Threshold Social Recovery for the Italian Public Digital Identity System

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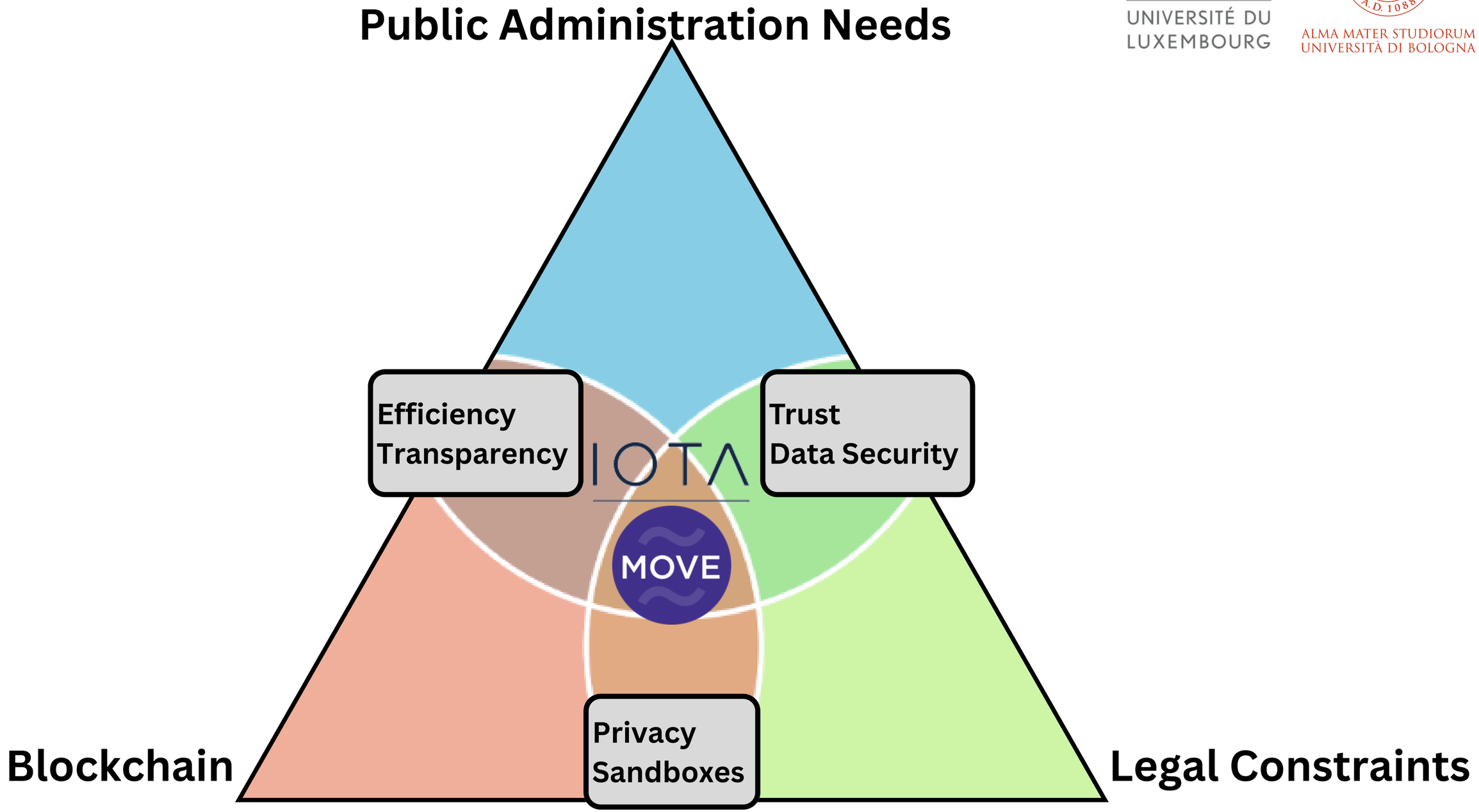

What is SPID?

