SOFIE
Secure and Open Federation of IoT systems

A position talk
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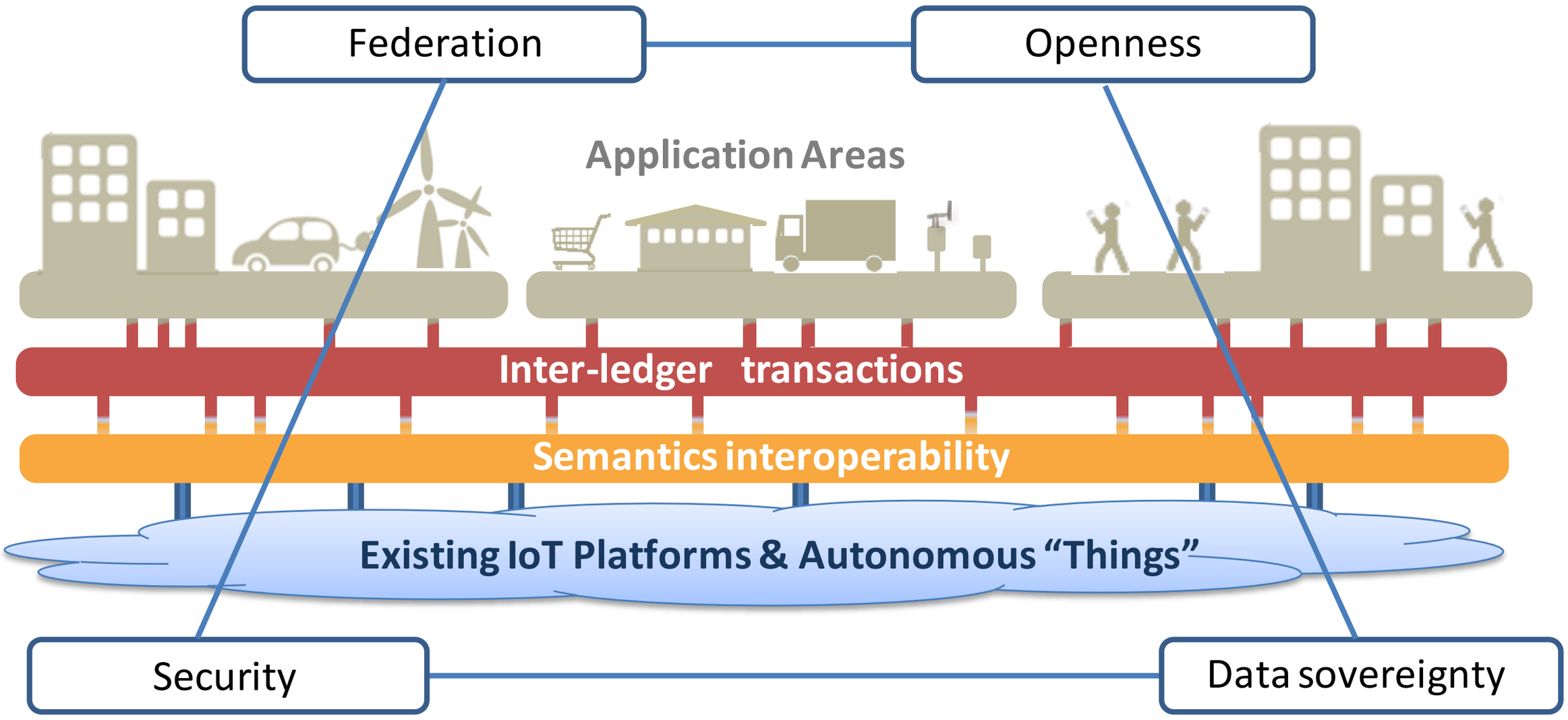
Outline

- SOFIE: Introduction and goals
- Core concept
- Basic technical approach
- Field trials
- Technical details
- Reflection
- Summary

