HYPERLEDGER FABRIC

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AGENDA

- **Hyperledger Fabric**
  - Hyperledger - History & Ecosystem
  - Classification of Hyperledger Fabric
  - Operating Principle
  - Pro & Con

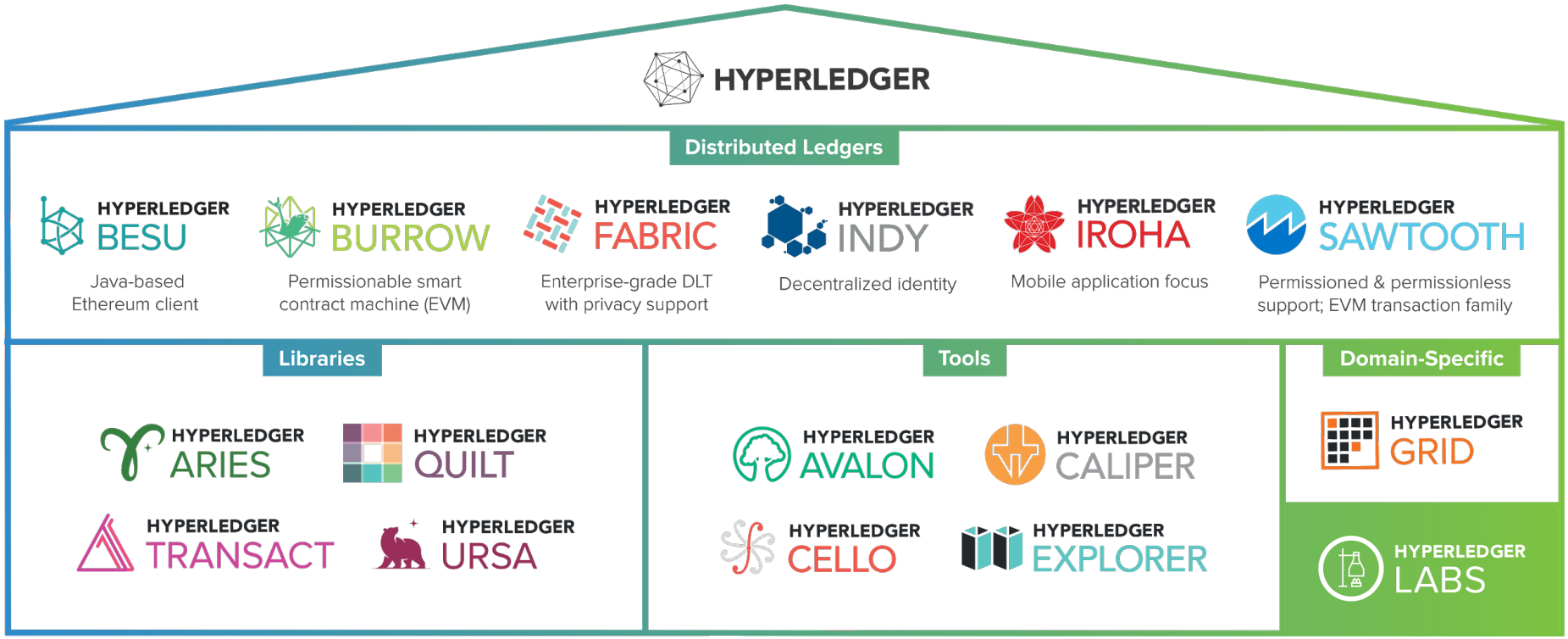
- **Prototype**
  - Previous Ideas
  - Motivation for our project
  - DEMO
  - Outlook

HYPERLEDGER PROJECT

HYPERLEDGER

- Goal: Development of industrial large-scale blockchain applications
- Founded in 2016 (IBM, Cisco, J.P. Morgan, Deutsche Börse Group)
- 250+ companies involved today
- Distributed ledger technology ensures transparent and decentralized open standard

HYPERLEDGER ECOSYSTEM



Source: [A]

