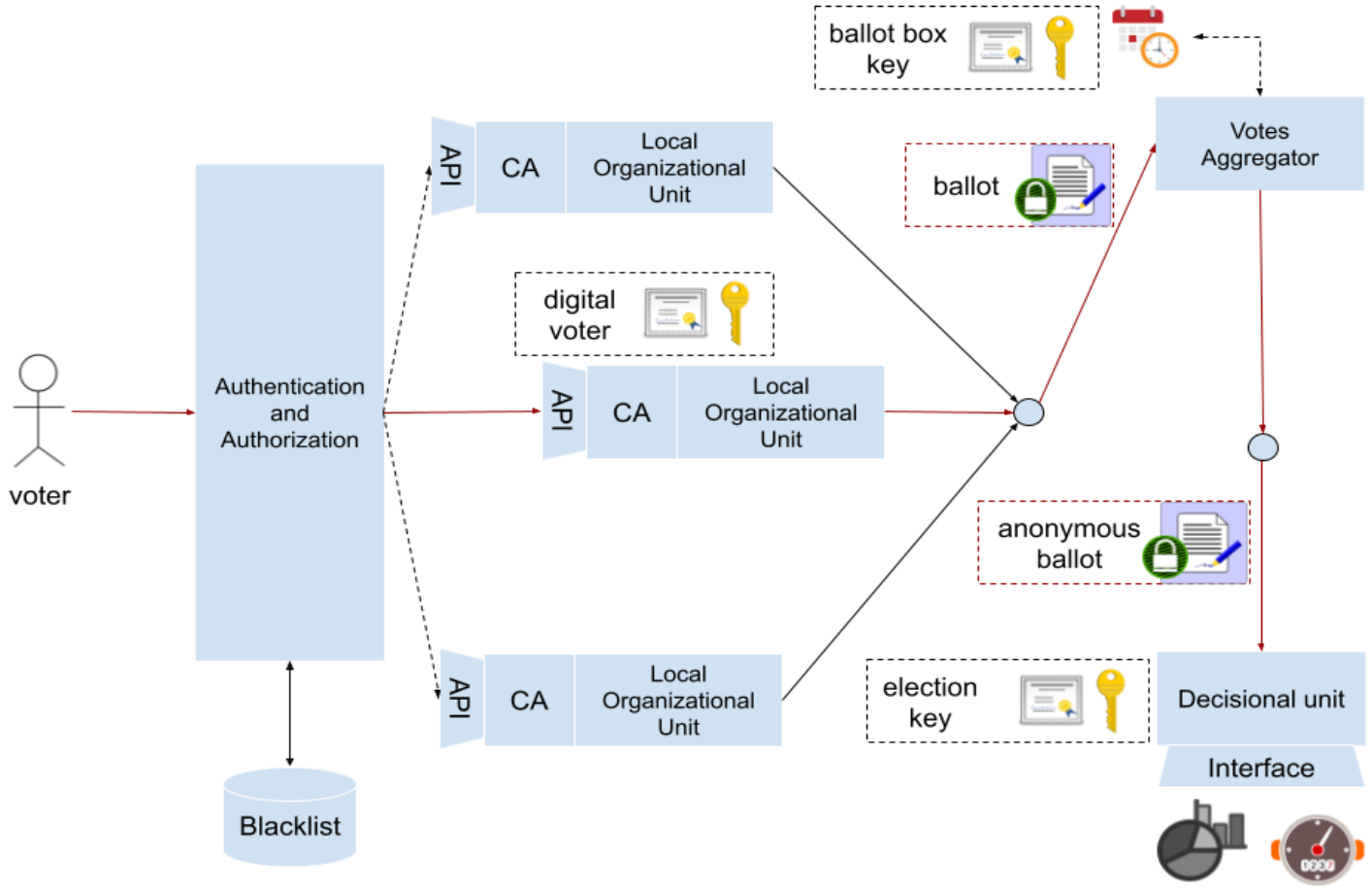
V 1.5

Goals

- Design a generic nation-wide e-election system based on Blockchain
- Reduce time to market
  - Reuse and adapt existing routines and processes
- Follow patterns from existing e-voting platforms

