



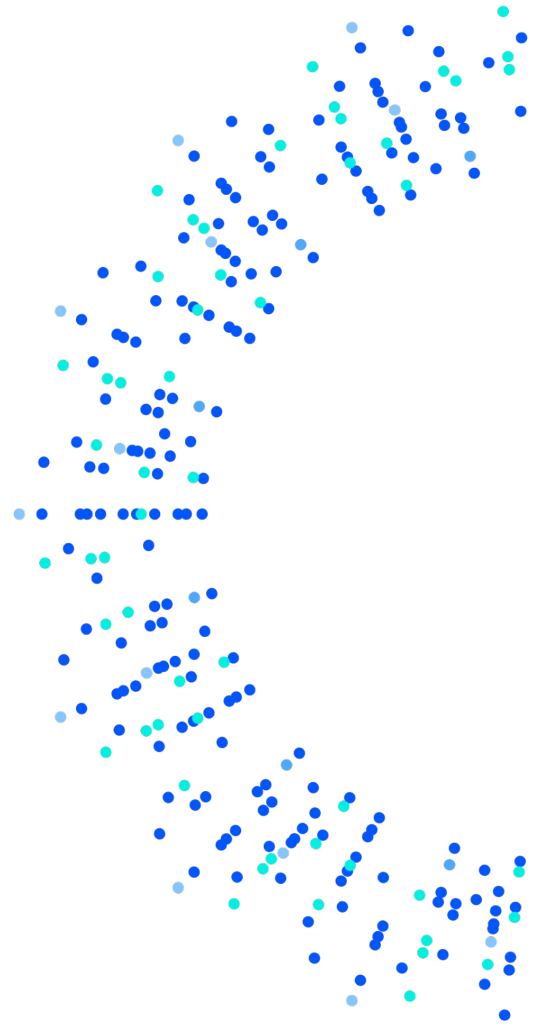
IOTA and digital Identity applied to digital product passports

Workshop on Digital ID management and data governance through emerging
edge computing and DLT solutions

(O-CEI Project. Horizon Europe Programme. <https://o-cei.eu/>)

February 2025

José Manuel Cantera



Who am I?

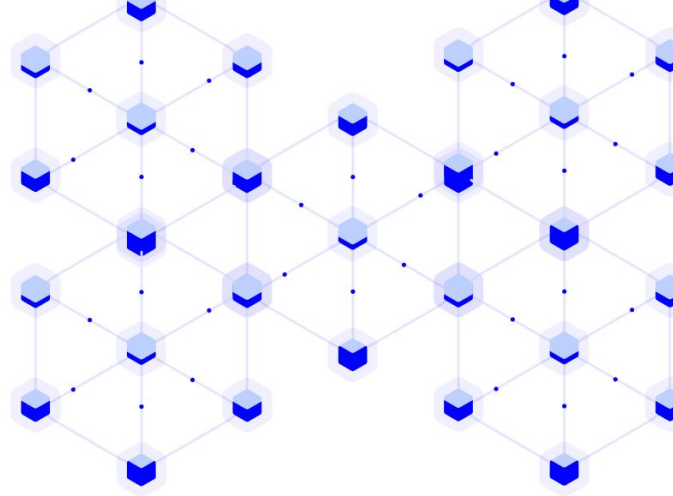
José Manuel Cantera Fonseca

Senior ICT Expert & Consultant

Under IOTA his role has been focused on architecture and strategic technical leadership of different projects such as:

- the **EU Blockchain Services PCP**, sponsored by the European Commission, where different DPP pilots were developed and evaluated
- **TWIN** : *Open infrastructure and platform for value chain ecosystems.*

With more than 25 years of experience in the technology sector, he has made significant contributions across standards development organisations, such as NGS1-LD, open API based on linked data, currently adopted by more than 300 smart cities across the world, or the GS1 EPCIS 2.0 standard, key for future supply and value chain visibility & traceability. Nowadays is also an expert actively contributing to the GS1 MSWG on "Circular Economy and DPP".





