



LAST-JD - Annual Conference 6 July

# IOTA Foundation & the Tangle

**Zichichi Mirko**

Research Scientist, IOTA Foundation

*[mirko.zichichi@iota.org](mailto:mirko.zichichi@iota.org)*



## **Mirko Zichichi**

Research Scientist, IOTA Foundation

**Ph.D. in Law, Science and Technology**

Universidad Politécnica de Madrid -

University of Bologna - University of Turin

***“Decentralized Systems for the Protection  
and Portability of Personal Data”***

# What is IOTA?

IOTA IS

~~A Blockchain~~

IOTA's Tangle is an open, feeless and scalable distributed ledger, designed to support frictionless data and value transfer.

The IOTA logo is a large, stylized, light blue circular shape composed of many small dots, resembling a network or a data structure. It is centered on the page and serves as a background for the main text.

IOTA

# Next Generation Data And Value Exchange

---

**New Economies. New Possibilities.**

IOTA is the first distributed ledger built for the “Internet of Everything” - a network for exchanging value and data between humans and machines.

The background features a dense field of small, light blue dots. Scattered throughout are several teal-colored network diagrams, each consisting of a central node connected to three or four peripheral nodes.

# Enabling The Machine Economy

IOTA is poised to play a central role in the next industrial revolution, enabling economic relationships between machines and bridging the human and machine economies.

# The IOTA Tangle

## Overcoming the limitations of Blockchain



### Highly scalable

IOTA uses a DAG data structure allowing transactions to be added in parallel, unlike blockchain alternatives.



### Low resource requirements

Designed for devices, such as sensors, to participate in a low-energy network.



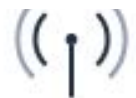
### Zero-fee transactions

Send 1 cent, receive 1 cent. Send \$1,000,000, receive \$1,000,000.



### Distributed

globally distributed network, IOTA is resilient and robust against attacks.



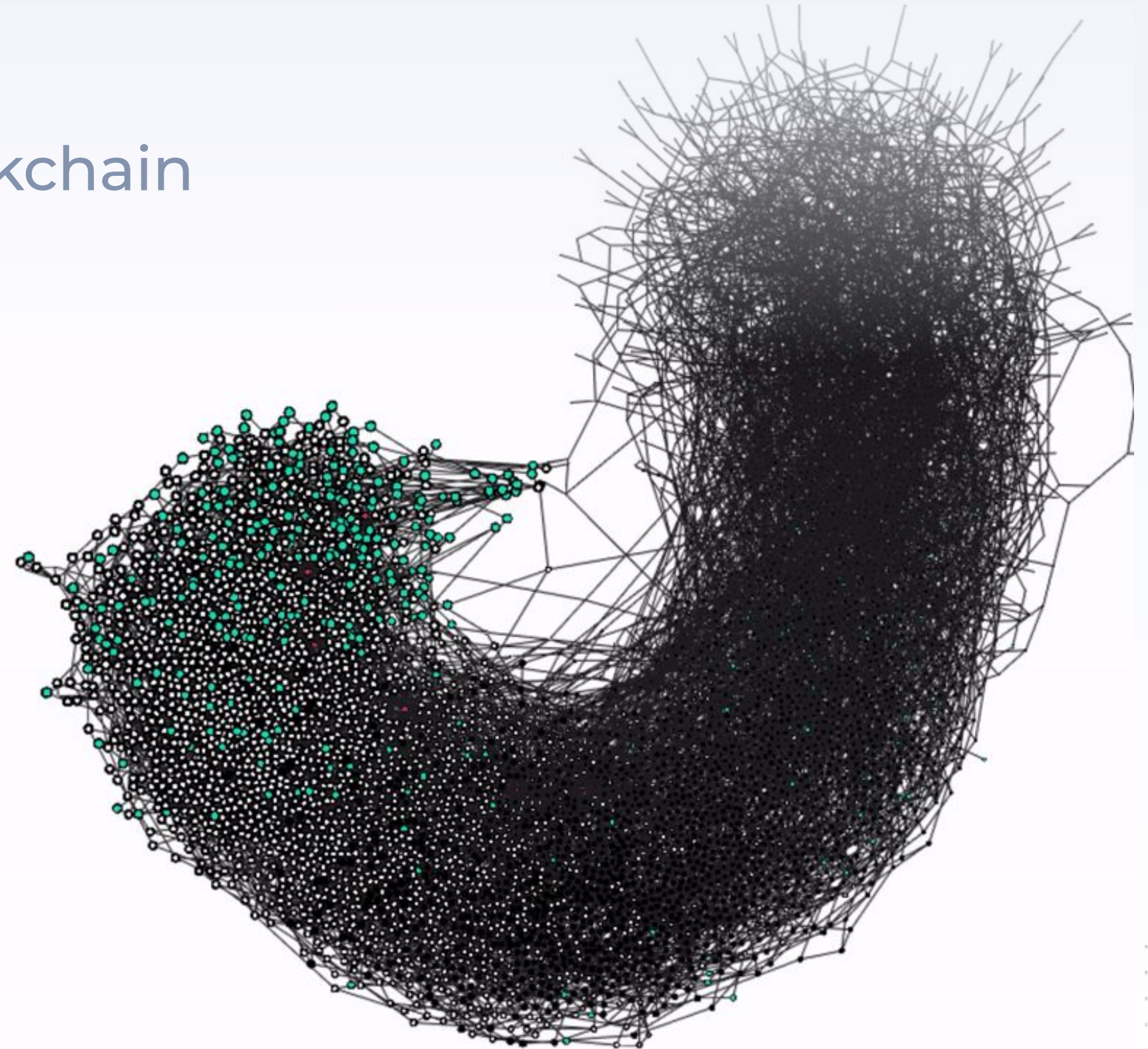
### Fast transactions

IOTA transactions are confirmed within minutes.



### Finality Within Seconds

Honest messages are approved very quickly and efficiently.