HYPERLEDGER FABRIC

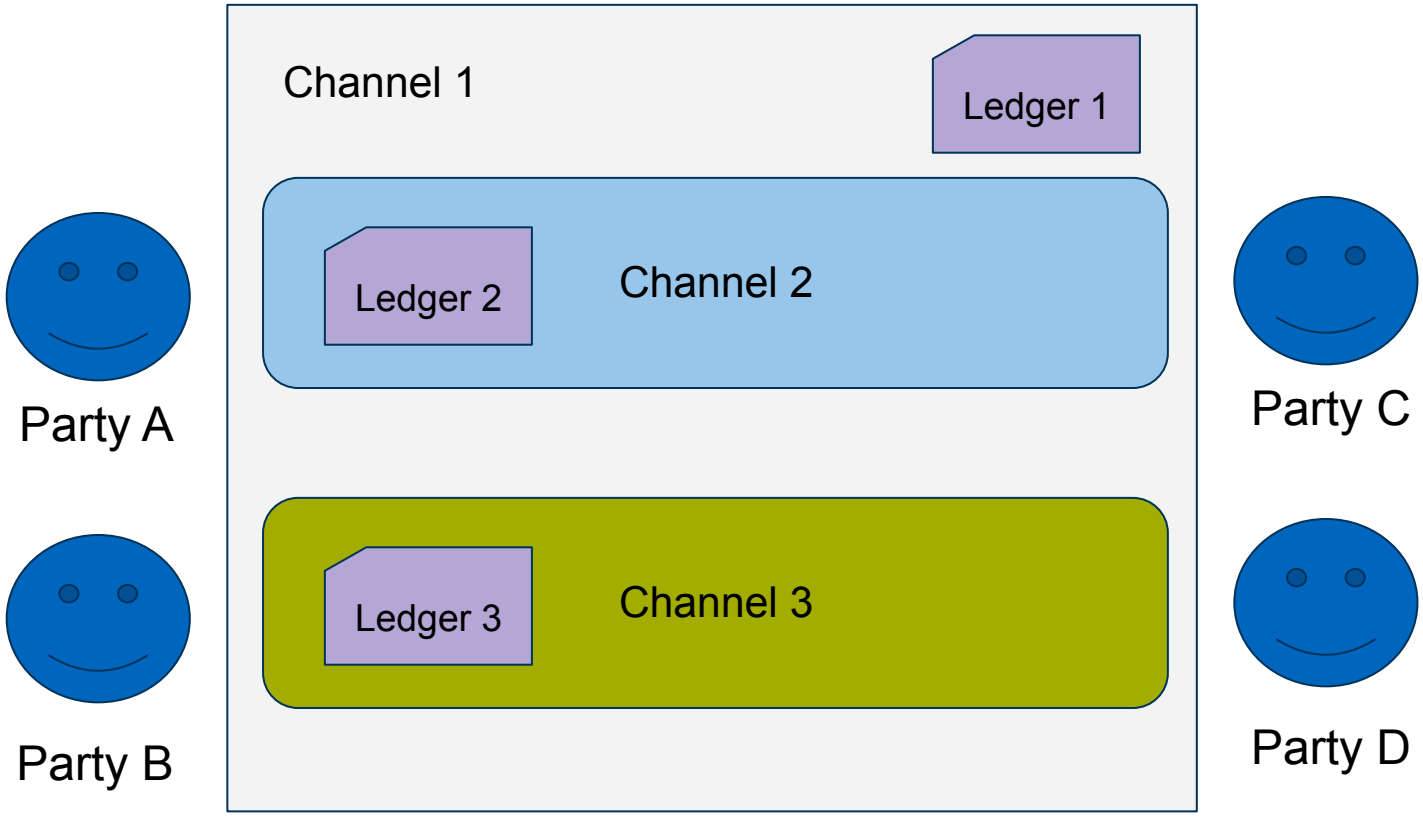
- Permissioned blockchain with modular architecture
- Throughput of 20,000 tps possible [1]
- SDK in various common languages (Java, Javascript, Go)

COMPARISON

	Bitcoin	Ethereum	**Hyperledger Fabric**	R3 Corda
Business Area	cryptocurrency	cryptocurrency, B2C	**B2B**	B2B
Type	public, permissionless	public, permissionless	**private, permissioned**	private, permissioned
Contracts	no smart contracts	smart contracts e.g. with Solidity	**smart contracts e.g. with Java, Javascript**	smart contracts e.g. with Kotlin, Java
Currency	Bitcoin	Ether	**none**	none