IOTA



About IOTA

Since 2015, the IOTA project has developed open-source software, focusing on next-generation decentralized technology that promotes transparent, secure, and ethical practices in the digital space.

Key entities driving the project

[IOTA Foundation](#) in Germany
(Research and Development)

[Tangle Ecosystem Association](#) in Switzerland
(Supporting the ecosystem in Europe and North America)

[IOTA Ecosystem DLT Foundation](#) in UAE (Expanding reach in the Middle East and beyond)

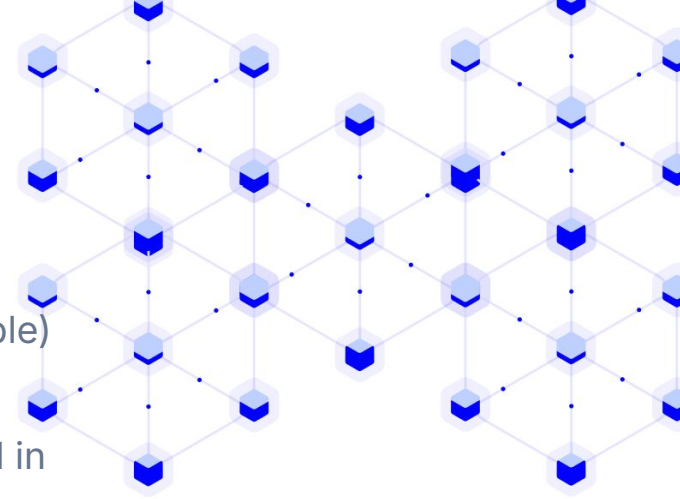
Agenda

- 1 Pilar 1 DLT : Key infrastructure service for building DPP Systems
- 2 Pilar 2 : Trust Frameworks
- 3 DPP Architectural blueprint
- 4 Our pre-commercial products
- 5 Where we are heading to?

01 Pillar 1 : DLT

DLT features

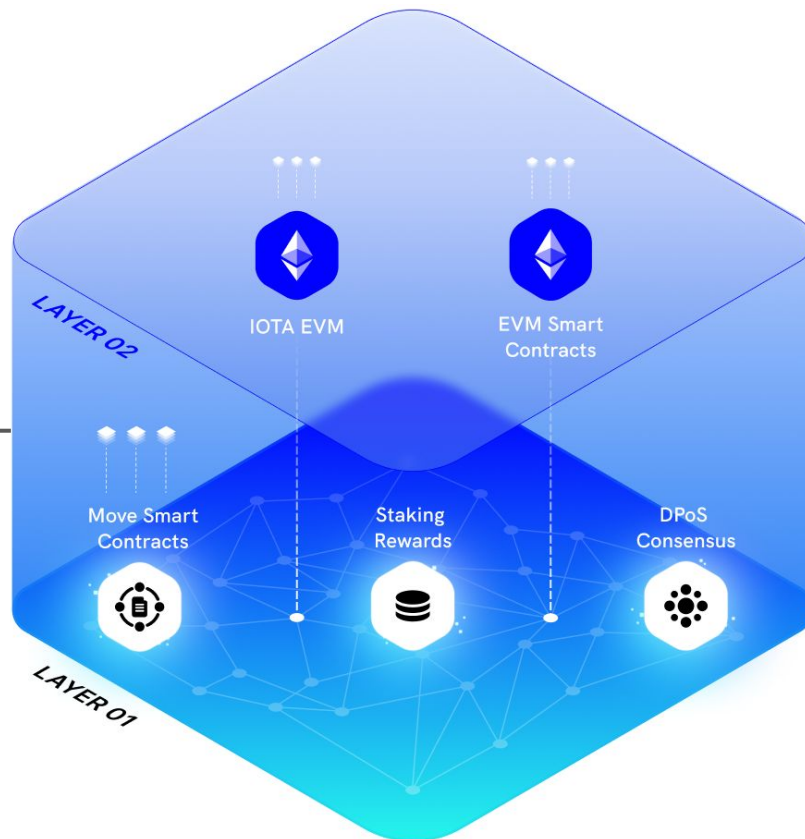
- **Ledger:** information store that keeps final and definitive (immutable) records of transactions
- **DLT:** a type of ledger that is shared, replicated, and synchronized in a distributed and decentralized manner
 - *transparency*, the append-only ledger, is auditable by the whole network
 - *immutability*, as data cannot be easily tampered with
 - *traceability and nonrepudiation*, because each network participant cryptographically signs each transaction issued in the immutable ledger
 - *decentralized execution of immutable instructions*, i.e., smart contracts