# The IOTA Foundation

Non-profit Foundation  
based and regulated in  
Berlin, Germany



**100+ full time employees**  
across 23 countries

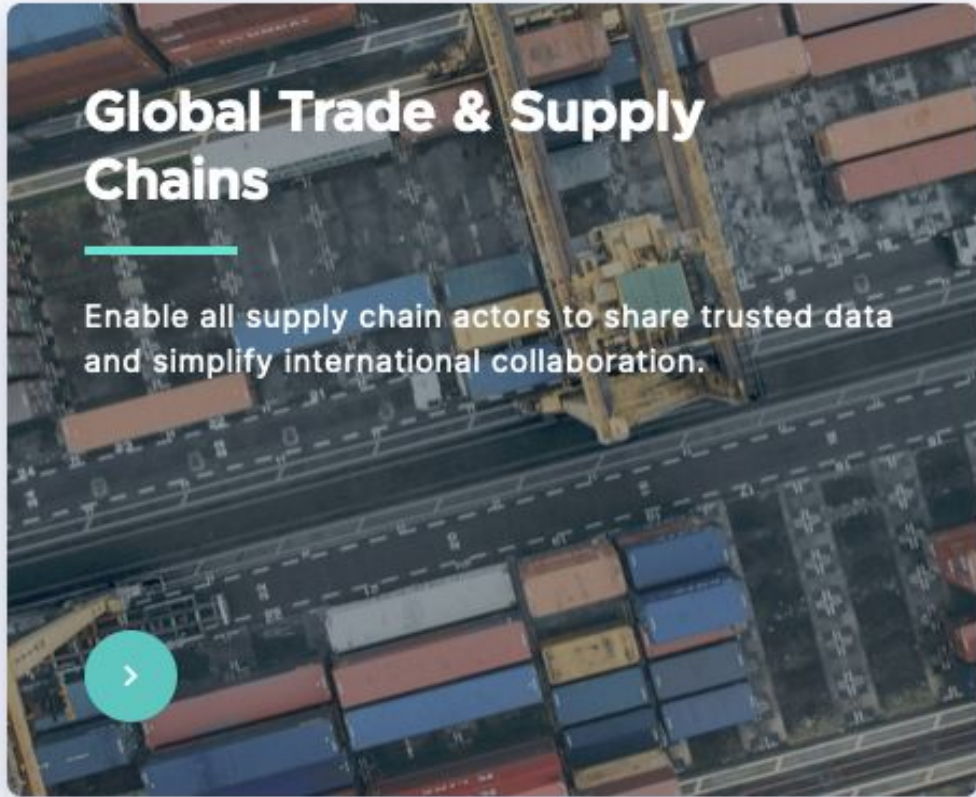


Focused on Technical and  
Regulatory Challenges of  
Crypto-Currencies & DLT



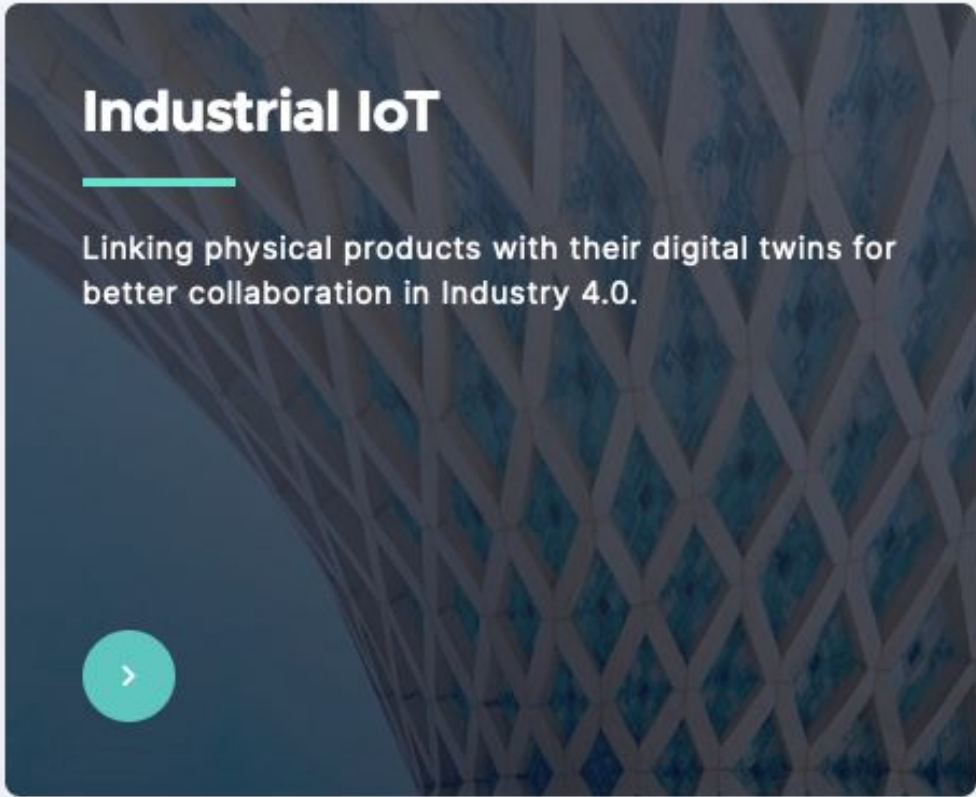



# Use Cases



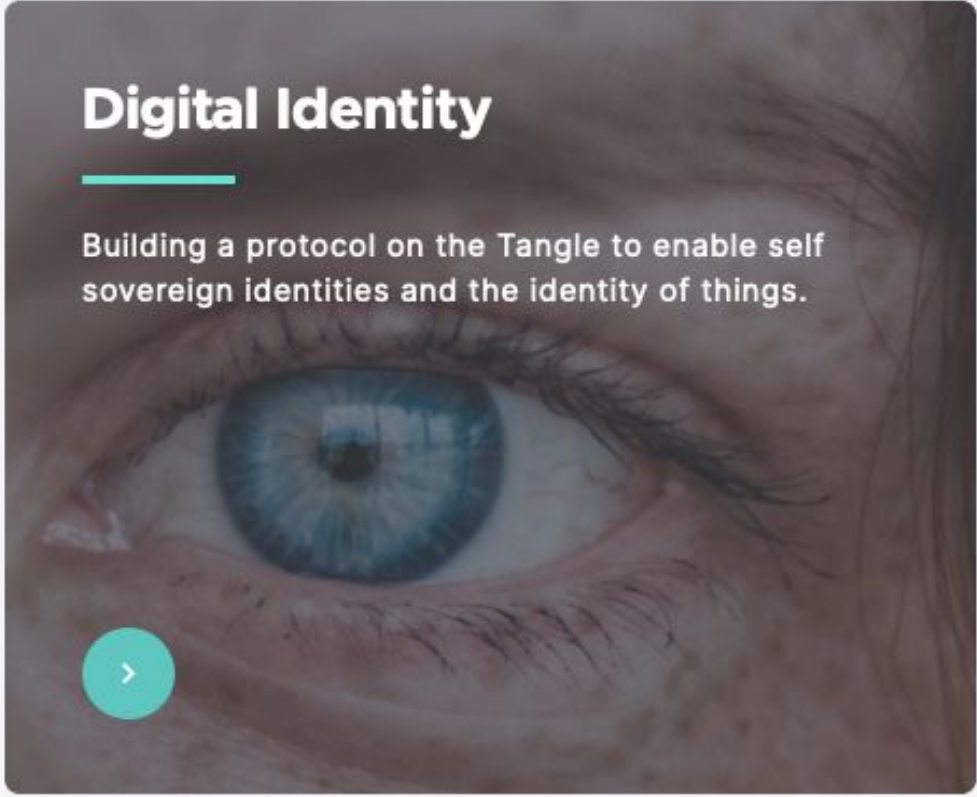

## Global Trade & Supply Chains

Enable all supply chain actors to share trusted data and simplify international collaboration.



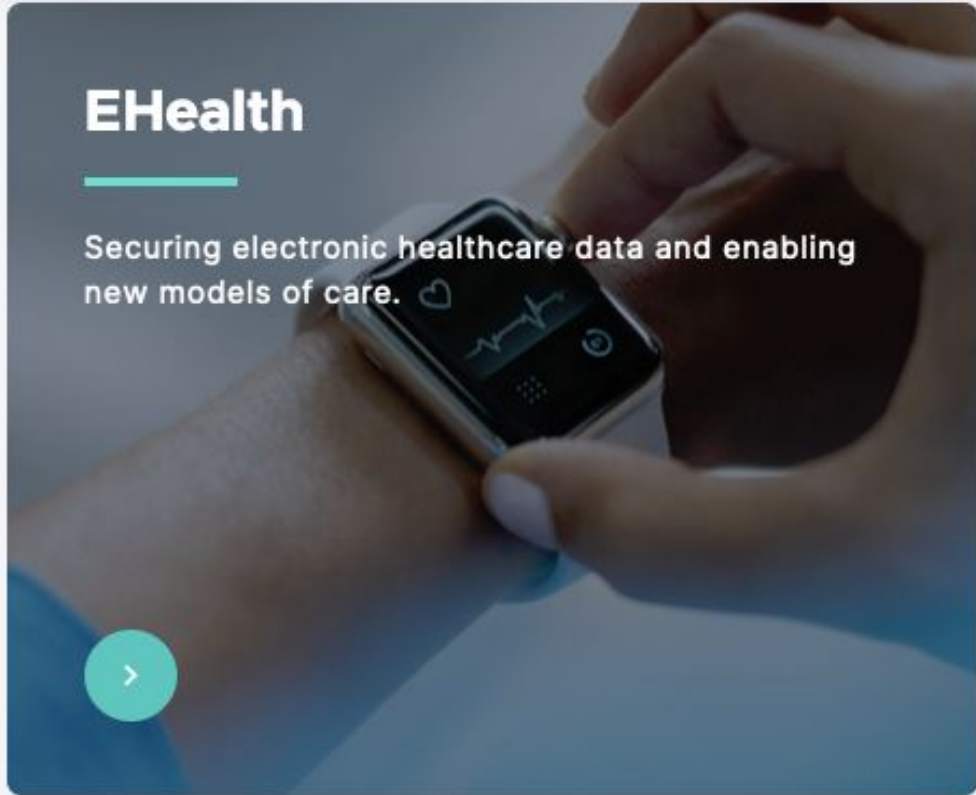

## Industrial IoT

Linking physical products with their digital twins for better collaboration in Industry 4.0.