OPERATING PRINCIPLE

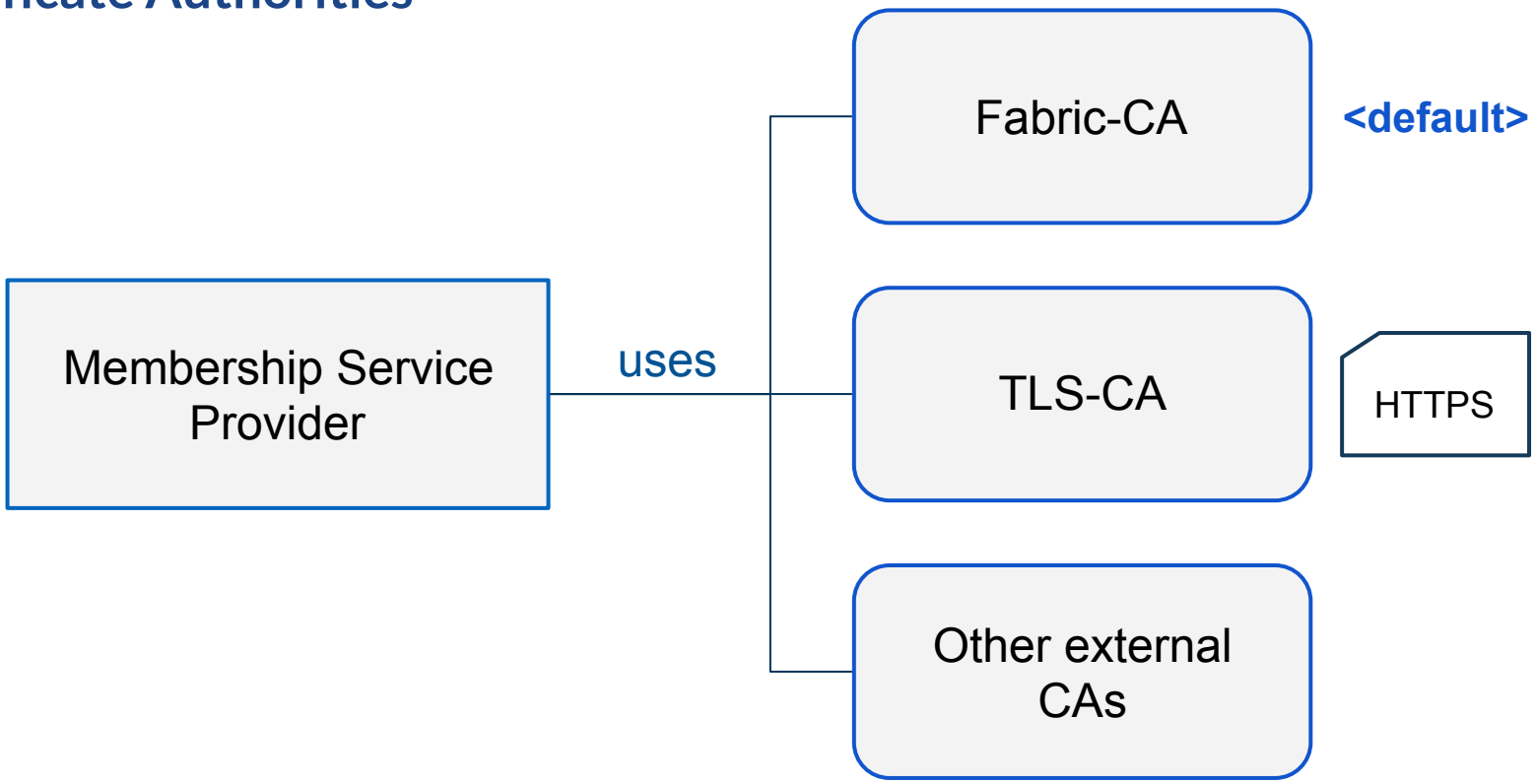
Channels



Source: [B]