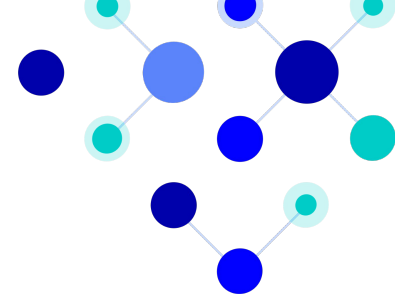
IOTA Network Landscape

L2 IOTA EVM sits on top of L1 IOTA Rebased, based on the well established **EVM**, **Solidity** smart contracts for Ethereum-compatible dApps, an **Account Model** ledger, **PoA Consensus**, and IOTA Token interoperability with the L1.

L1 IOTA is the highly scalable core layer, based on the **MoveVM**, **Move Language** smart contracts for DApps, an **Object Model** ledger, **DPoS Consensus** for decentralized validation.



IOTA: Processing Efficiency



The model implemented in IOTA has significant implications for managing the global state of the network, with Objects and Transactions forming a **Directed Acyclic Graph** (DAG). Faster transaction execution through parallelization is possible for owned objects.

Transactions modify the Object itself.



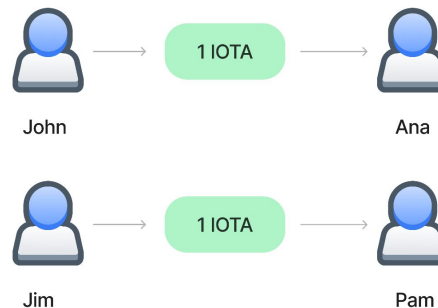
Account Centric Model
John (-1 IOTA)
Ana (+1 IOTA)


2 updates on the ledger


Object Centric Model
1 IOTA
(Owner: John -> Ana)

1 update on the ledger

Unrelated transactions are processed in parallel.