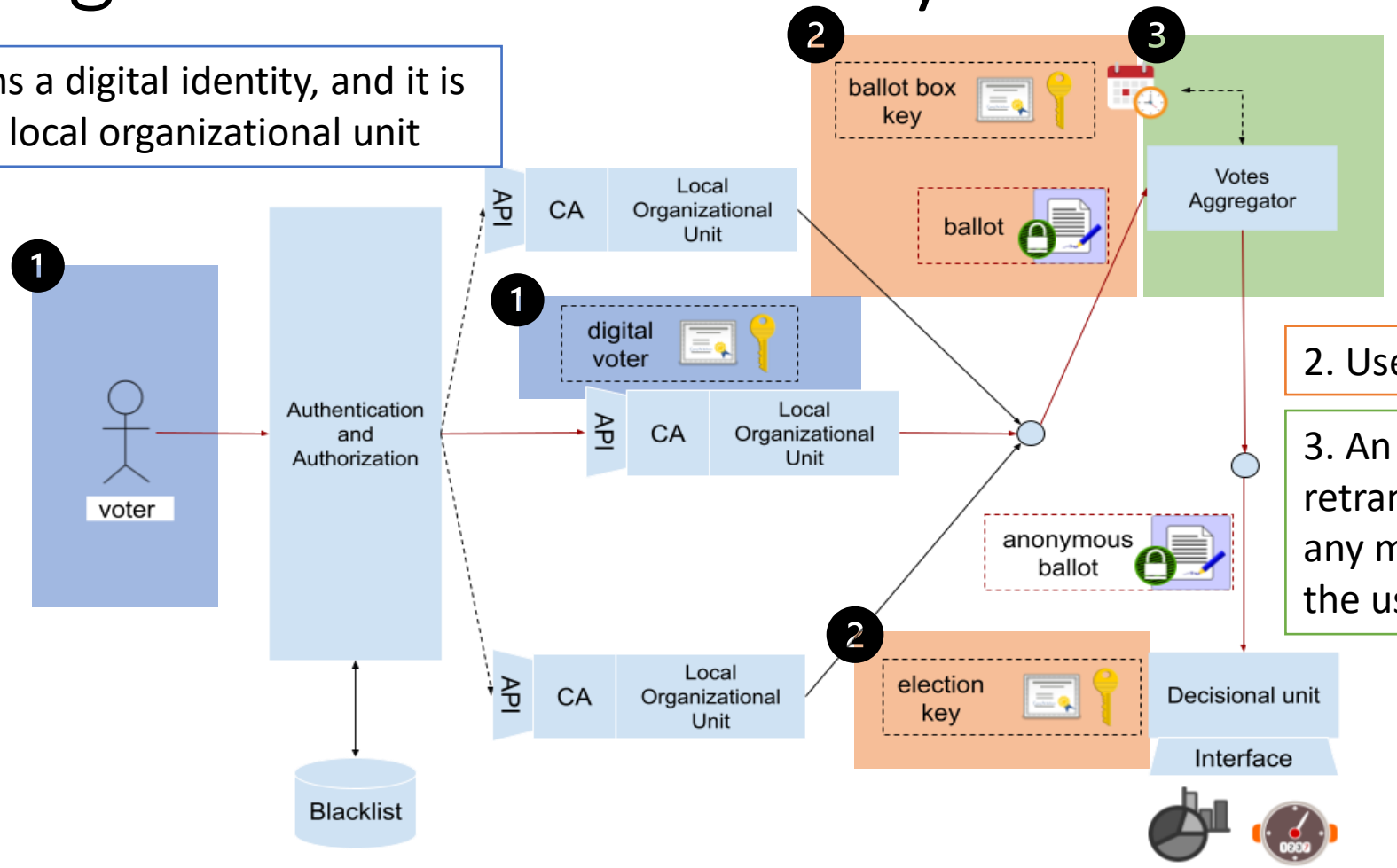
- Enterprise Blockchain implementations have incredible results in critical industries:
  - Retail (supply chain)
  - Finance
  - Medical system