OPERATING PRINCIPLE

Membership & Certificate Authorities



OPERATING PRINCIPLE

Nodes

- Endorsing peers
  - test-execute transactions
  - create chaincode

OPERATING PRINCIPLE

Nodes

- Endorsing peers
  - test-execute transactions
  - create chaincode
- Committing peers
  - validate & commit transactions

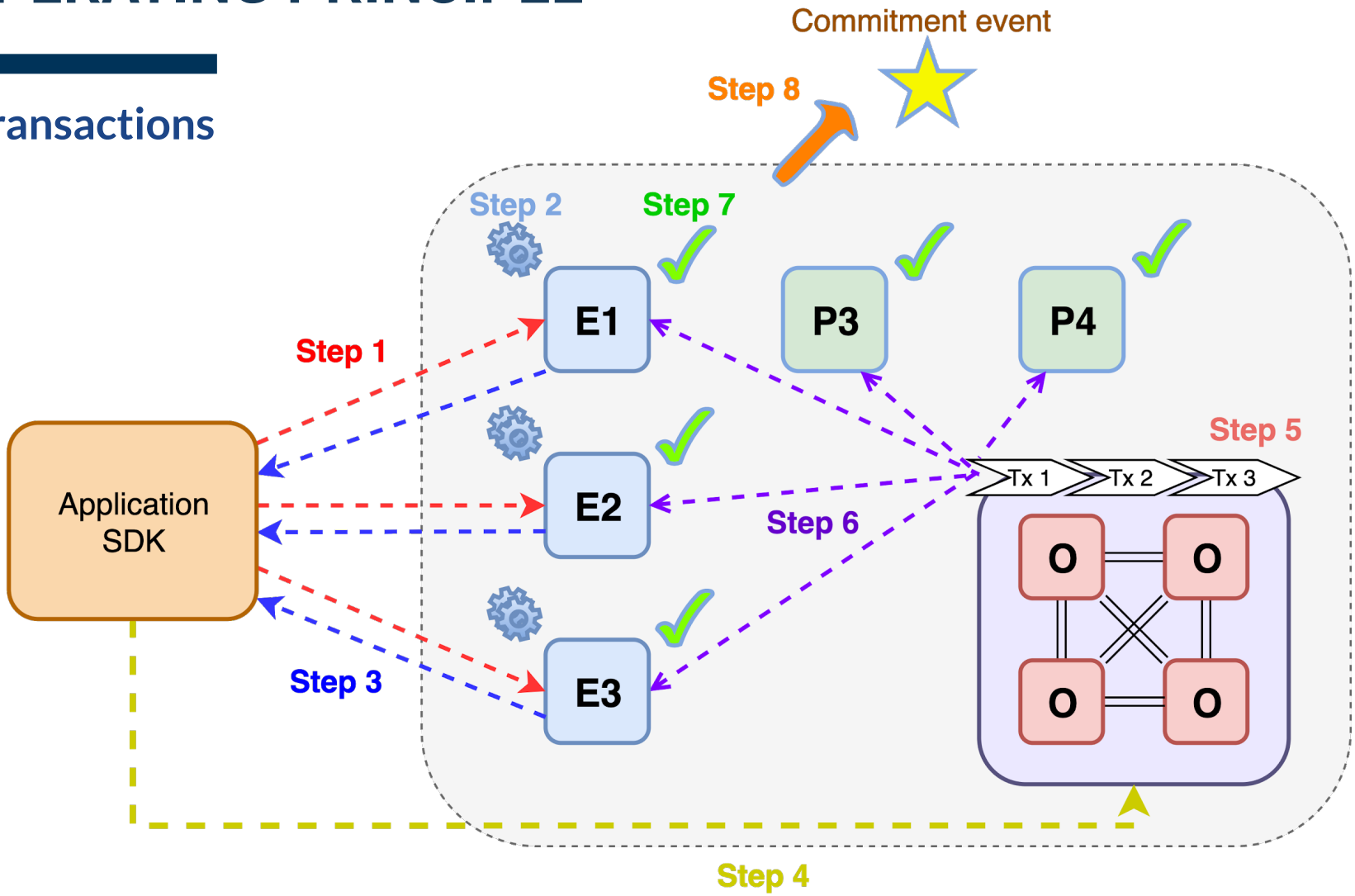
OPERATING PRINCIPLE

Nodes

- Endorsing peers
  - test-execute transactions
  - create chaincode
- Committing peers
  - validate & commit transactions
- Ordering service peers
  - order transactions