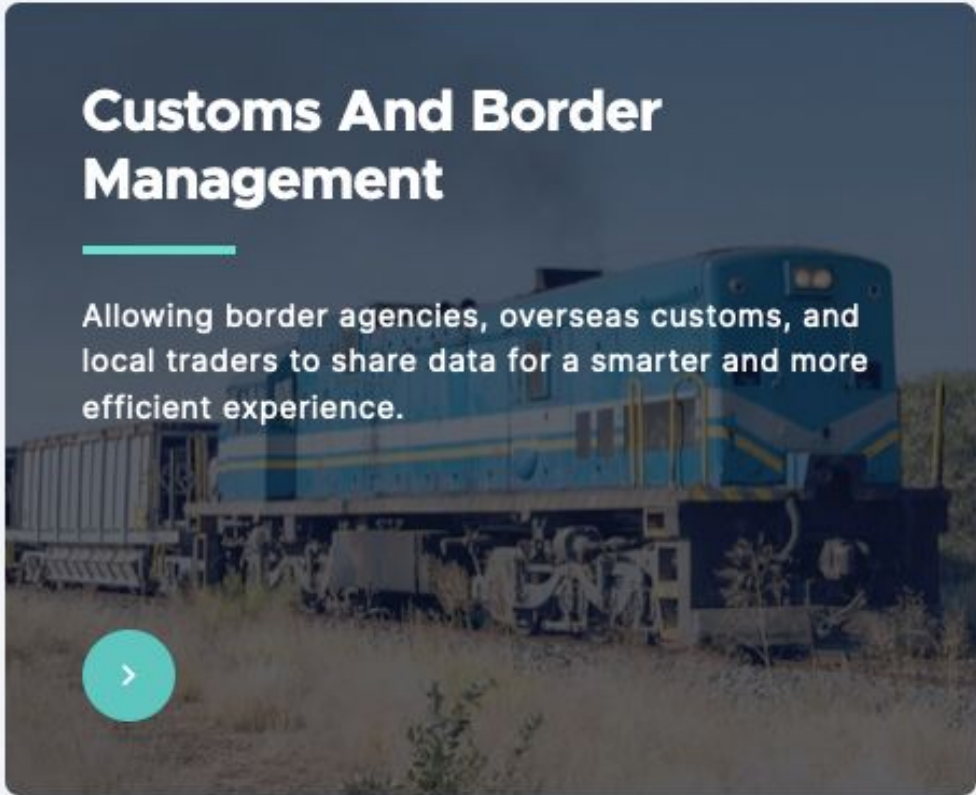

## Digital Identity

Building a protocol on the Tangle to enable self sovereign identities and the identity of things.




## EHealth

Securing electronic healthcare data and enabling new models of care.



## Customs And Border Management

Allowing border agencies, overseas customs, and local traders to share data for a smarter and more efficient experience.



European Commission | IOTA

# EBSI



# Global Trade & Supply Chain

IOTA can simplify collaboration and provide trust between traders, governments, logistics and end-consumers.



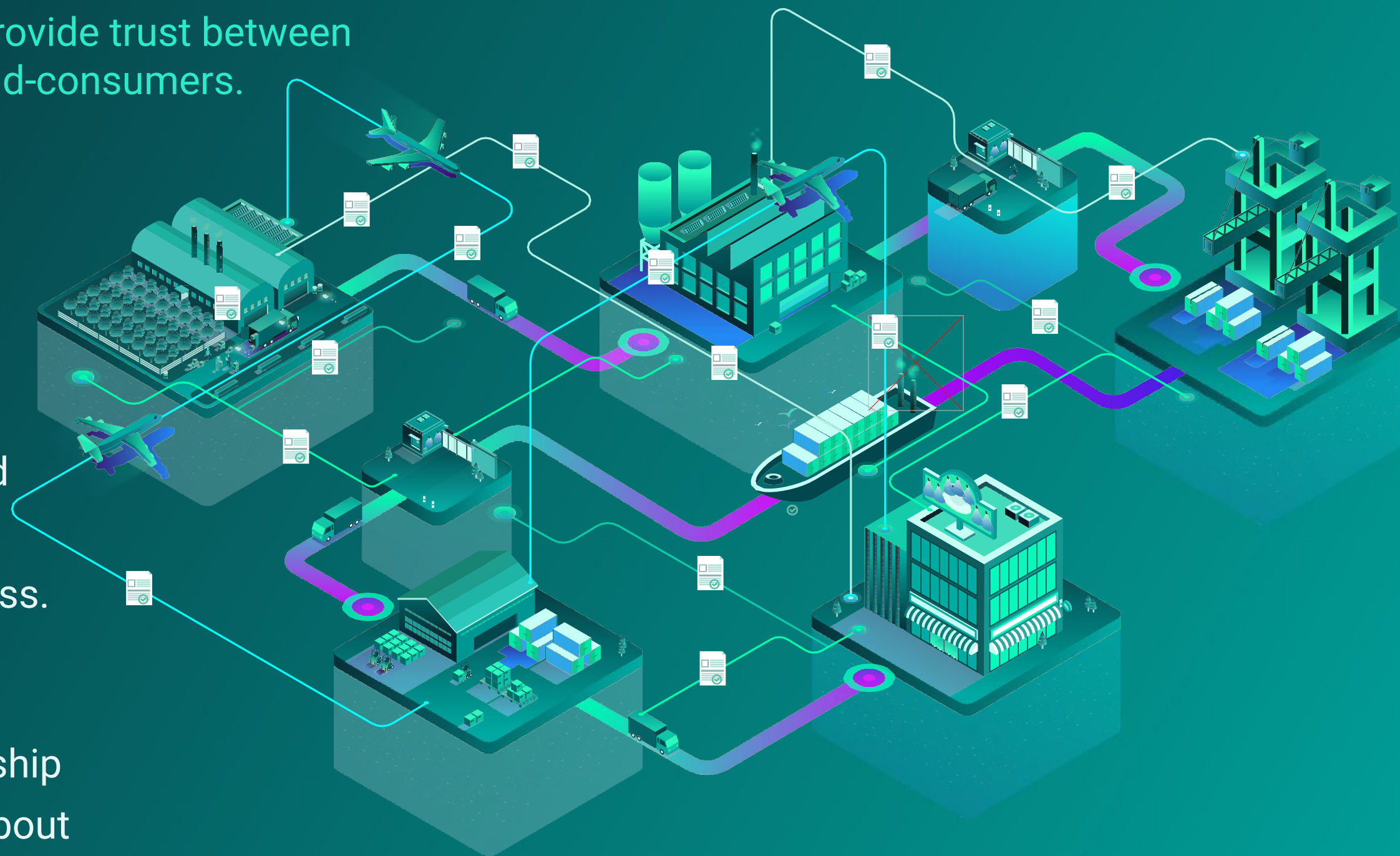
**Immutable audit trail** keeps encrypted hash of logistical updates.