eIDAS 1.0

2014

- Focused on cross-border PA
- Mutual recognition of eID schemes
- Mainly centralized

SPID

2016

AgID Agenzia per l'Italia Digitale

eIDAS 2.0

2024

- Wider final users
- **Mandatory** EU Digital Identity Wallet
- Blockchain as a *qualified trust service*
- Mildly distributed

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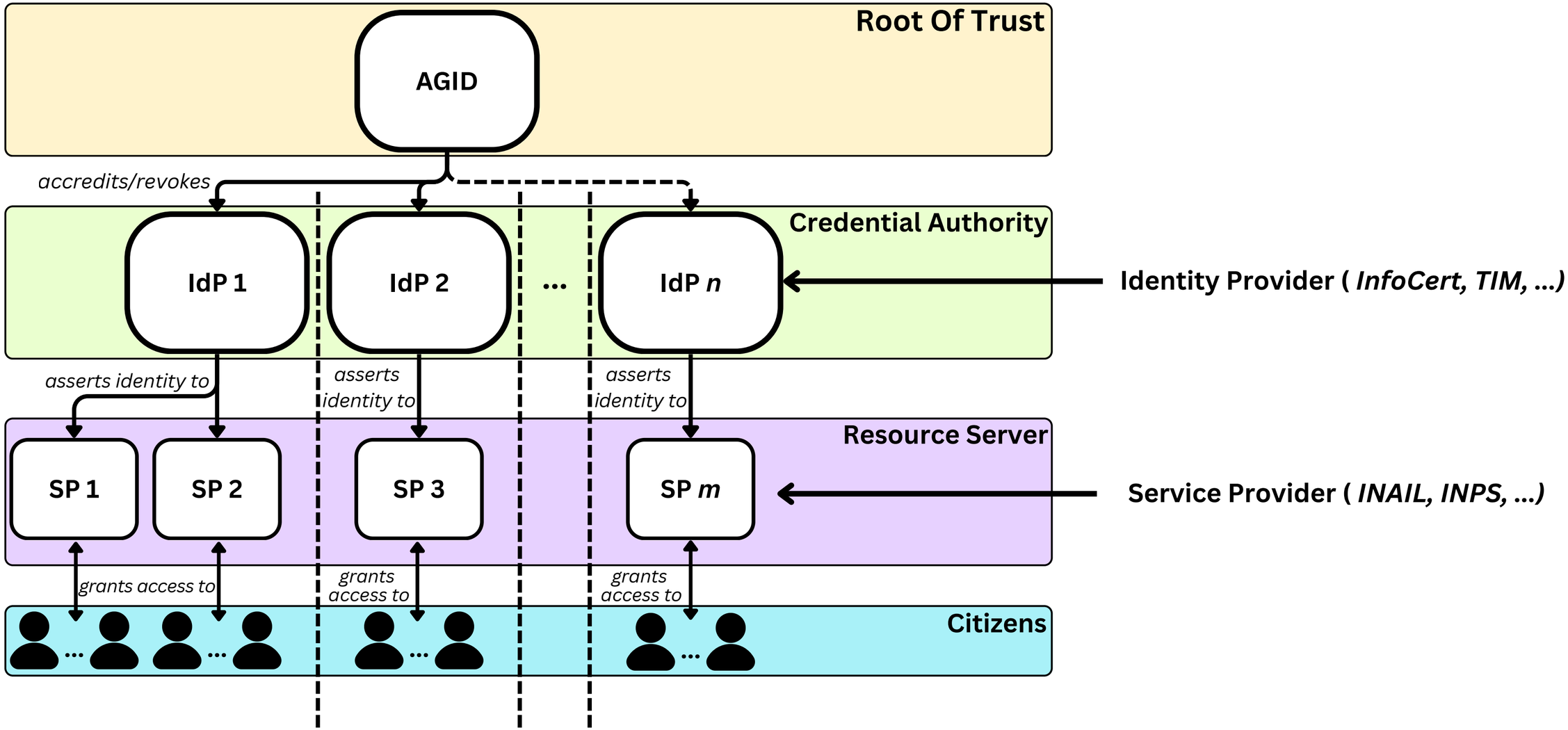
What is SPID?