OPERATING PRINCIPLE

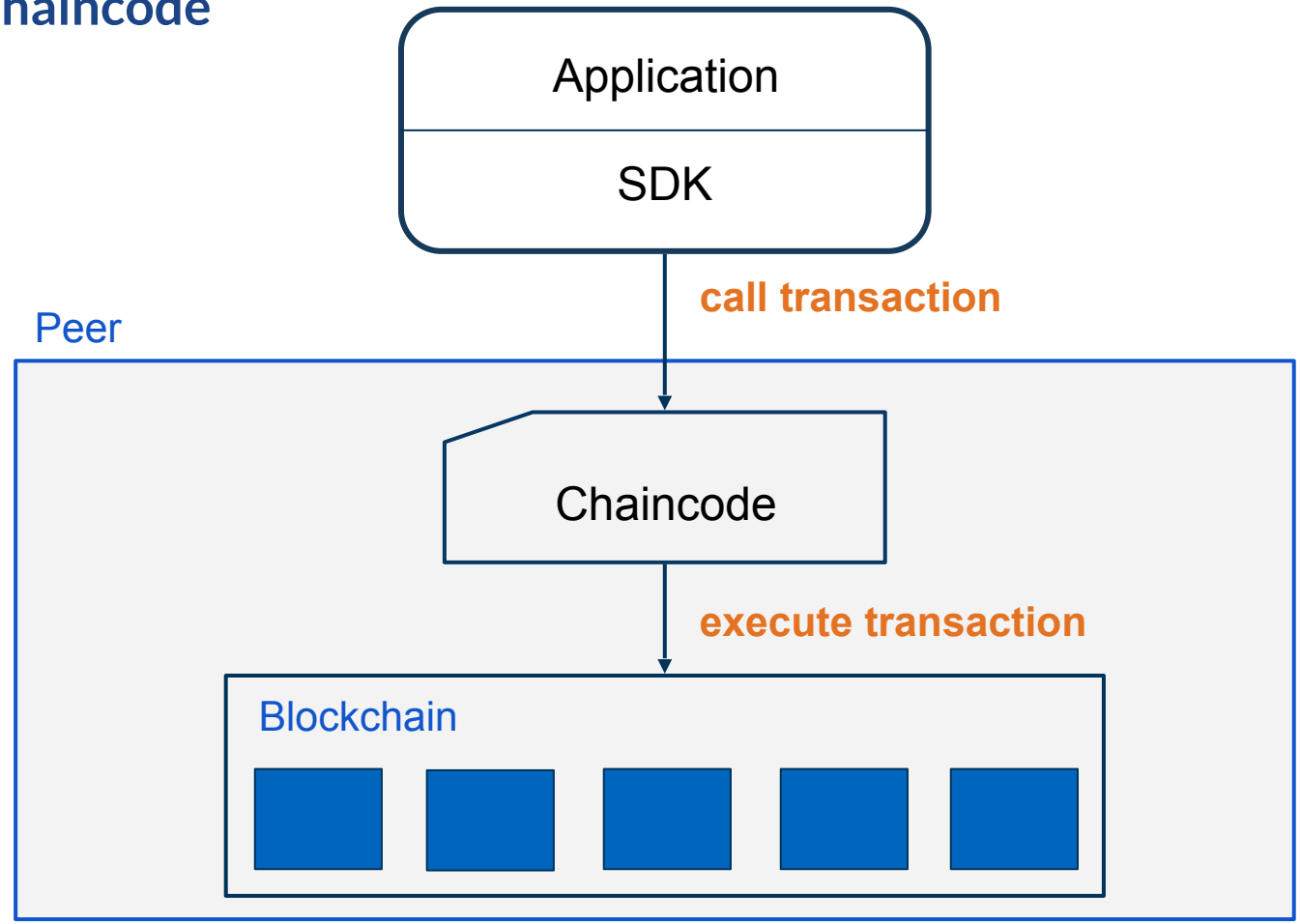
Transactions



Source: [B]