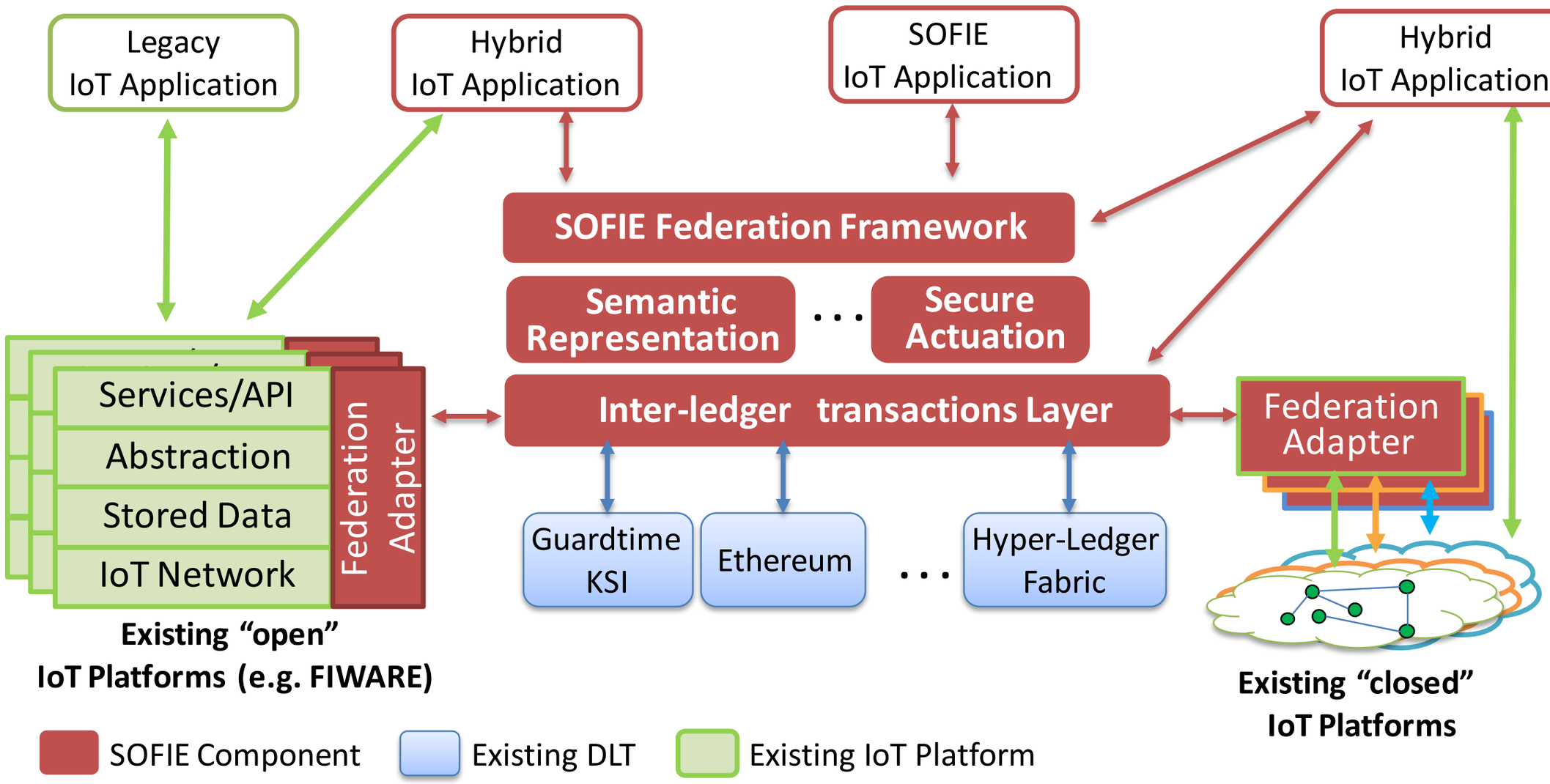
Introduction and goals

- EU H2020 IoT-03 R&I project
- 3 years 2018–2020, total 4.5 M€, 10 partners
- Key idea: Secure Open Federation of IoT platforms, using DLTs
- Stated concrete EU-funded objectives:
  - Define an IoT federation *architecture* and develop a corresponding *framework*
  - *Deploy and evaluate* the federation framework *in field trials*
  - Evaluate the *commercial viability*
  - Establish the IoT federation approach as *a major enabler*
- **We want to understand the community needs!**

Core concept



Technical approach



SOFIE field trials

- Mixed reality gaming
- Energy (2 partly federated trials)
- Food chain

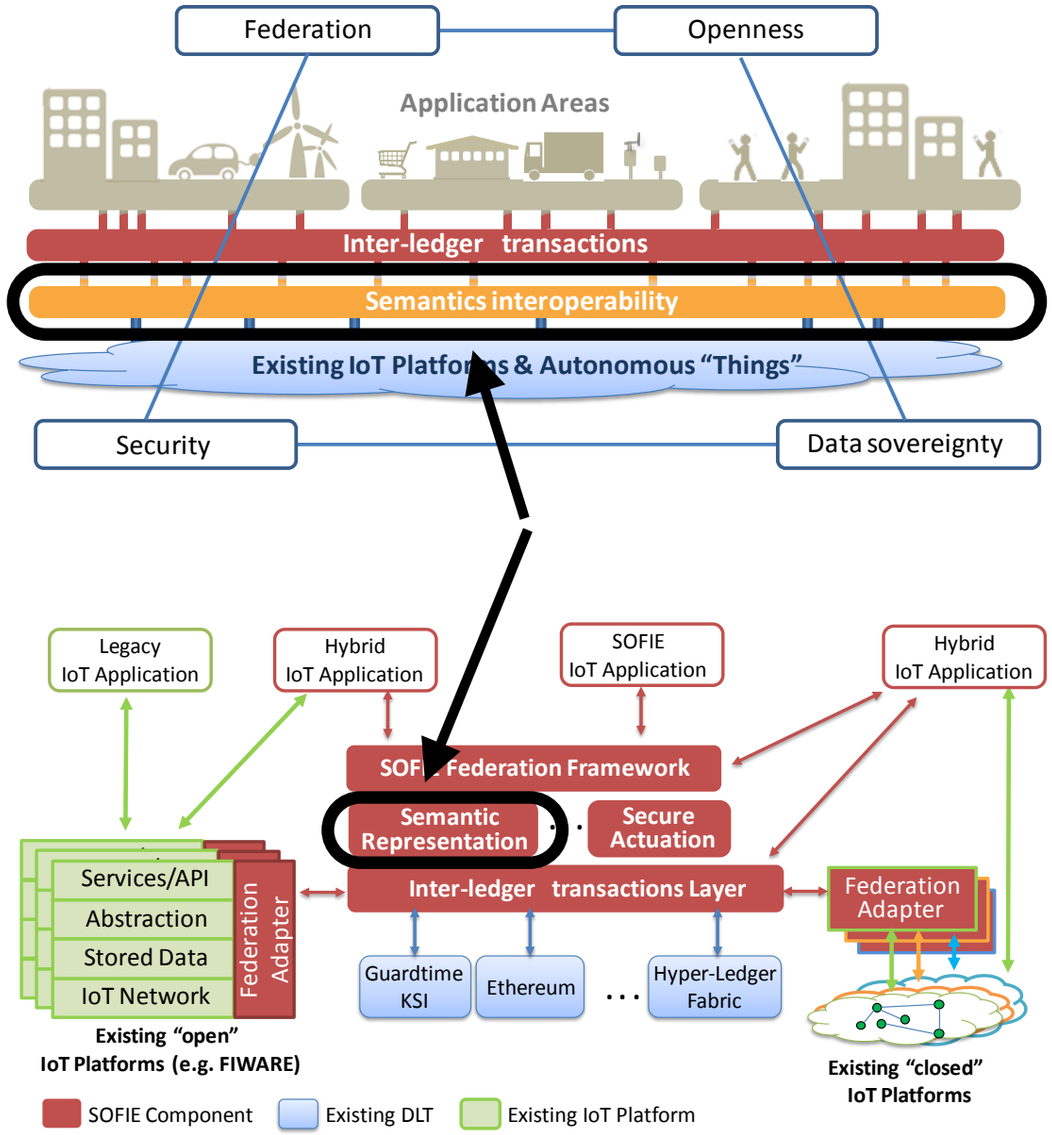
- **Looking for additional external users / trials**