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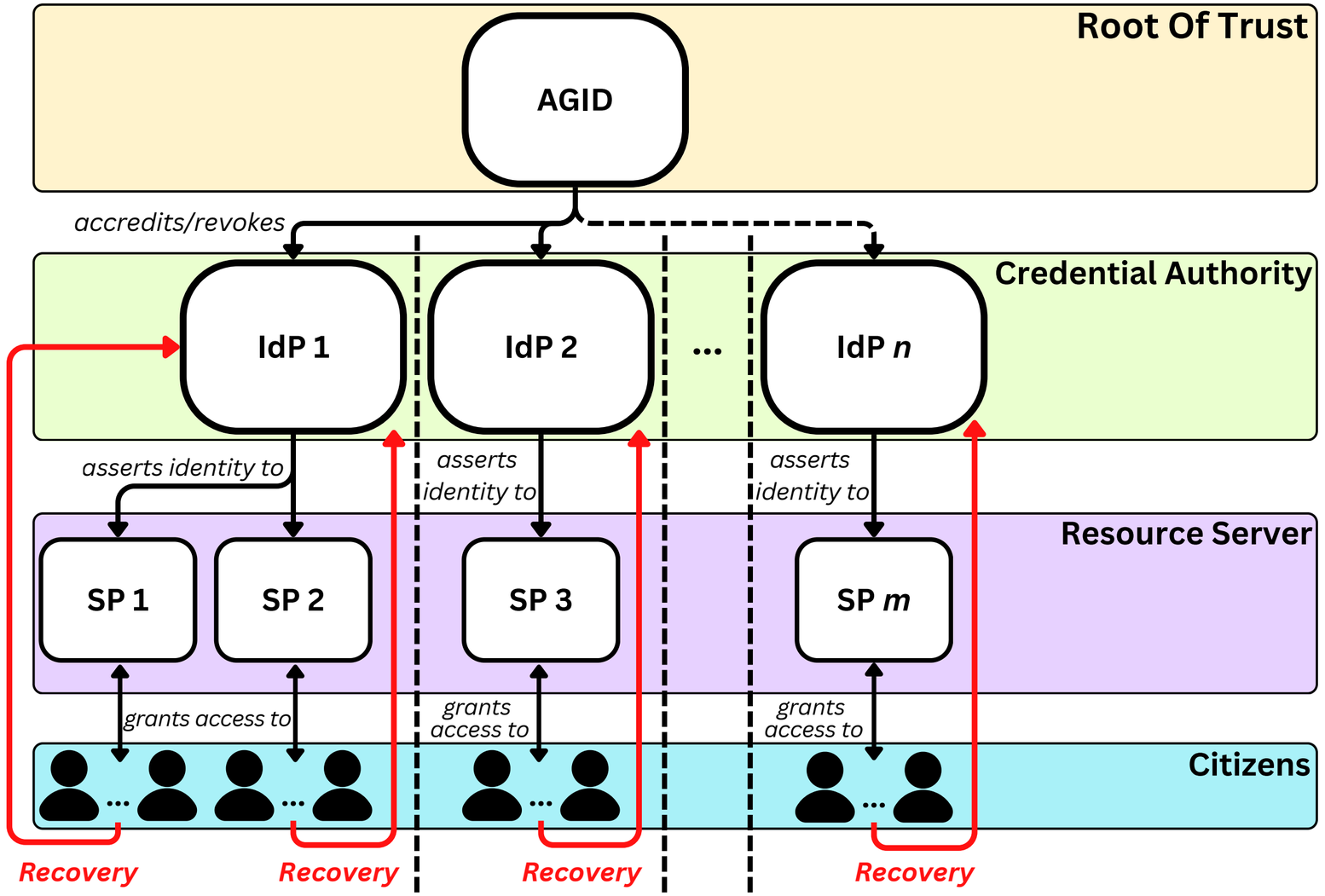
SPID Limitations