OPERATING PRINCIPLE

Apps & Chaincode



Source: [C]

PRO & CON

PRO	CON
open source development	lack of resources & documentation
modular toolbox	(too) fast development
privacy through channels	

PROTOTYPE - IDEAS

Organs

Expensive Drugs

Food

Digital Passport

Shipping Containers

Art

Documents

Provenance Tracking

Credit Rating

CV

Apartments

News

Election System

PROTOTYPE - USE CASE

PROTOTYPE - USE CASE

Money Laundering

Corruption

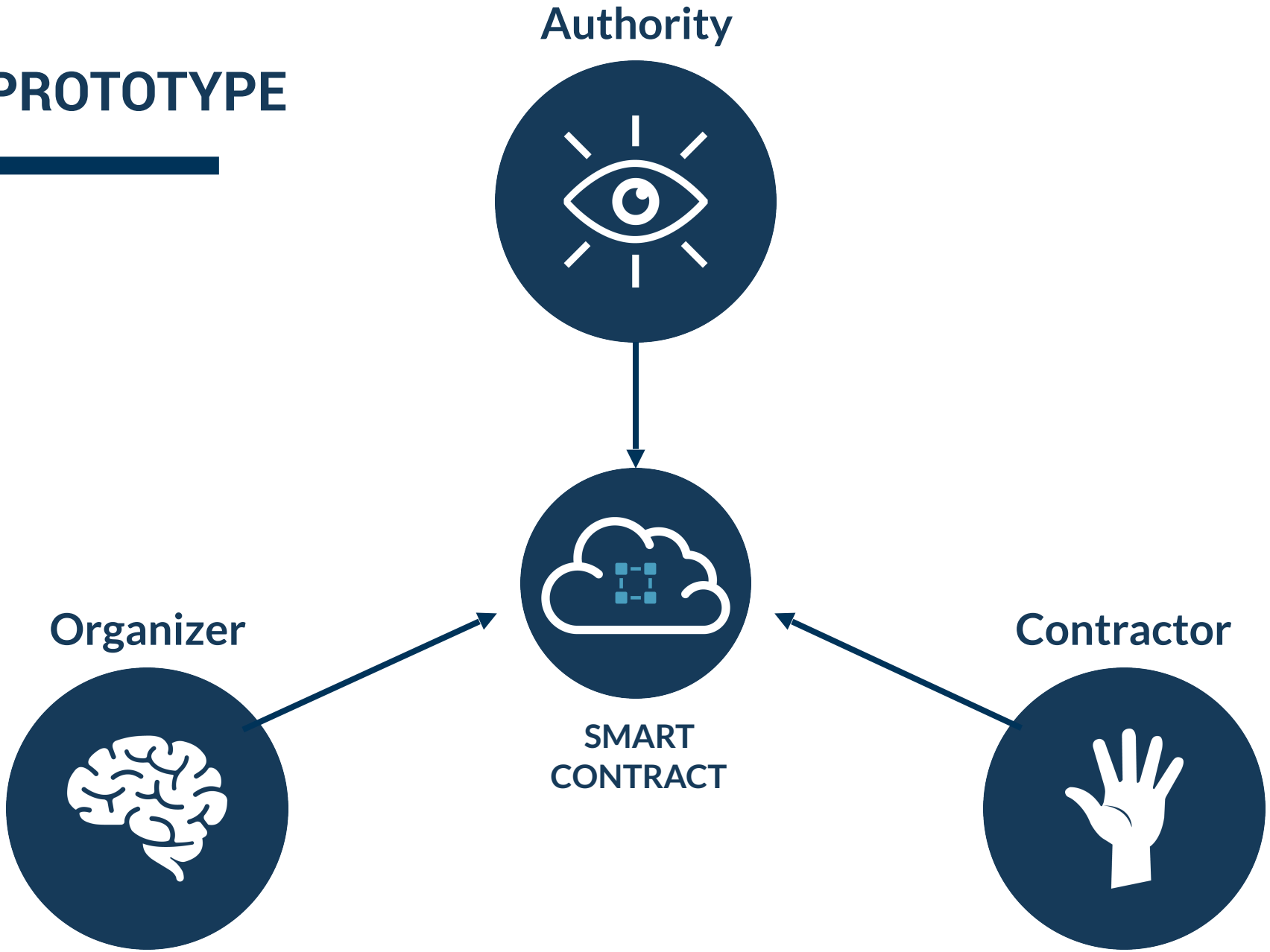
PROTOTYPE

Authority

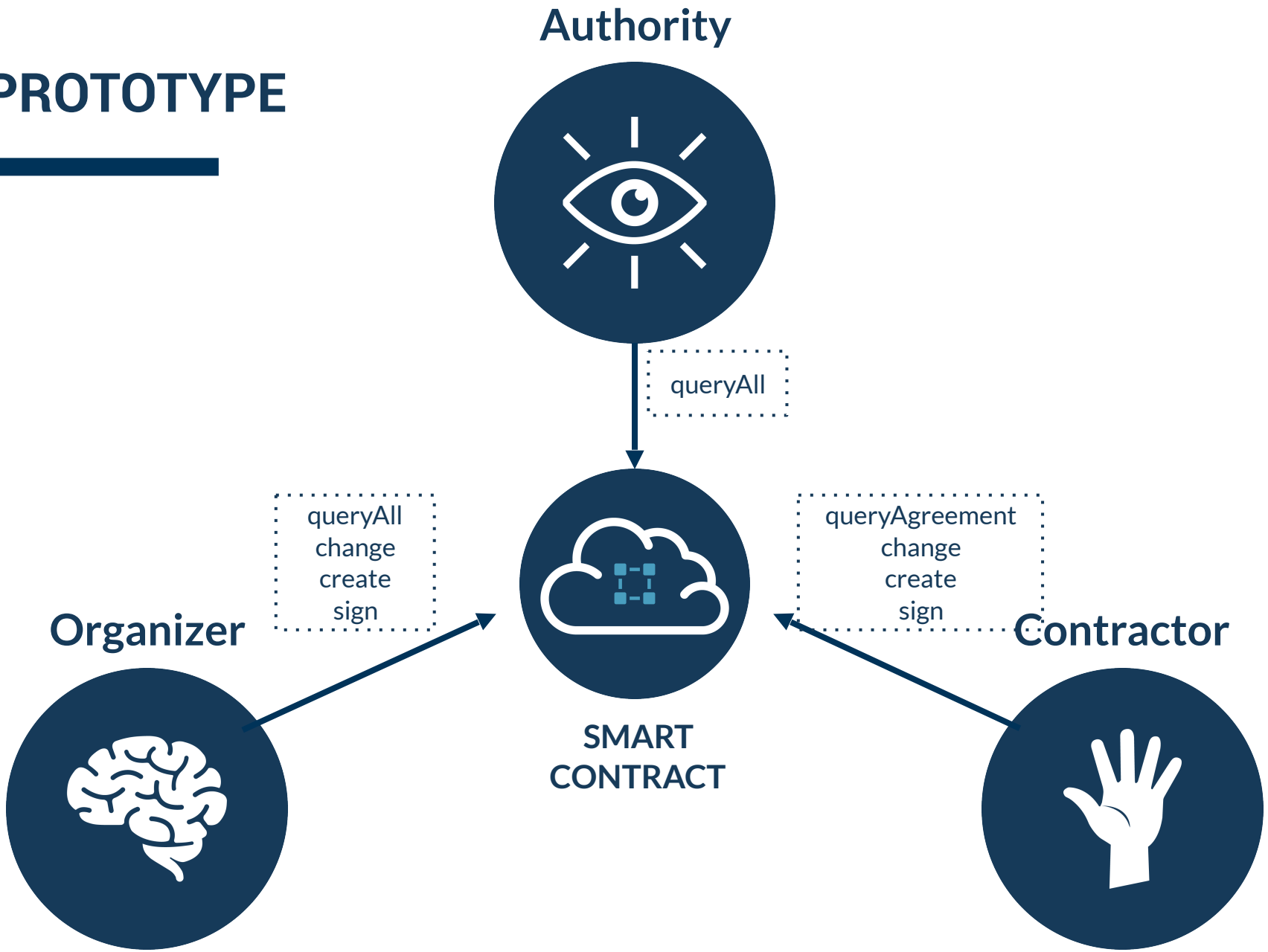
Organizer

Contractor

PROTOTYPE



PROTOTYPE


Authority
queryAll
queryAll
change
create
sign
queryAgreement
change
create
sign
Organizer
Contractor
SMART
CONTRACT