Technical details

- Current working assumptions
  - Feedback very much appreciated
- Semantic interoperability
- Inter-ledger transactions
- Federation adapters
- Secure actuation
- Outline for the overall security

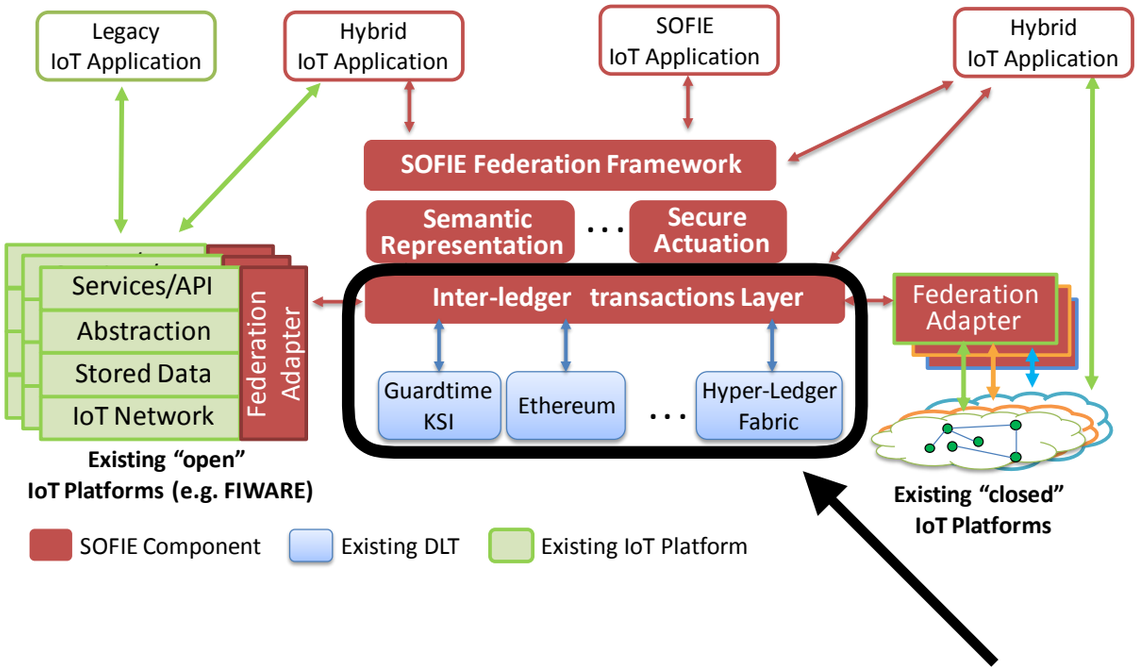
Semantic interoperability

- Represent devices and higher-level objects
  - What it is?
  - How to access it?
  - How to get credentials?
- Working assumption: Use W3C Web of Things
  - Thing descriptions