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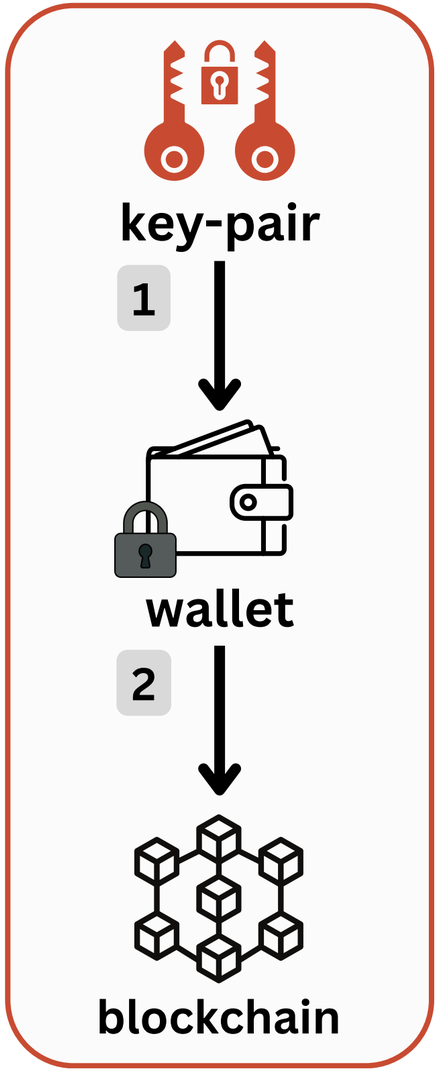
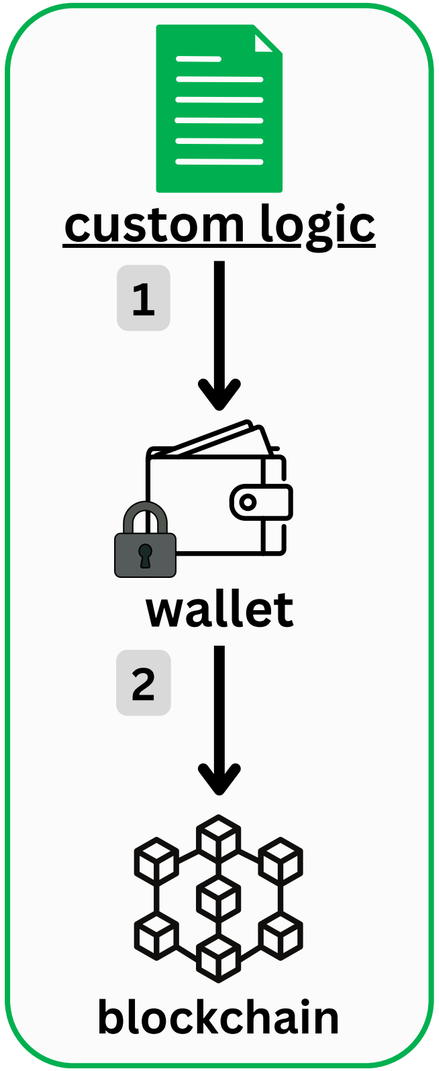
What is Account Abstraction?

- Key-based wallet
- No recovery mechanism
- Poor control
- Quantum threat

Traditional approach





- Rule-based account
- Programmable policies
- Tunable control

Abstract Account

Account Abstraction - High Level view

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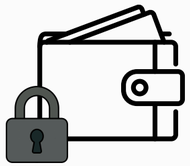
- Multi-party approval
- Time-locked conditions
- Social recovery
- ...

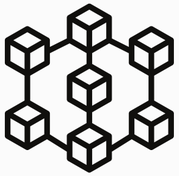
custom logic

1



wallet

2



Liability & Loss

Lost key?

- **Traditional wallets** → no remedy
- **Account Abstraction** → recovery rules

Compliance & Delegation

Who authorize?

- **Traditional wallets** → no control
- **Account Abstraction** → fine tunable

Custody & Control

Who owns the account?