PROTOTYPE - BENEFITS

Efficient

Analyzable

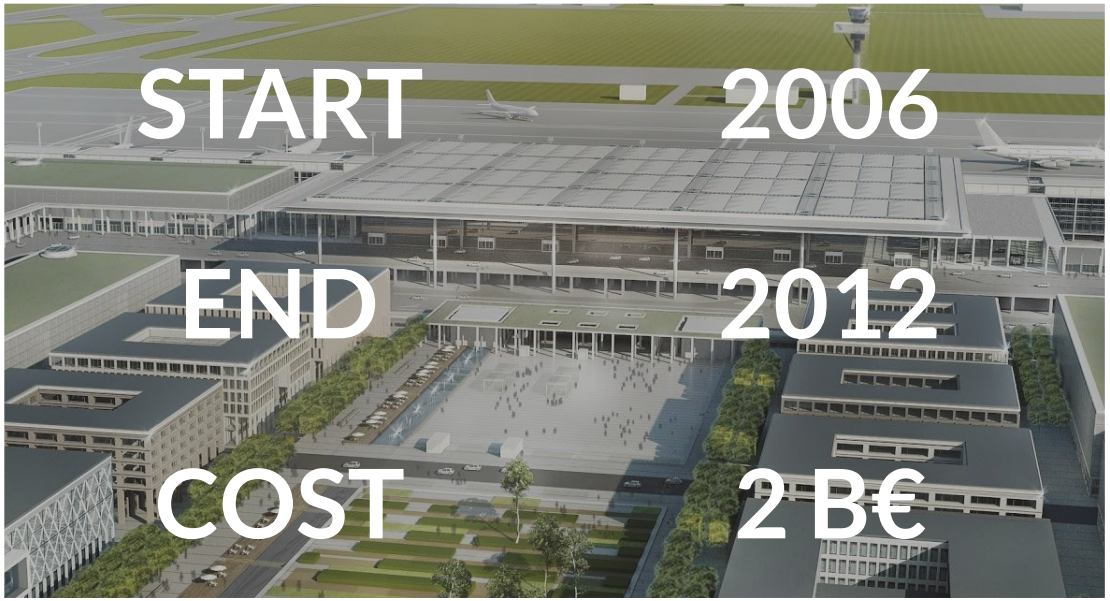
Safe

Transparent

USE CASE - AIRPORT BER

Source: [D]

USE CASE - AIRPORT BER



START	2006
END	2012
COST	2 B€

Source: [D]

USE CASE - AIRPORT BER

Source: [D]

DEMO

USE CASE

Benefits

- Make cash flow in large-scale projects more transparent
- Detect cash leaks and suspicious manipulations
- Deliver starting point for in-depth auditioning

USE CASE

Limitations

- Preventing criminal activity all by itself
- Working in an entirely corrupted environment
  - i.e. where none of the parties are genuine

OUTLOOK

- Store digital copies of legal agreements in adjacent database
- Legal agreements between contractors
- Graphical User Interface (GUI)
- Issue and react to events

SOURCES

Bibliography

[1] Christian Gorenflo, Stephen Lee, Lukasz Golab, and Srinivasan Keshav. 2019. FastFabric: Scaling Hyperledger Fabric to 20,000 Transactions per Second. (2019), 455–463.

Images

[A] https://www.hyperledger.org/

[B] *Hyperledger Fabric*, F. Matthes, Lecture Nr. 12 on Blockchain-based Systems Engineering (IN2359), 2019, p. 11-20.

[C] *Hyperledger - Introduction*, F. Matthes, Lecture Nr. 11 on Blockchain-based Systems Engineering (IN2359), 2019, p.

[D] https://www.berlin-airport.de/_images/presse/mediathek/_fotos/real-estate/06-airport-city-simulation.jpg