Concept Architecture



Segregation model - anonymization

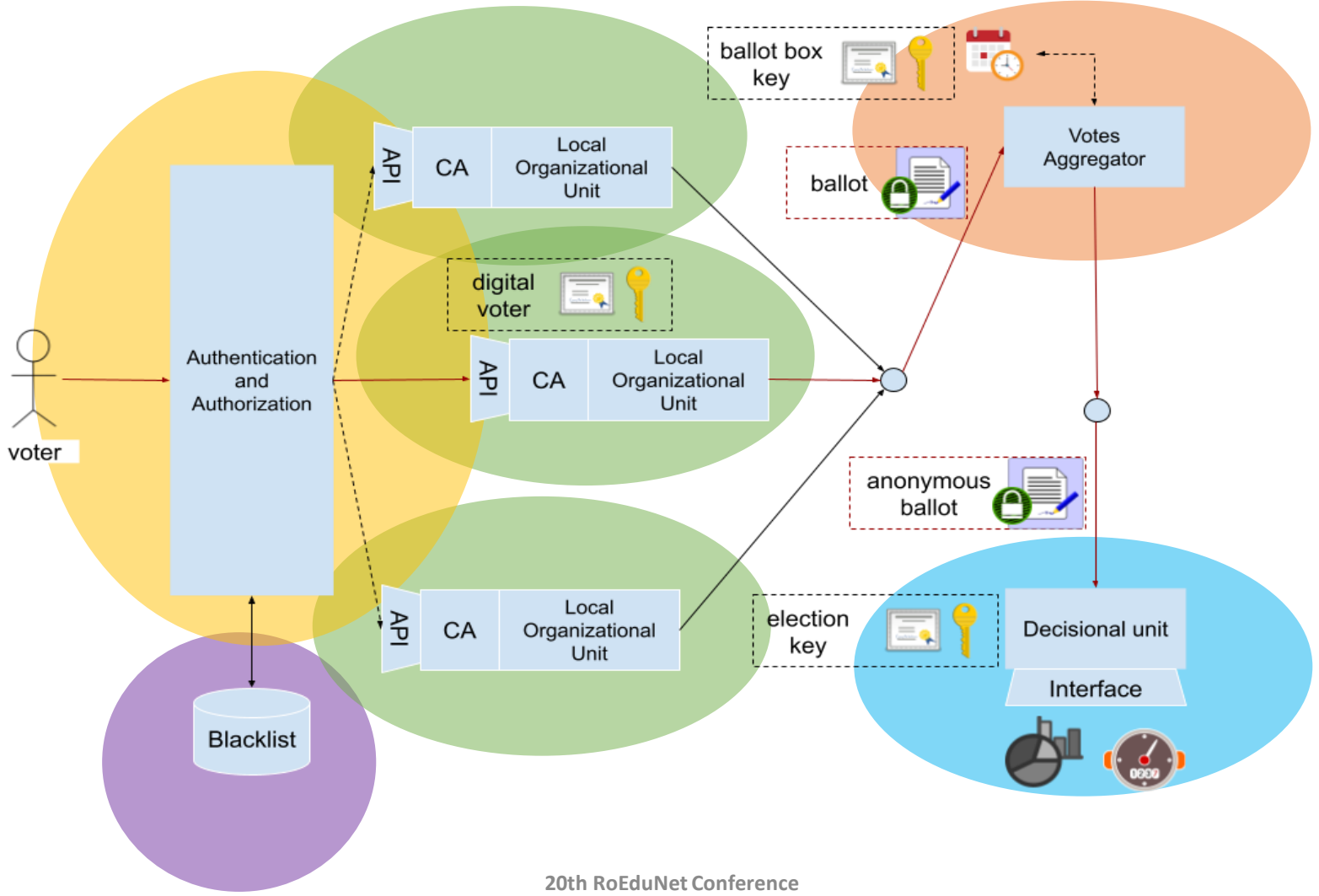
1. User obtains a digital identity, and it is allocated to a local organizational unit