- **Traditional wallets** → private key
- **Account Abstraction** → whoever satisfies the programmed rules

- **Legal relevance:** challenges existing notions of "custody" in MiCA, MiFID II, and trust law. Control evolves from being “boolean”.

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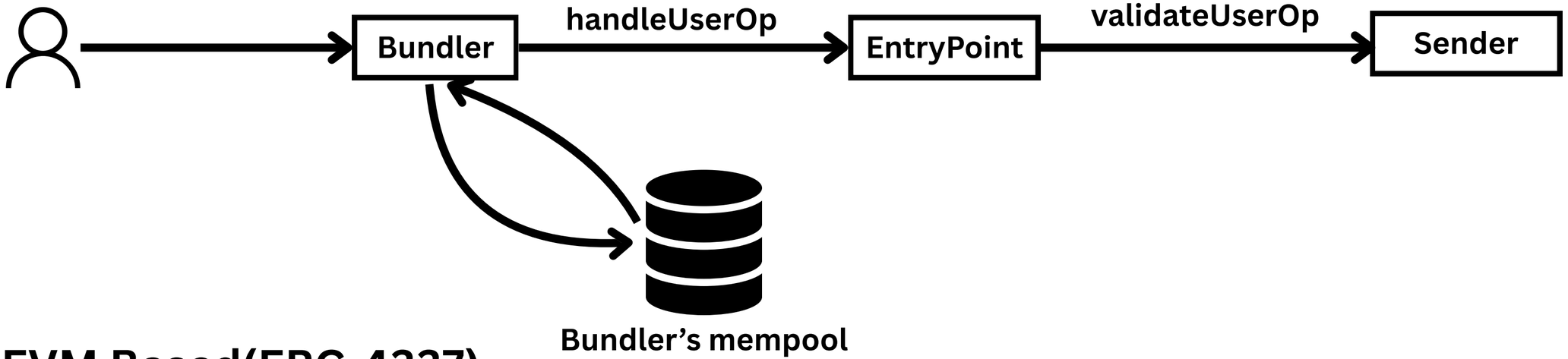
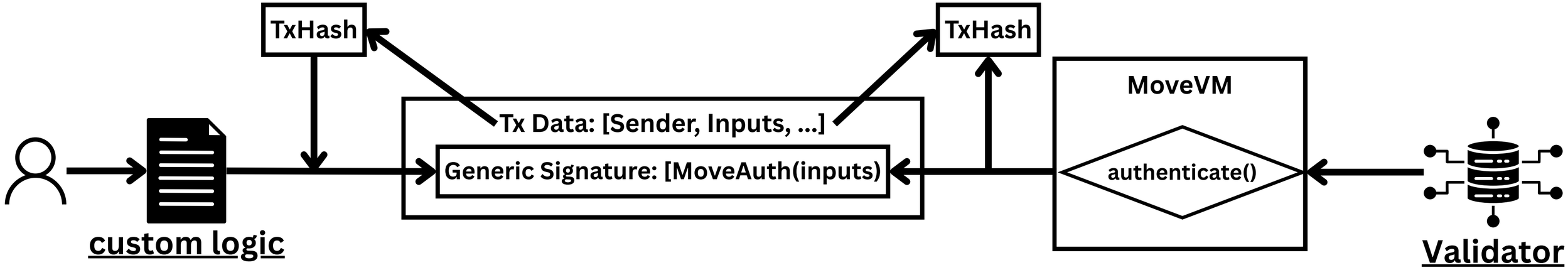
IOTA Abstract Account



EVM Based(ERC-4337)