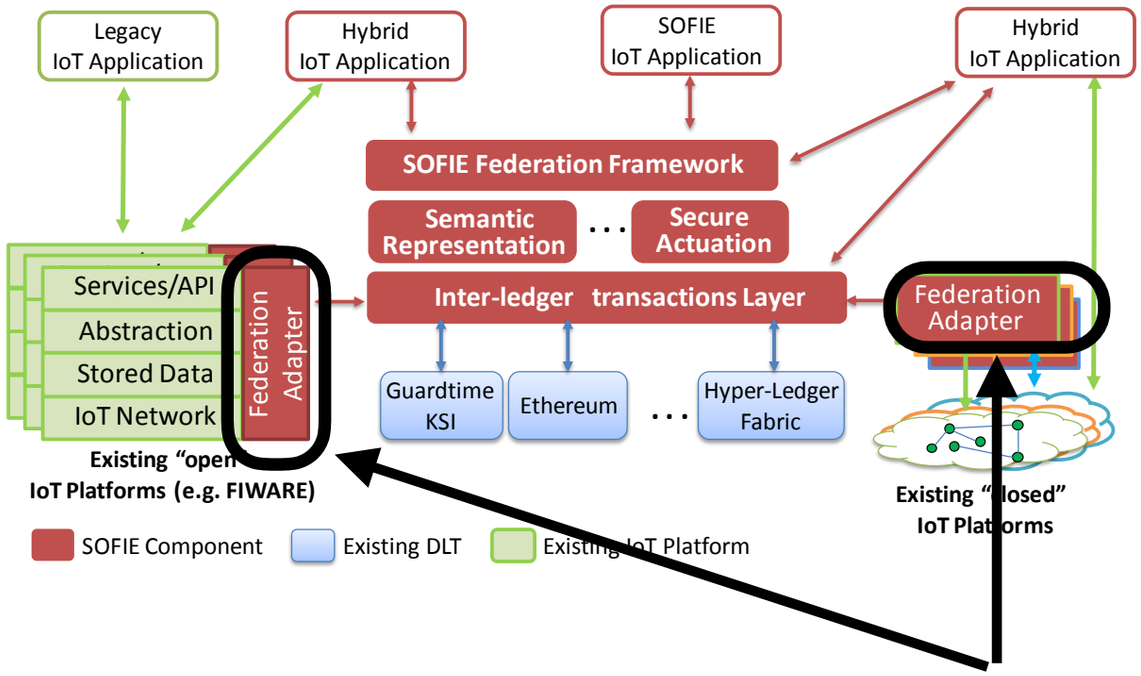
Inter-ledger transactions

- A single transaction entered into multiple ledgers
- Multi-stage transactions
- Part of semantics "above" any of the participating ledgers
- Combine BC strengths
  - E.g. speed, security, scalability, smarts, …
- Somewhat similar to sidechains



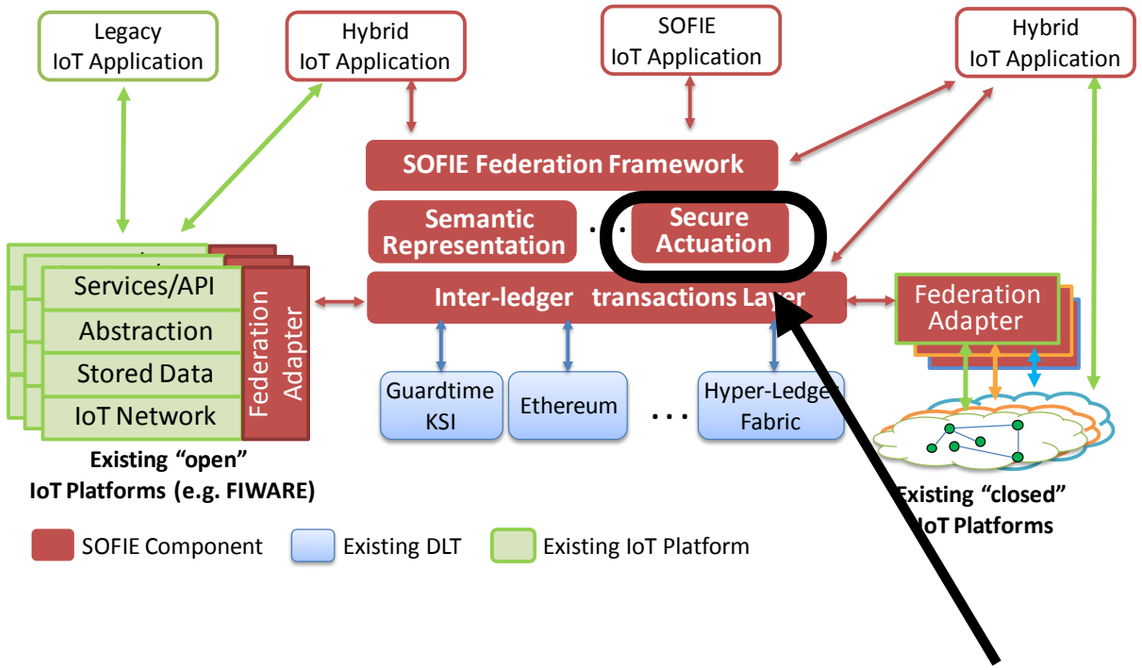
Federation adapters

- Events to blockchain
- Actions from blockchain
  - Triggered by transactions or through smart contracts
- What should these be at the very concrete level?
  - NodeJS microservices