**Data integrity:** Original documents and events reported to authorized actors provide process transparency and access.



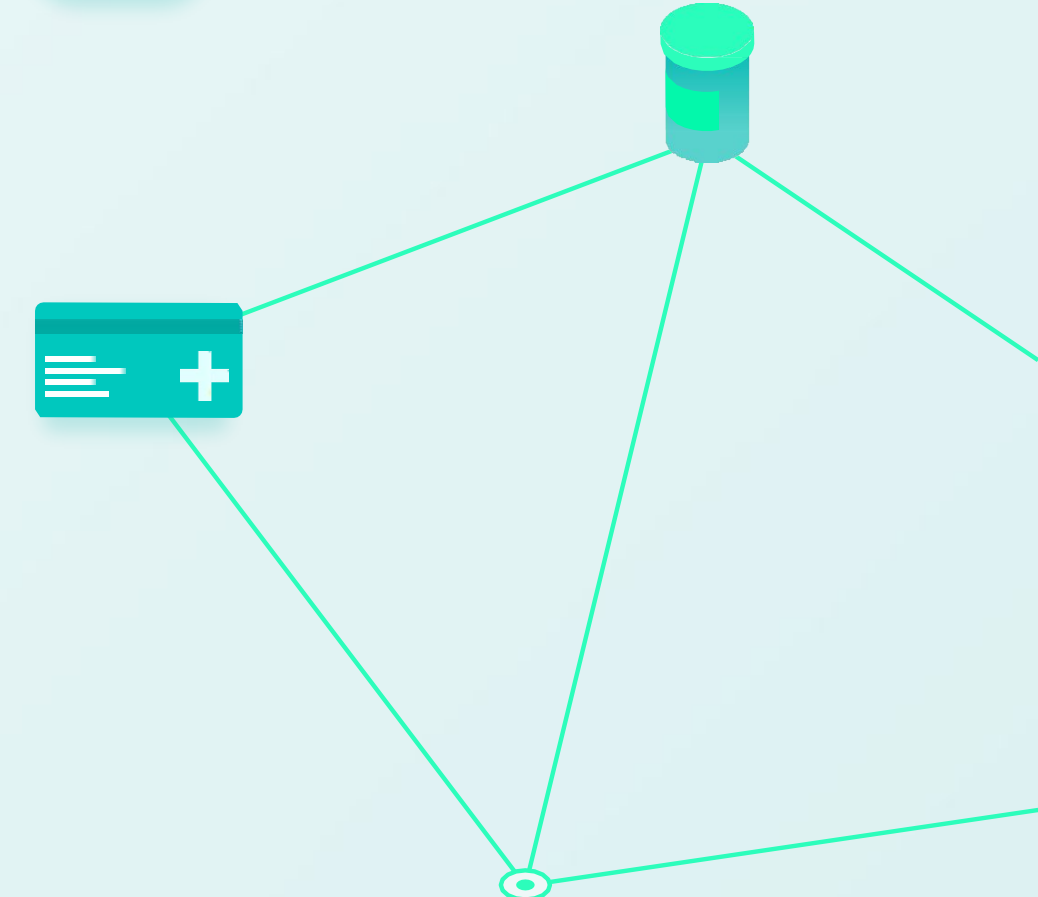
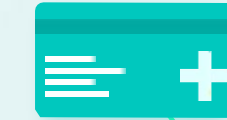
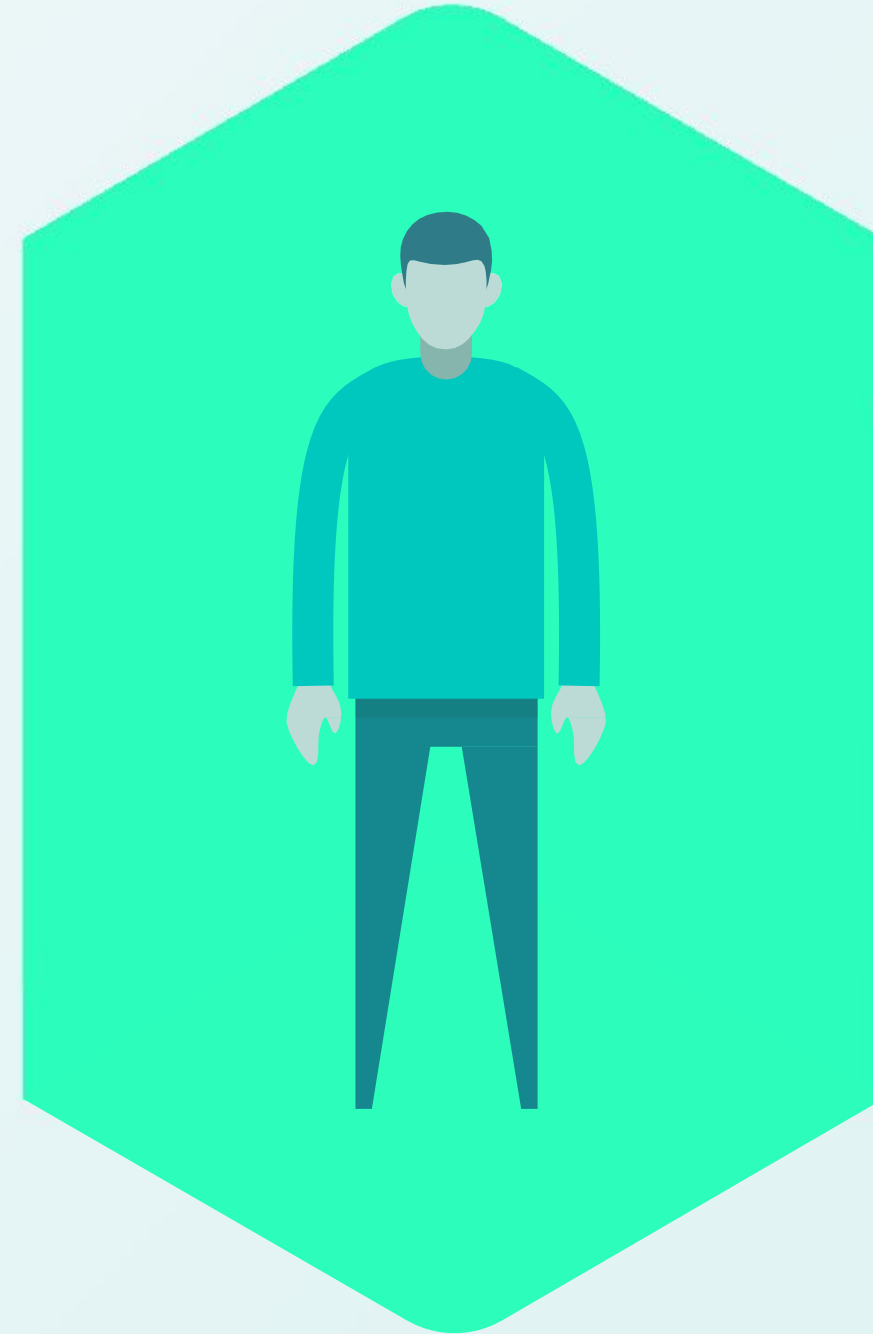
**Track & trace:** Includes geo-location, transfer of ownership / custody, and real-time data about conditions such as temperature, humidity, etc.



# eHealth

Granting the power to share and creating a new model of healthcare. IOTA secures patient data & democratizes access.

-  **Research Data Integrity**  
IOTA ledger can prove the integrity of research data.
-  **Remote Patient Monitoring**  
IOTA protocol secures data streams from remote sensors using healthcare interoperability standards.
-  **Pharmaceutical Trials**  
Securing an immutable record and process of drug trials by logging every step and test result onto the Tangle.
-  **Health Data Exchange**  
The IOTA protocol allows for granular and secure data exchange between healthcare providers, citizens and caregivers.



PROJECT

**Skaly**

PROJECT

**SmartOptz**

PROJECT

**Pact**



# Industrial IoT

IOTA is uniquely suited for Industry 4.0 - a platform for trusted exchange of data and secure exchange of value, with low resource requirements and no fees.



The H2020 ENSURESEC project aimed at delivering a set of threat intelligence tools that enable the prevention, mitigation, and recovery from cybersecurity attacks.



The IOTA Foundation designed and developed two DLT-based services, the Audit Trail Gateway (GW) and the Self-Sovereign Identity (SSI) Bridge.

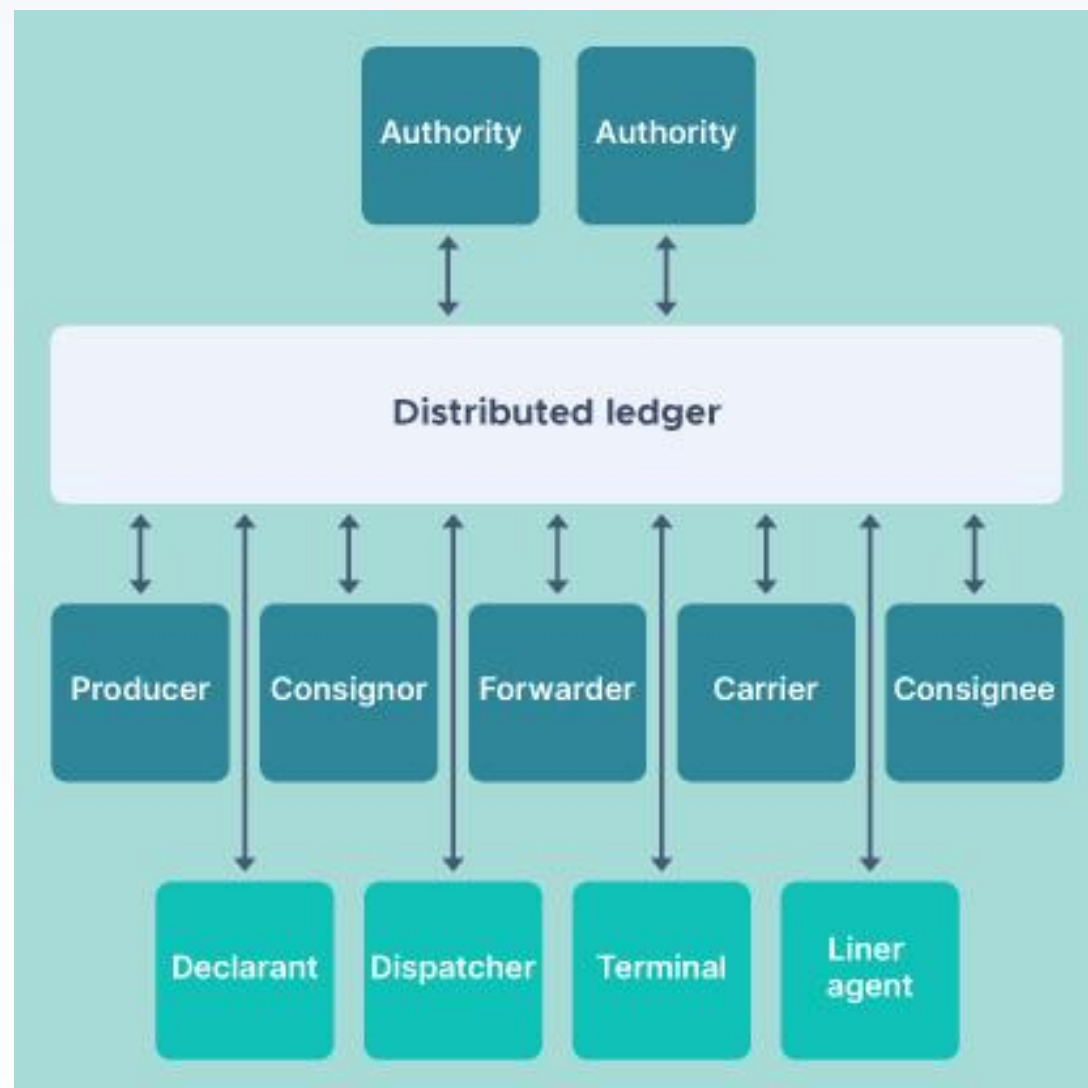


The first service leverages the power of IOTA to share immutable data, while the second offers integration with IOTA Identities to allow people, organizations, and devices to create unique decentralized digital identities and to be issued with verifiable credentials.