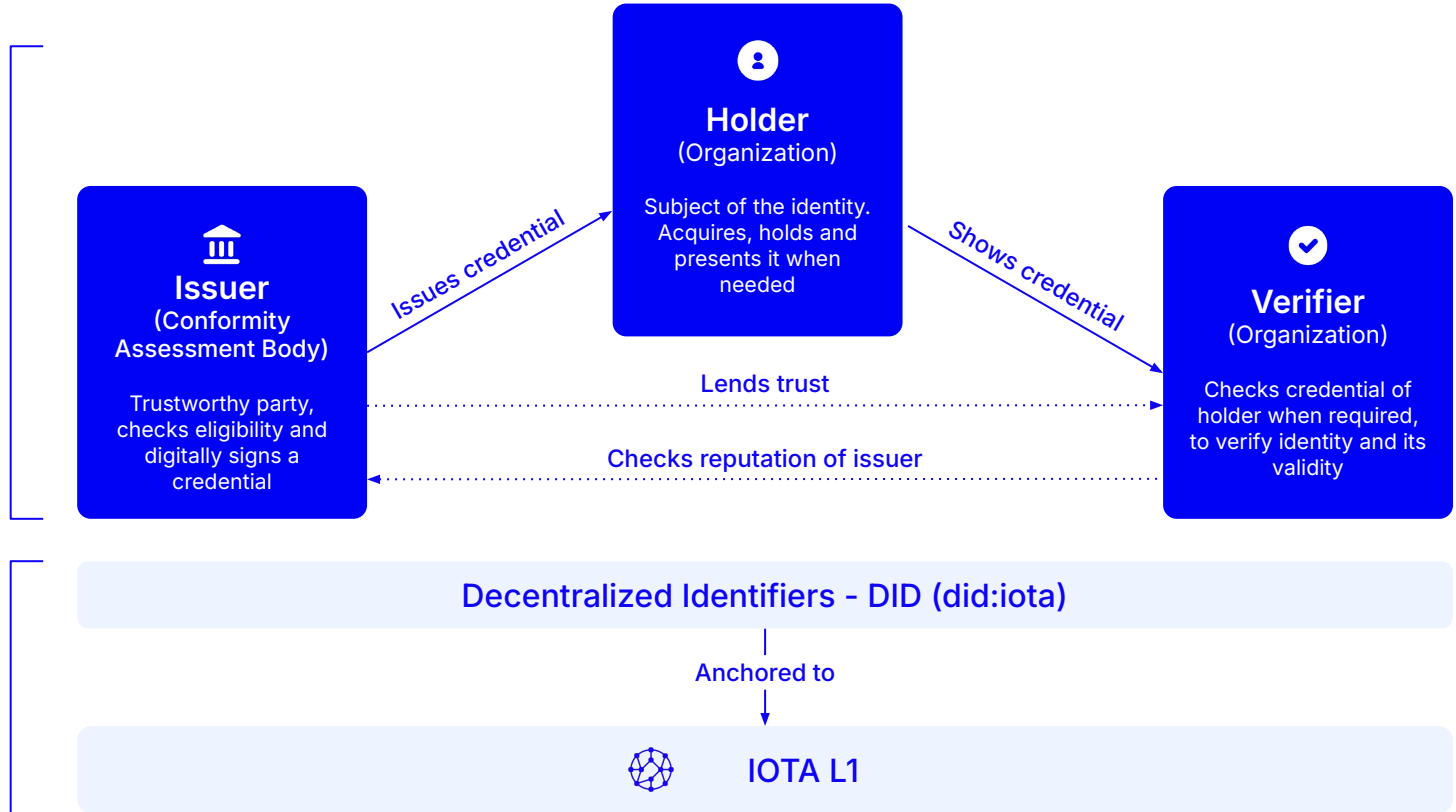
 0129401249012

 6726812381278

Parallel execution

2 Pillar 2: Trust Frameworks

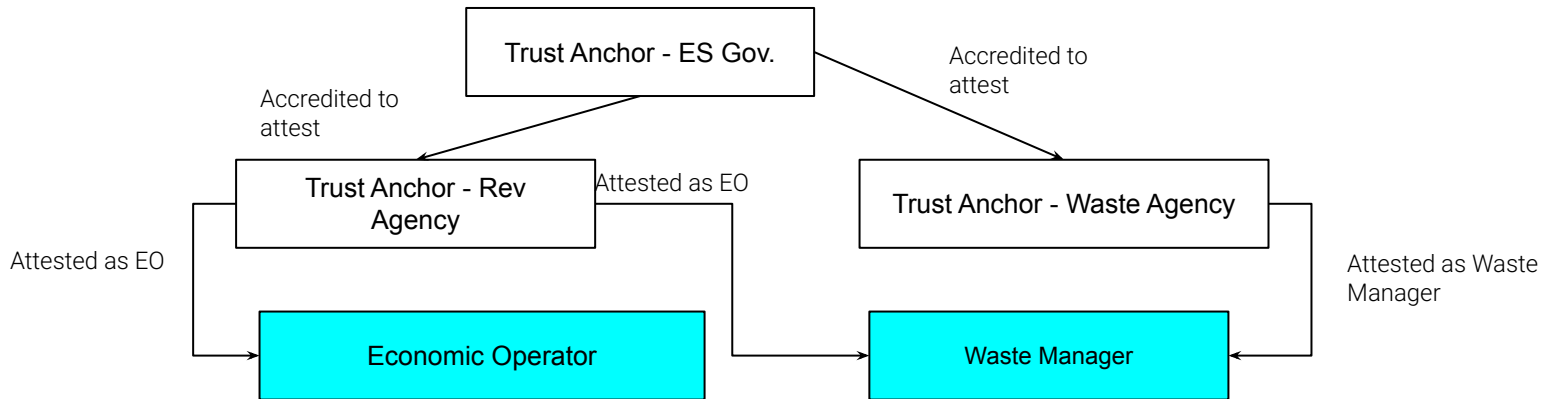
Fundamental principles



Trust framework

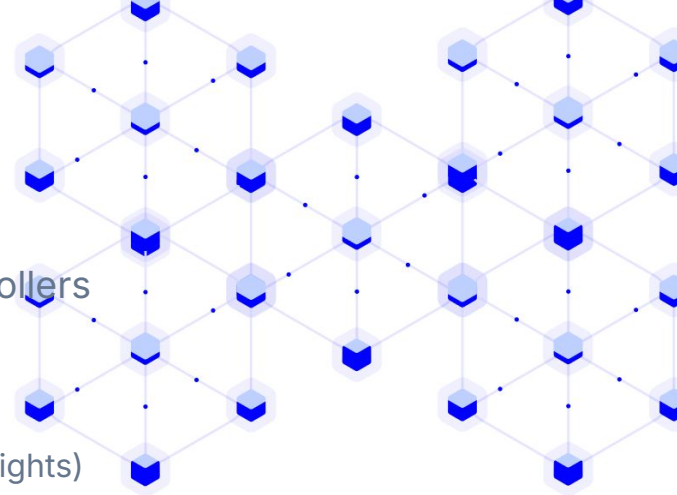
The key for building value chain ecosystems

- **Trust Anchor.**
 - Ex Tax Agency is accredited by the Government to accredit Economic Operators as “Legal Entities” by generating a Verifiable Attestation
 - Ex Waste Agency is accredited by the Government to accredit recyclers or waste managers
- **TI Trusted Issuer (Compliant Participant).**
 - Ex. Economic Operator is accredited by the Tax Agency to attest on products → Attest claims for a DPP