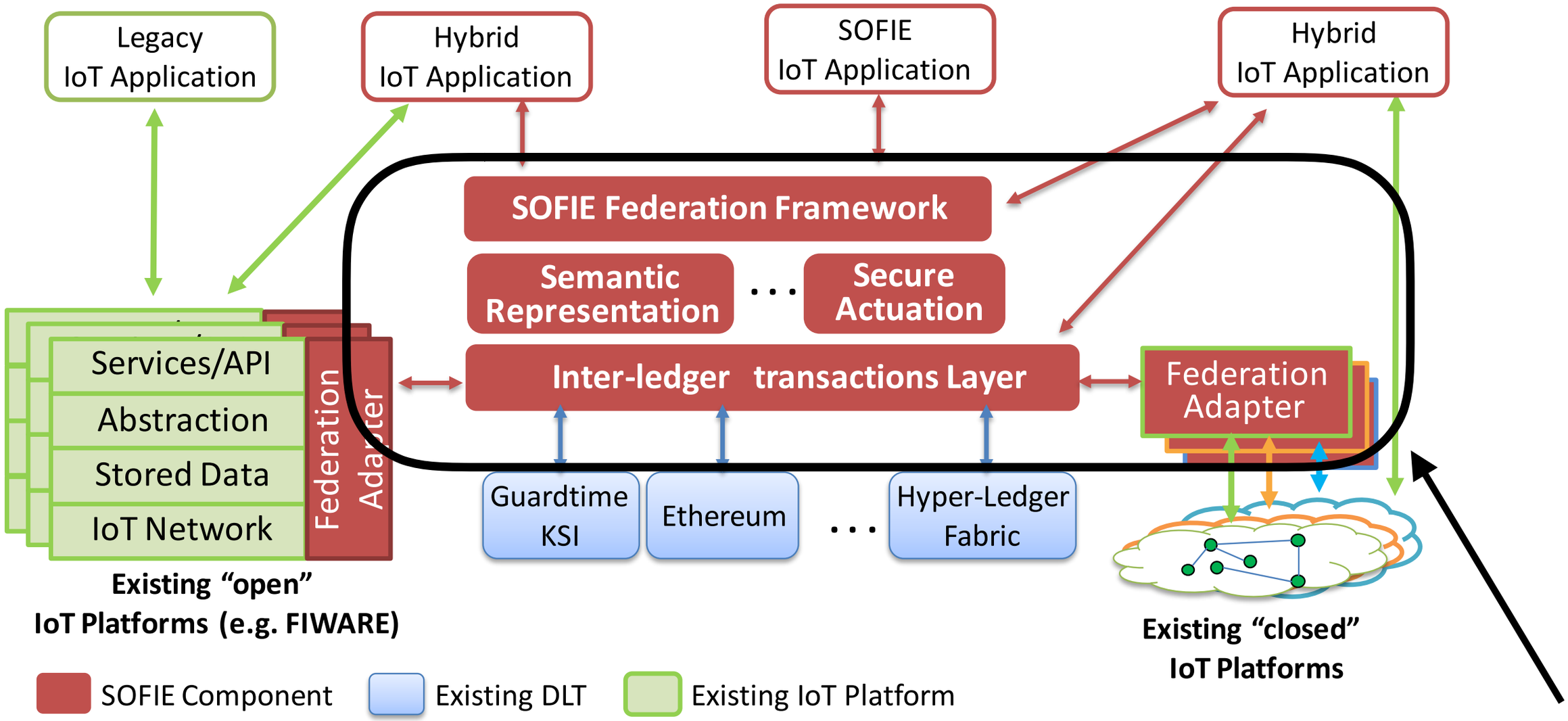


Secure actuation

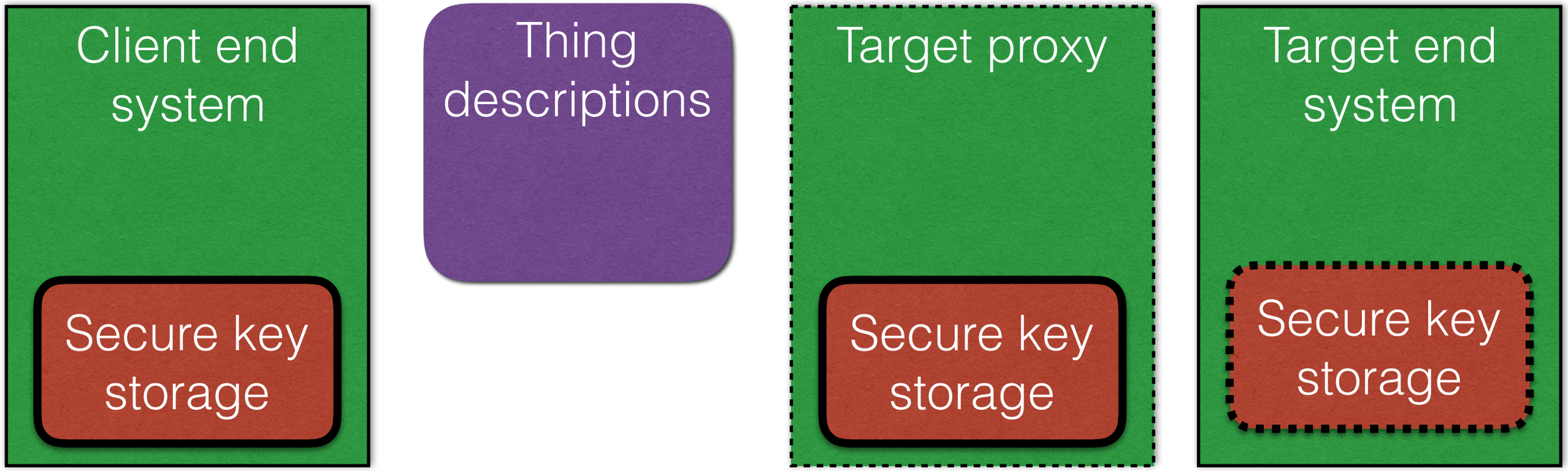
- Enter a conditional transaction
  - Trigger action
  - Wait for events
- Events arrive
  - From independent sensors
  - Confirm transaction
- Transaction rolled back in the case of no/conflicting events