# Customs and Border Management

The IOTA Foundation is piloting a system with **Trademark East Africa** that will connect border agencies with overseas customs and local traders for smarter and more efficient trade.



By working together, traders in East Africa become better connected to the wider region and overseas markets. Early indications suggest it can add more than 5% to the region's GDP through new economic opportunities and job creation.



# IOTA Digital Identity

At IOTA, we are building a *Unified Identity Protocol* to serve as the **invisible layer of trust for the internet**: open, scalable and free, so that everyone and everything can enjoy **trust as a basic digital right**.

IOTA Identity builds on the **W3C**'s proposed standards:

- **Decentralized Identifier (DID)**, enables the holder to prove ownership over their personal data.
- **Verifiable Credentials (VC)**, statements about the holder that can be verified.



## Address Validation

Customers can prove where they live for shipping and billing addresses.



## Age Verification

Customers can prove they are 18+ for online purchases.



## Authority Login

Customers can prove who they are and gain access to their account without passwords.





# What Is EBSI?

The European Blockchain Services Infrastructure (EBSI) is a network developed by the European Commission and the EU Member States, Norway and Liechtenstein that supports cross-border services between governments, businesses and citizens.

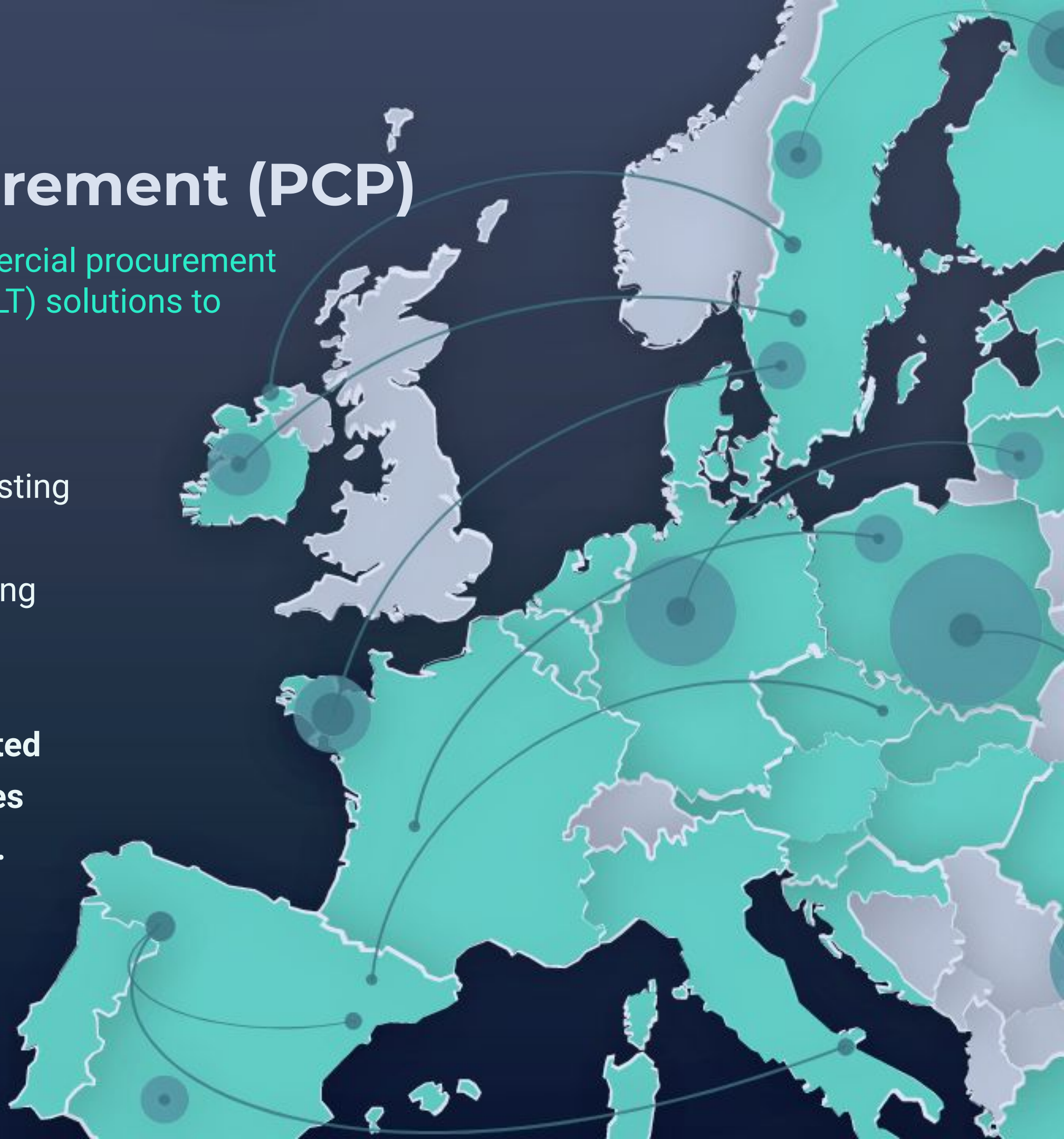
EBSI wants to improve the efficiency and trust of EU-wide transactions, enhance the mobility of citizens, enterprises and goods, and reduce Europe's environmental impact.

# EBSI pre-commercial procurement (PCP)

The IOTA Foundation is participating in EBSI's pre-commercial procurement (PCP), which pilots new distributed ledger technology (DLT) solutions to underpin the evolution of EBSI.

After being selected for Phase 1 of the PCP from 35 applicants, and also successfully completing rigorous testing in Phase 2A of the EU blockchain Pre-Commercial Procurement the IOTA Foundation has been selected along with two other projects for the **last phase**.

**We are offering our core technology that can be integrated into the EBSI infrastructure, making IOTA's functionalities available for institutions and actors from across Europe.**



# IOTA & EBSI

---

IOTA's Tangle is ideally suited to meet the infrastructure needs of EBSI. As an open, feeless and scalable distributed ledger, IOTA meets all key requirements:



## Flexible

IOTA can support permissioned environments for resources and control data distribution to comply with EU regulations for data sharing.



## Open Source

The Tangle – IOTA's DLT – is built on open-source software, allowing organizations to develop services and run applications on a public network.



## Scalable

IOTA is ideally suited to high volume and velocity use cases, and data sharding developed in the EBSI PCP can create dedicated application-based regional or logical clusters.



## Sustainable

The Tangle validates data and transaction without Proof of Work, using much less energy than traditional blockchains.



## Feeless

As a feeless protocol, and contrary to other blockchains, anyone can afford to use IOTA.





# EBSI Use Cases

The EBSI infrastructure is well suited for a wide range of use cases, ranging from the digital management of educational credentials to the establishment of trusted digital audit trails and document traceability, SME financing, data sharing among authorities, digital identification and more.

As part of the PCP, the IOTA Foundation is testing the platform with two specific new use cases:



## Intellectual Property Rights Management

EU-wide intellectual property rights management in the creative industry helps creatives track the use of their work, transfer intellectual property rights and receive compensation in an automated and trusted way.