IOTA Based



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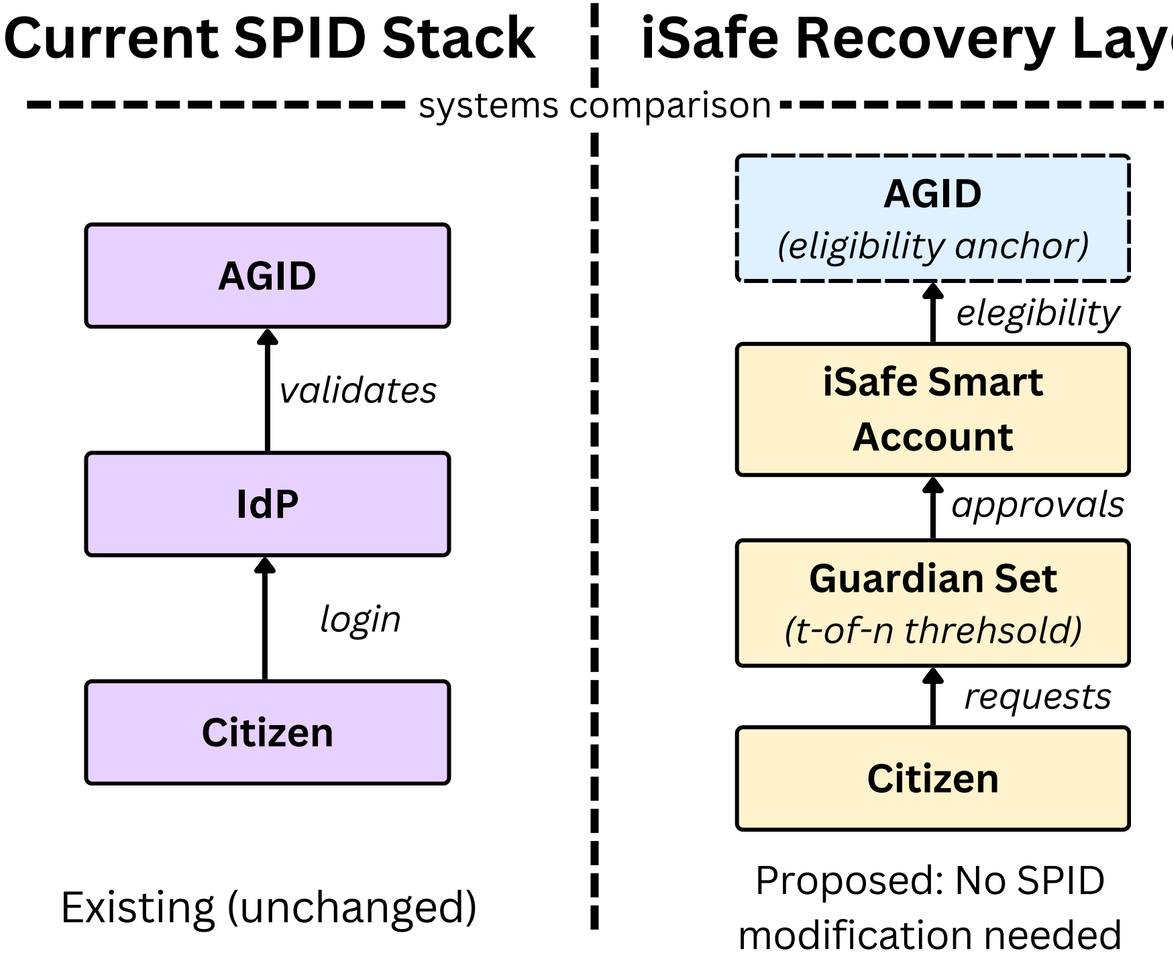
Proposed Recovery Layer



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Threshold-Based Recovery Mechanisms

Properties	Shamir Secret Sharing	Threshold Signature	Multisig Wallet	Account Abstraction
On-chain Signer Visibility	None	None	None	Yes
Programmable Logic	No	No	Limited	Yes
Native Support for replay protection and gasless tx	None	None	Limited	Yes