Federation framework



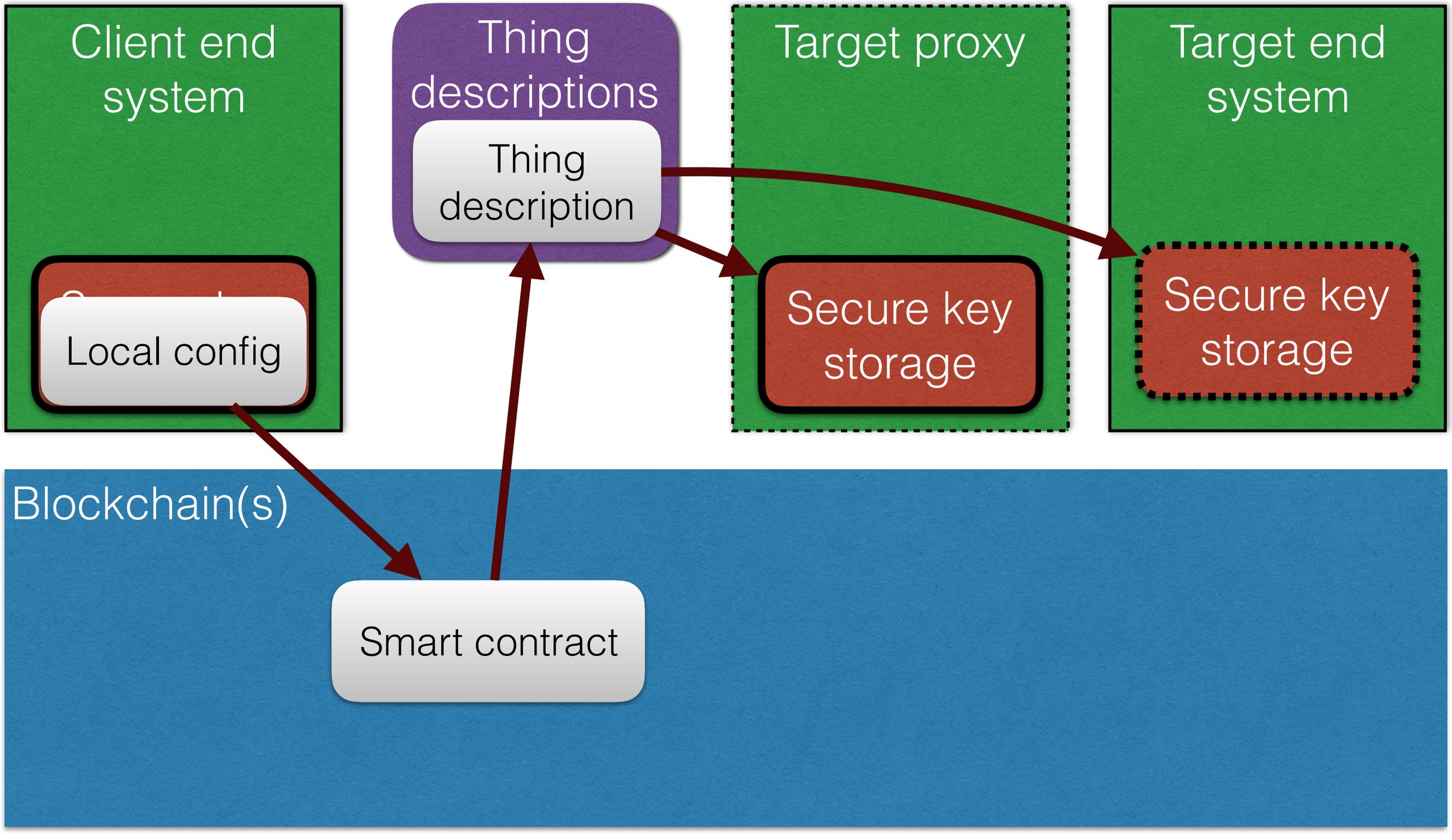
Overall security



Blockchain(s)

- Integrity protected append-only storage
  - Secure storage for audit trails
  - Secure storage for transactions
- Each transaction associated with public key(s)
  - Typically contains a hash of the key & sig

Trust/cert chains



Reflection

- Not rocket science
  - Mostly novel integrating of existing components
- Security and privacy may be challenging
  - Especially end-to-end data security
  - Apparently lots of conflicting needs
- Need community help to get the details right

Summary

- H2020 IoT-03 R&I, 2018–2020, 4.5 M€, 10 partners
- Secure Open Federation of IoT platforms with DLTs
- Trial areas: Gaming, Energy, Food chain
- We are looking for
  - Community feedback (e.g. to our white paper)
  - New external trials / users (from mid 2018)

Extra slides

Mixed reality gaming

Gamers

Games

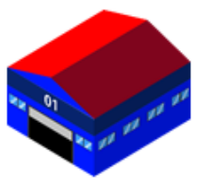
Blockchain-based marketplace for in-game assets