3 Architectural blueprint

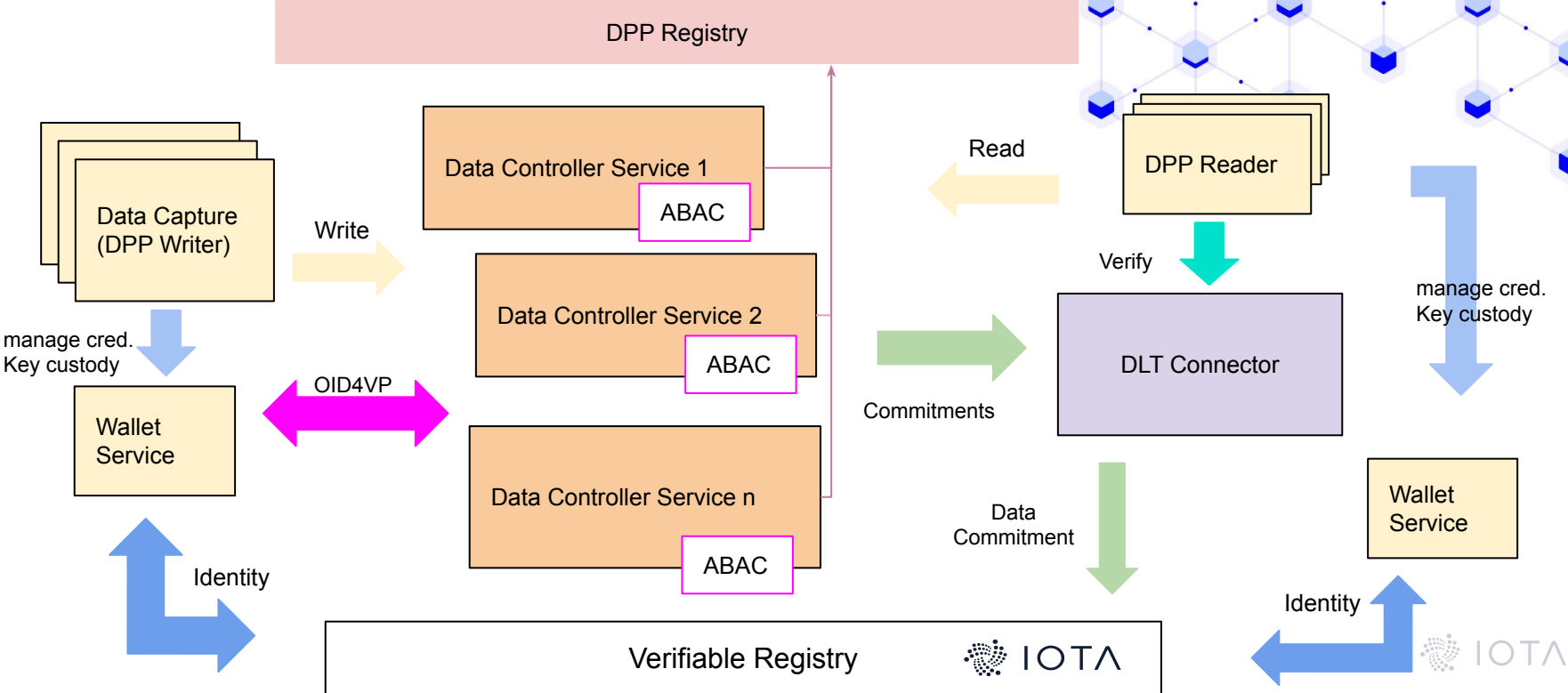
Enabling verifiable data on DLTs



- A DPP System is a decentralized one with multiple data controllers
- Should be all data in a DLT?
 - DLTs are not good at indexing data
 - There are data in a DPP that might not be public (subject to access rights)
- Solution
 - DPP Data Controllers store data as requested by DPP Writers
 - DPP Data Controllers commit to the data via an entry on the DLT
 - DPP Readers can request data to Data Controllers and verify the data through a DLT Entry (immutability, timestamping, sequencing)
 - Alternatively commitments to the data can be achieved through timestamping (proof of inclusion)
- A commitment can be realized via a DLT Entry representing an Audit Trail or can be the state of a Smart Contract
- A commitment only contains hashes of the real DPP data kept by a Controller

DPP System Architecture with Verifiable Data

Blueprint



4 Our pre-commercial products

Experiment 1.- DPP for electronics

<https://github.com/eReuse/devicehub-teal>

Zebra
DevCon 2023



UNIVERSITAT POLITÈCNICA
DE CATALUNYA
BARCELONATECH

Inventory
Inventory / All devices

☐ Lots ▾ + Actions ▾ 🔍 Exports ▾ 🏷 Labels ▾ 📄 Placeholders ▾ 📷 Snapshots ▾

All Computers

Displaying devices of type *All Computers*

20 entries per page

Select	Title
<input type="checkbox"/>	Desktop dell inc. optiplex 745
<input type="checkbox"/>	Desktop lenovo 27563g7
<input type="checkbox"/>	Laptop sony corporation vgn-z11wn_b
<input type="checkbox"/>	Laptop hewlett-packard hp probook 6
<input type="checkbox"/>	Laptop hewlett-packard hp 250 g1 notebook
<input type="checkbox"/>	Desktop hewlett-packard hp compaq dc7900 ultra-slim desktop

Laptop - Laptop hp hp probook 450 g8

Details



Type
Manufacturer
Model
Part Number
Serial Number
Usody Identifier (DHID)
Inventory Identifier (PHID)
Device Identifier (CHID):
Last Digital Passport (Last Dpp):

Status

Physical
- not status -
Lifecycle
- not status -
Allocation
Not allocated



Laptop
hp
hp probook 450 g8
- not detected -
CND4286Z55
2B55M
50
a77659f6fd95bcc36...
a77659f6fd95bcc36...