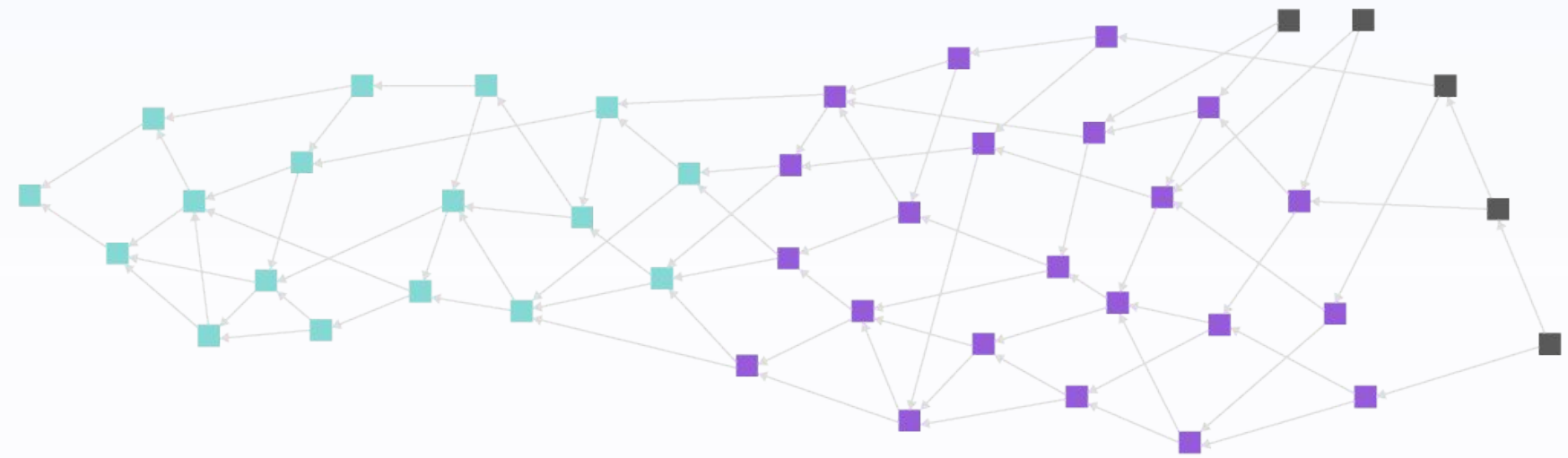
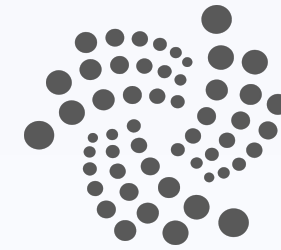
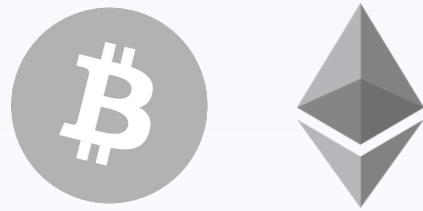


## Digital Product Passport

Digital product passport for the circular economy, applied to consumer electronics and electric vehicle batteries. The use case addresses policies such as the Sustainable Products Initiative and the “battery passport” proposed in the new Batteries Regulation.

# Technical Overview

# Blockchain Vs Tangle graph structure



Blockchain

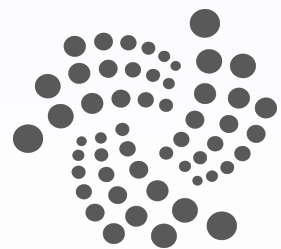
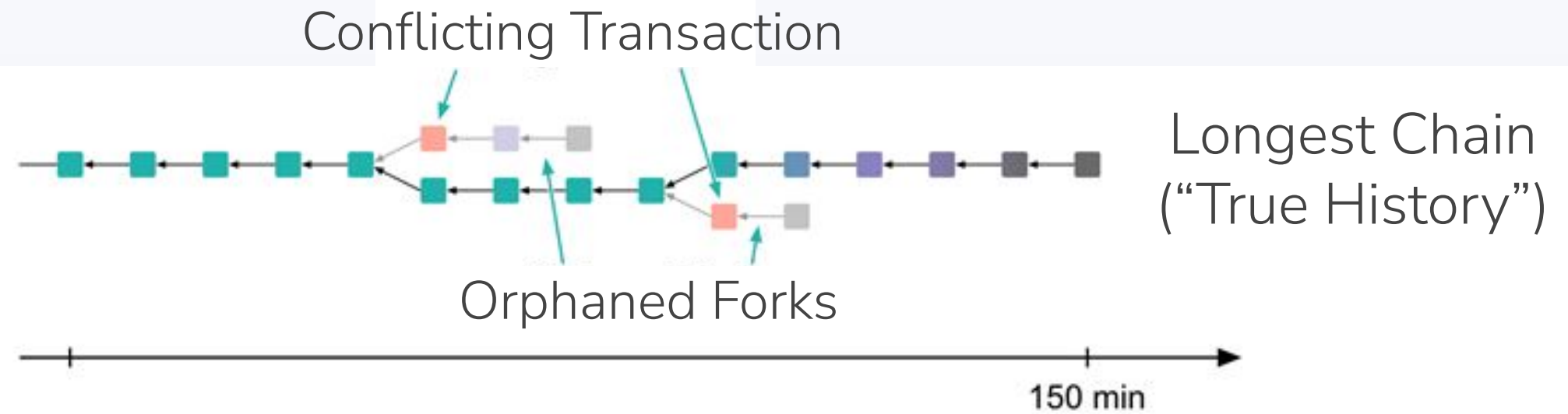
Tangle  
(DAG - Directed Acyclic Graph)