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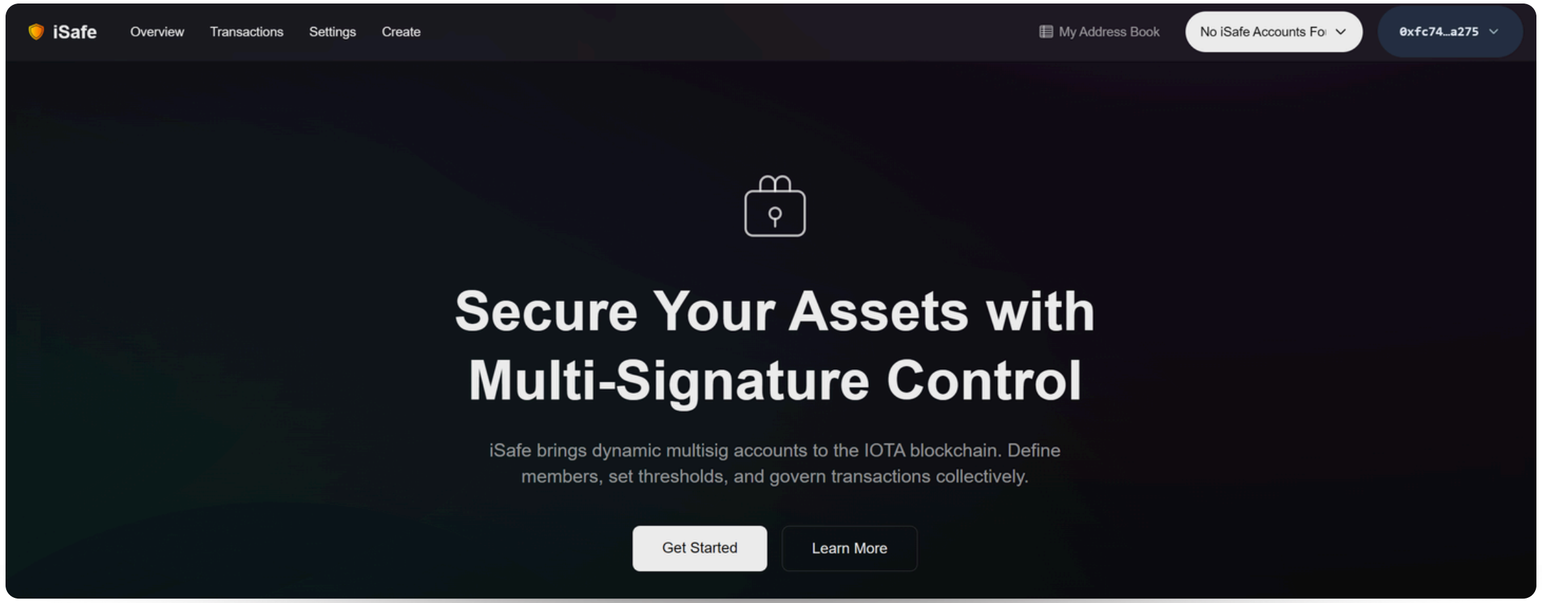
Preliminar Prototype

- Gnosis Safe-alike dApp deployed on IOTA's devnet
- Ethereum ERC-4337 mempool-alike Indexer
- Weighted multi-sig
- Dynamic member and threshold multi-sig



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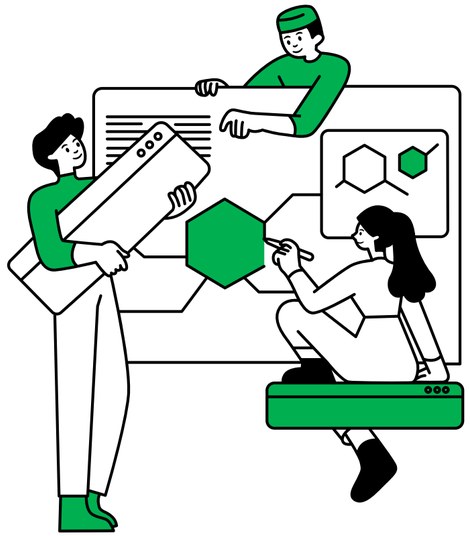
Extensible Works



Perf Evaluation

- Stress-test AA
- Measure errors and latencies

Regulation

- Standardization
- Privacy

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Thank you for listening!