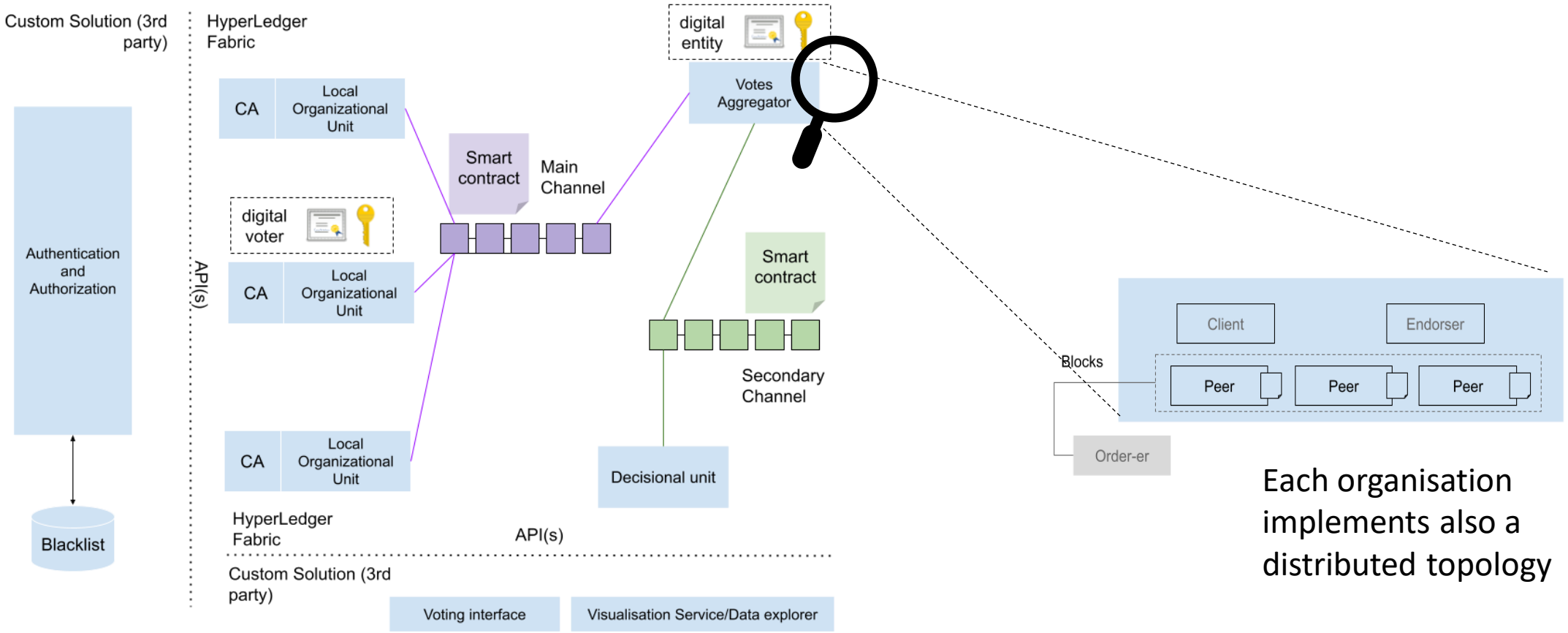
2. User double encrypts its ballot

3. An intermediary entity will retransmit the votes and remove any metadata that may identify the user

Segregation model - responsability

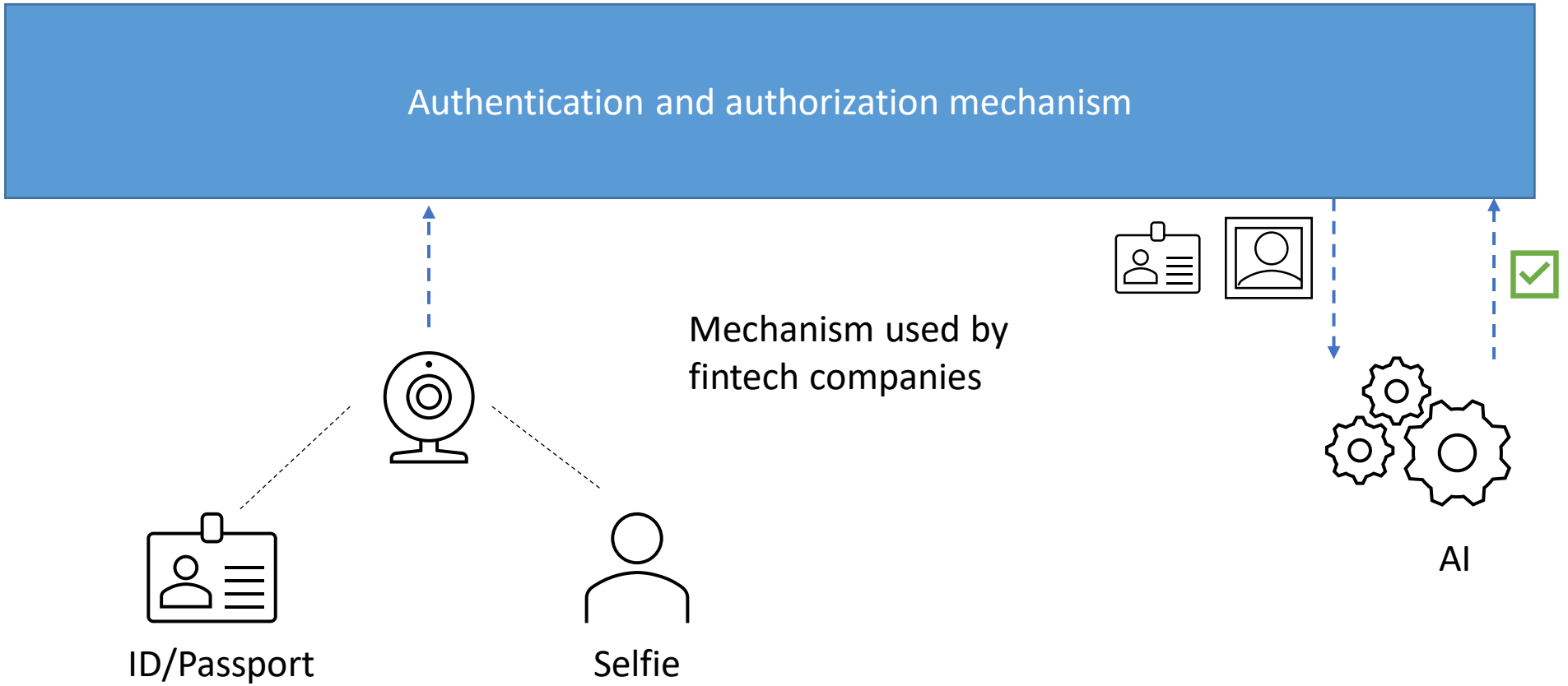


Designing with Hyperledger Fabric (Blockchain technology)

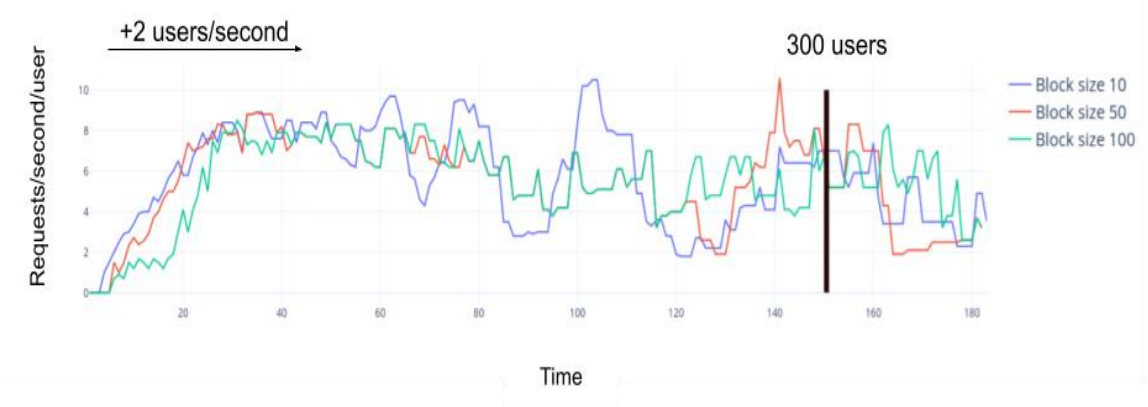


Each organisation implements also a distributed topology

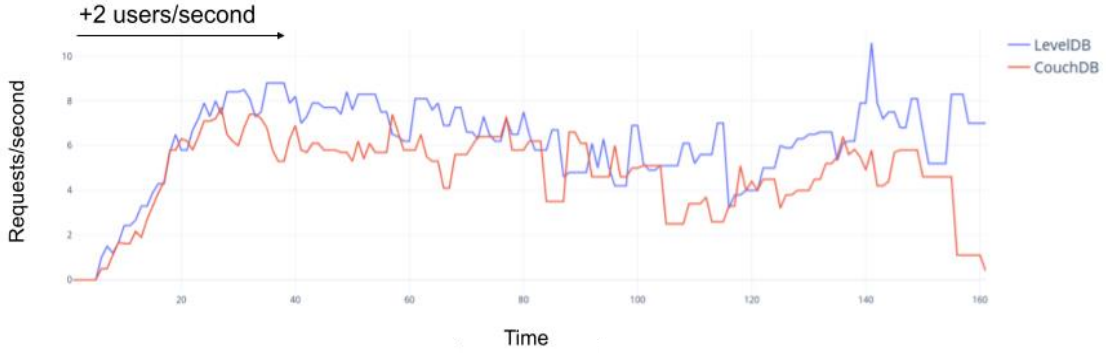
Alternative authentication model



Performance measurements and scalability



Block size influence in system performance



Database influence in system performance

Results:

- Bigger block sizes may increase the system performance for the utilization behaviour expected
- Hyperledger with GoLevelDB may improve the overall performance for the dataflow proposed

Conclusions

- We provided a concept architecture and design for a generic, nation-wide e-election system
- We proposed a segregation model for distributing responsibility and an anonymization methodology for voters
- We proposed an alternative authentication system to classical methods
- We developed a Proof of concept and established some Hyperledger configuration models for better performance