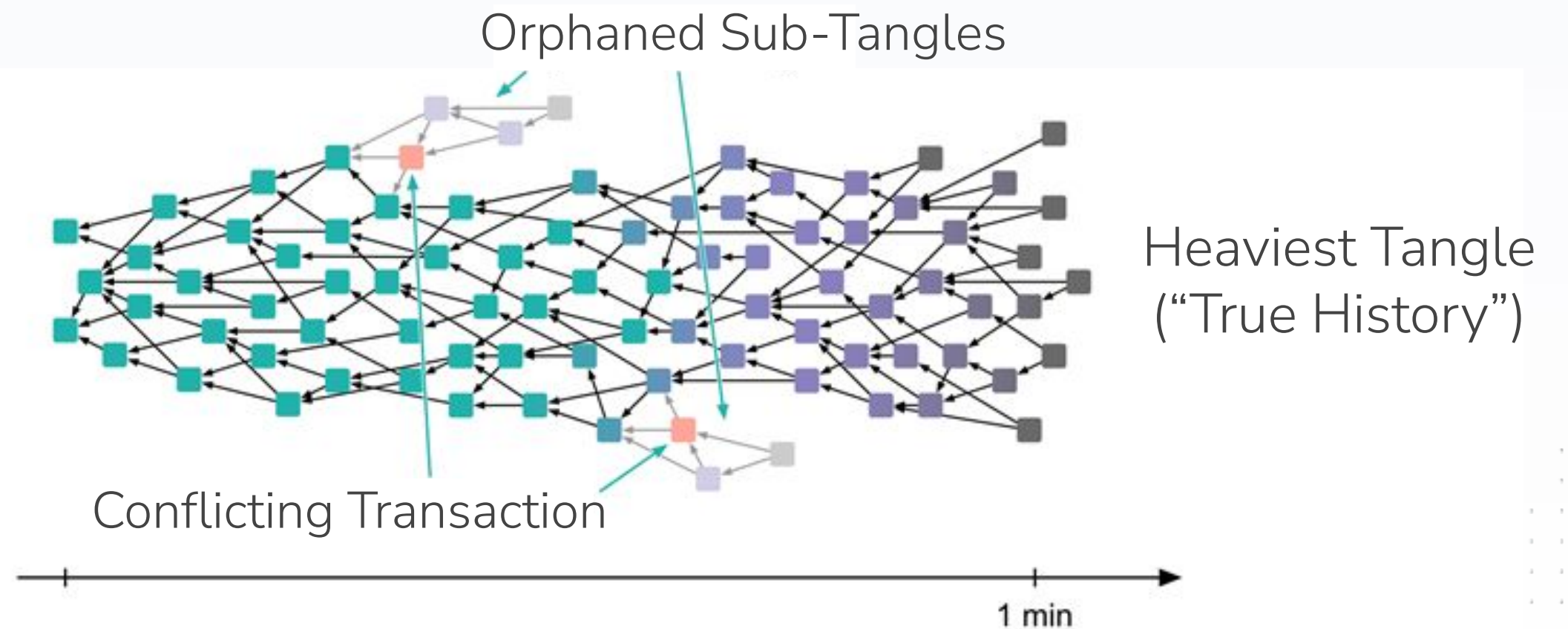
# Consensus in IOTA vs. Blockchain



Blockchain

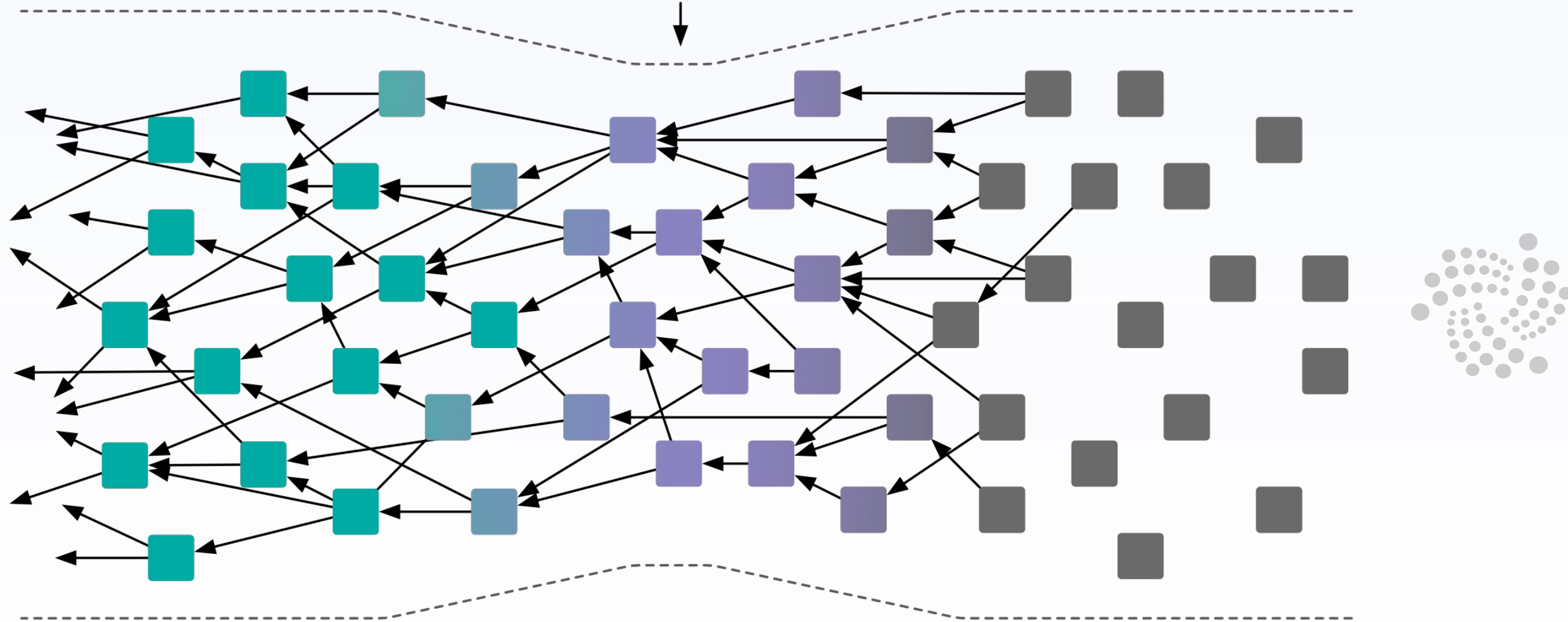


IOTA Tangle



# The Tangle

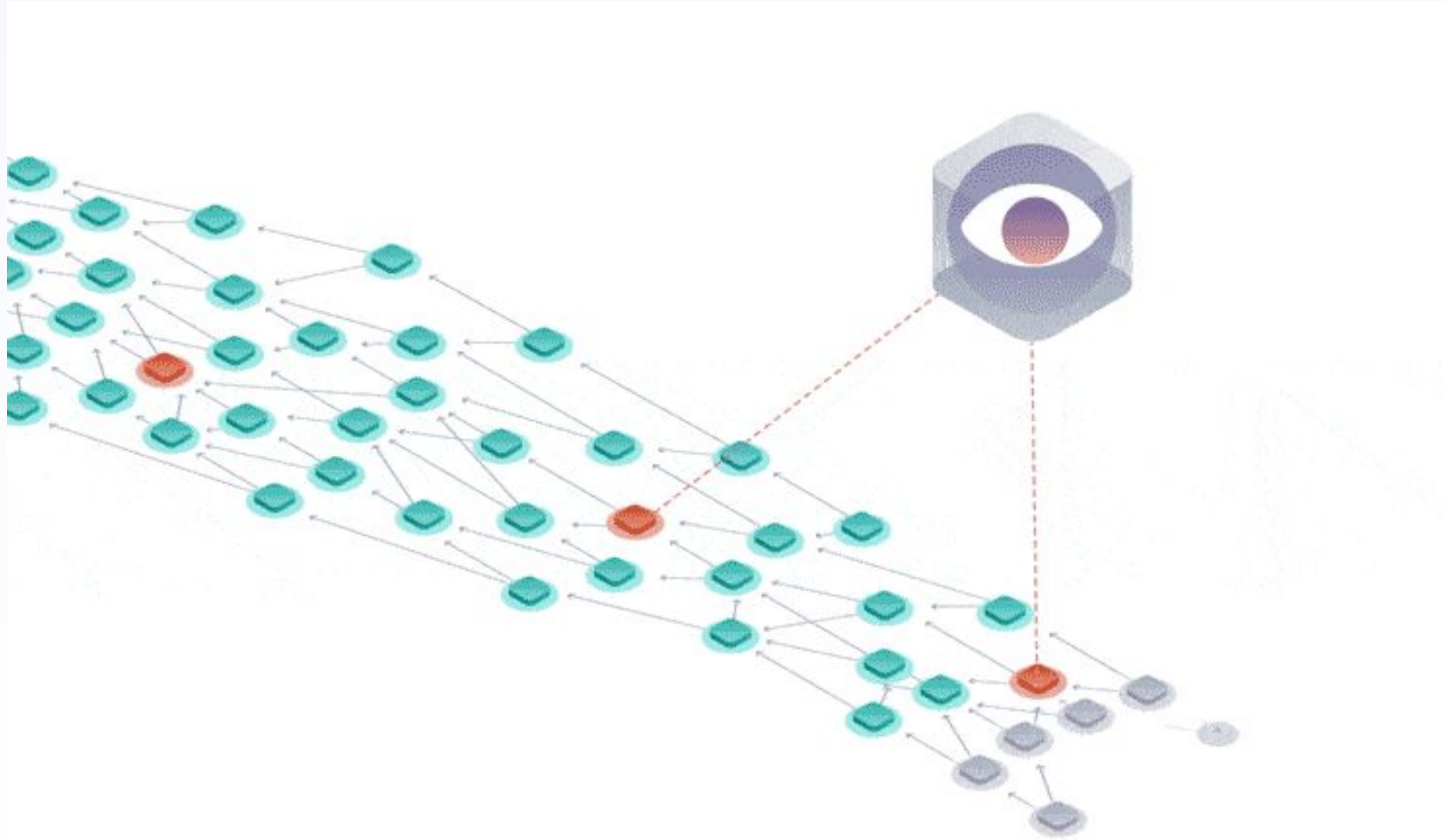
More activity  
=  
More validation



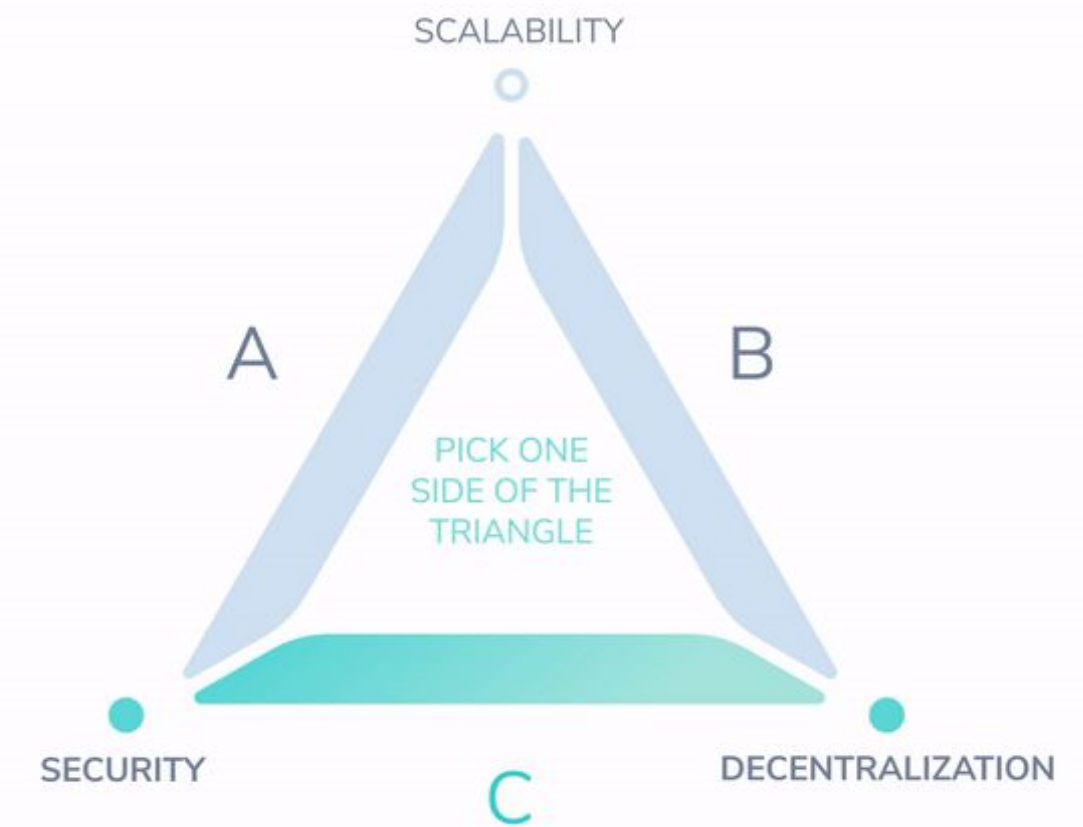
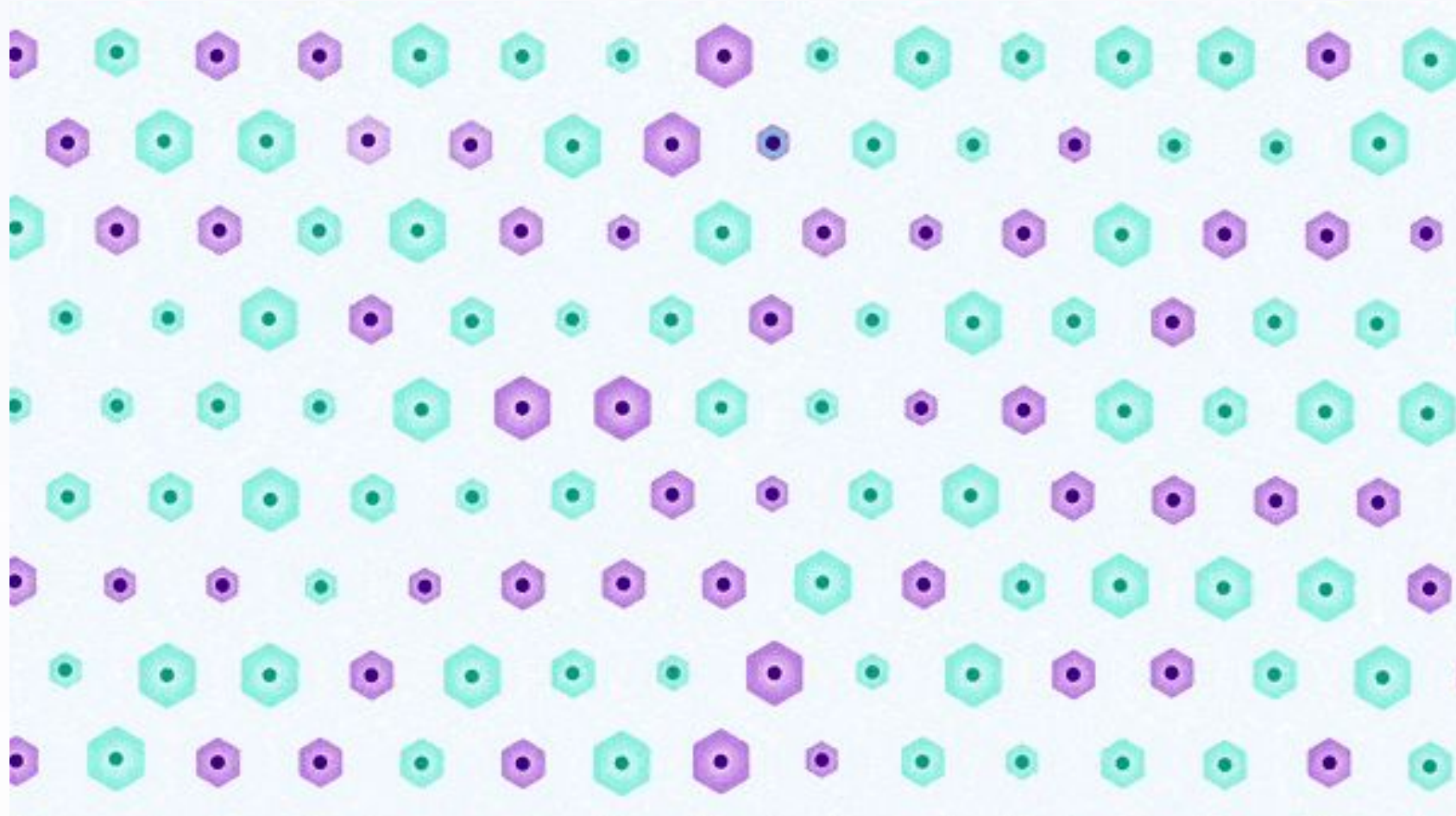