SOFIE Federated IoT Platform

Physical World

NFC

Shopping Mall

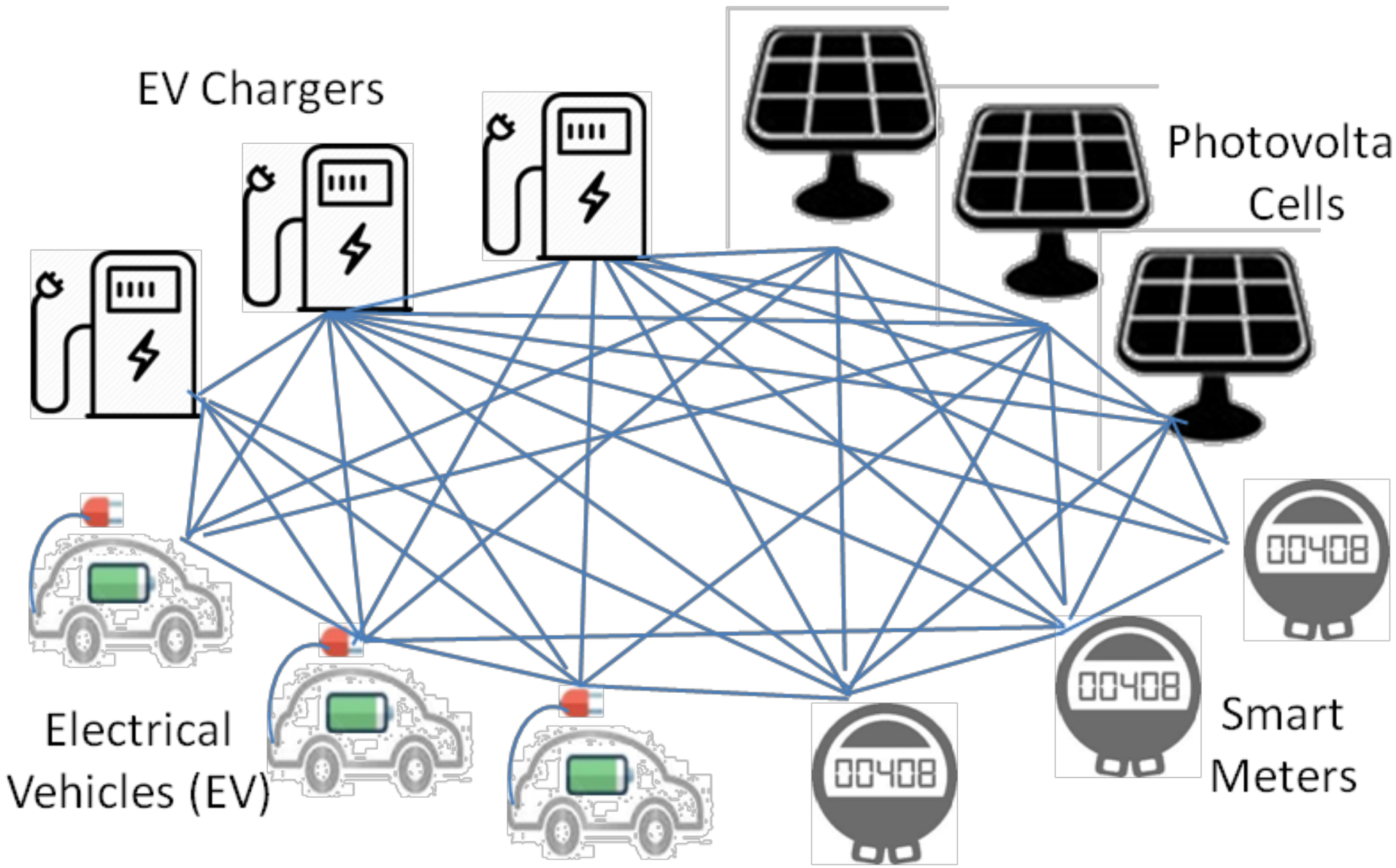


Warehouse

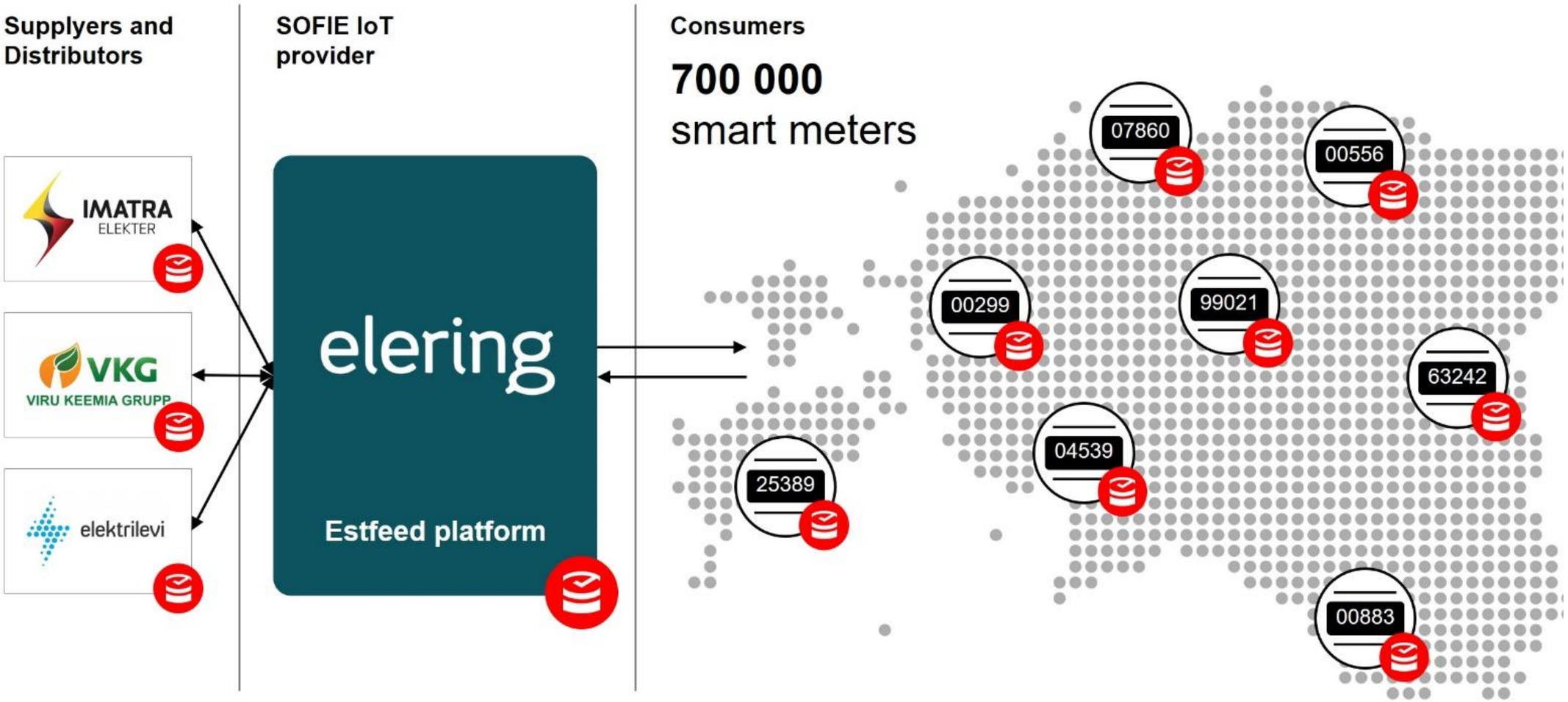
Park

IoT Platforms (movement sensors, passage control, lighting, etc.)

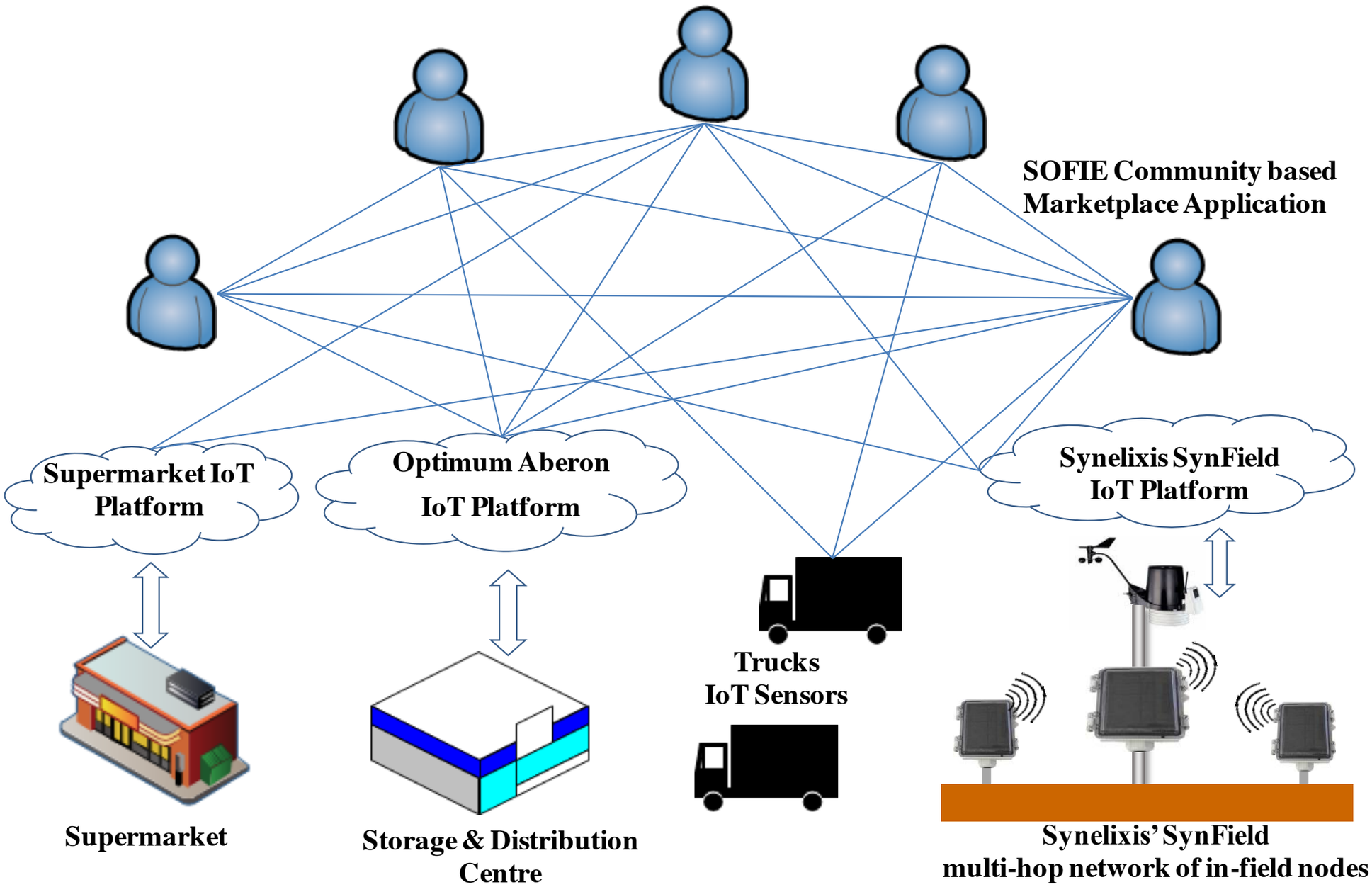
Energy: Terni



Energy: Estonia



Food chain


SOFIE Community based
Marketplace Application
Supermarket IoT
Platform
Optimum Aberon
IoT Platform
Synelixis SynField
IoT Platform
Trucks
IoT Sensors
Supermarket
Storage & Distribution
Centre
Synelixis' SynField
multi-hop network of in-field nodes