# Feeless Transactions



# The Coordinator



# Shimmer: the future of DLT



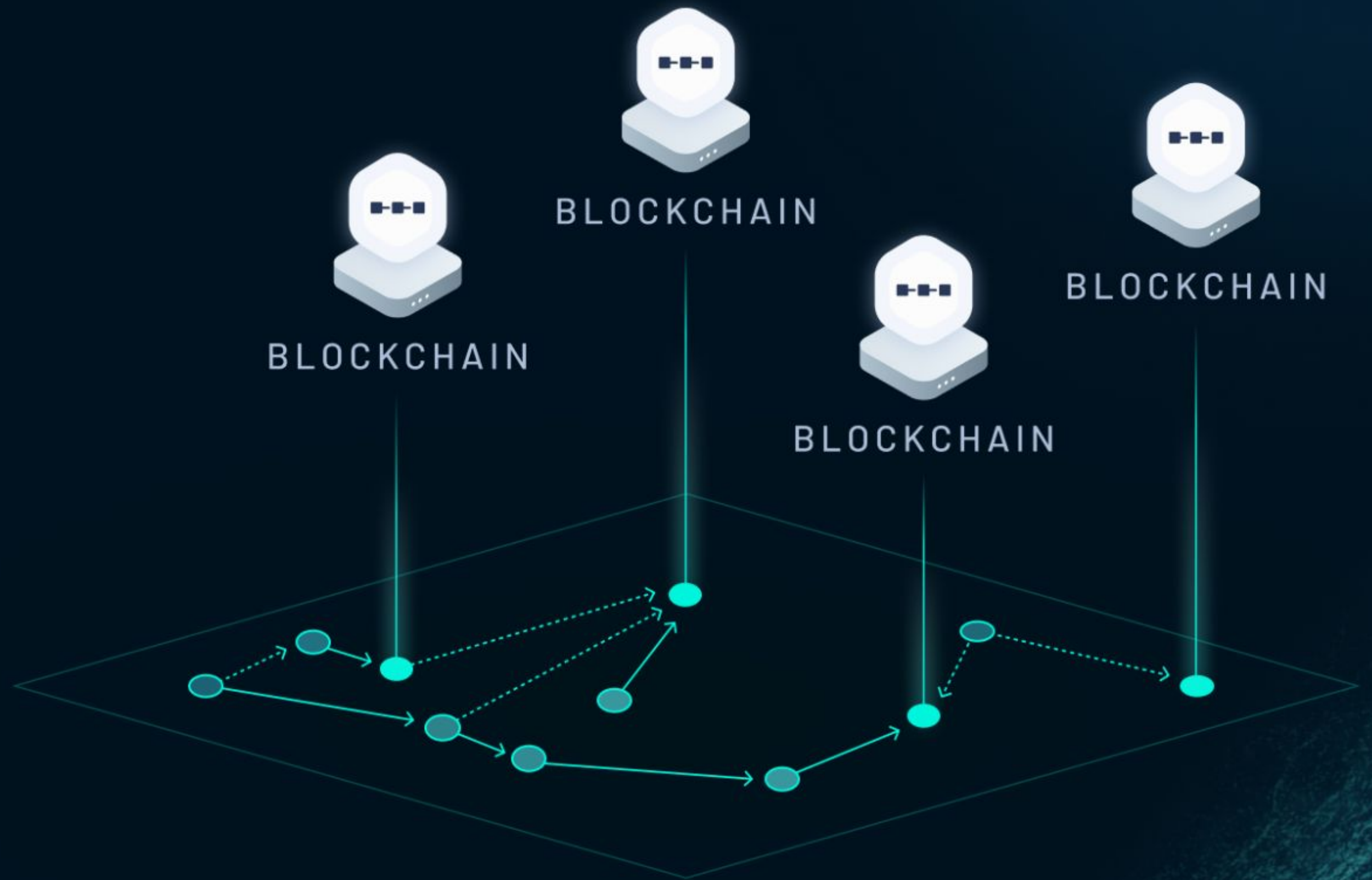


# Shimmer EVM

stardust

L2 LEDGERS

L1 UTXO LEDGER



# Smart Contracts



+



**EVM**

=



IOTA SMART CONTRACT CHAINS

ETHEREUM VIRTUAL MACHINE

SOLIDITY CONTRACTS CAN BE  
EASILY PORTED TO IOTA



# Questions?

**Mirko Zichichi**  
mirko.zichichi@iota.org