Icecat data sheet



HP ProBook 450 G8 i7-1165G7 Notebook 39.6 cm (15.6")
Full HD Intel® Core™ i7 8 GB DDR4-SDRAM 512 GB SSD
Wi-Fi 6 (802.11ax) Windows 11 Home Silver

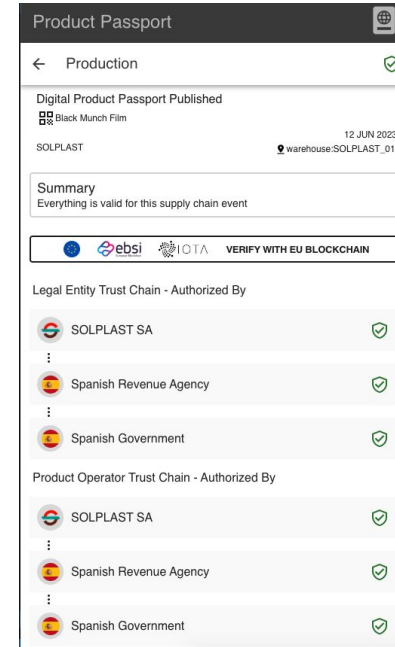
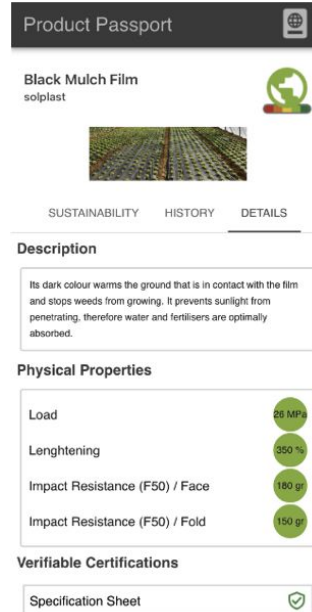
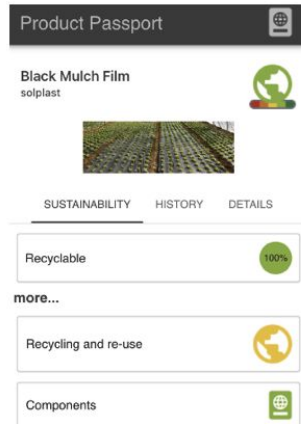
More examples



Experiment 2 .- DPP for plastic upcycling



DIGIMARC



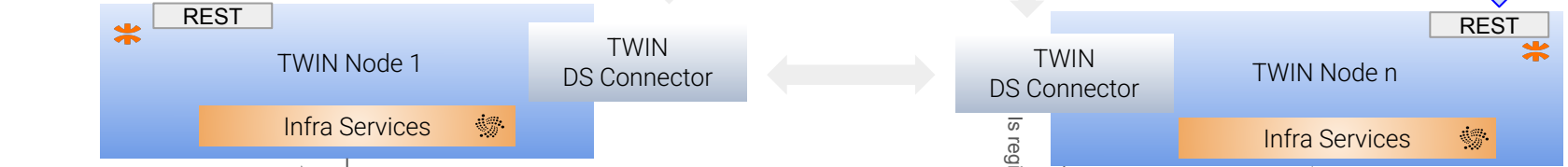
5 TWIN : Our bet for digitising value-chain ecosystems

TWIN . - Open platform and infrastructure for value chain ecosystems

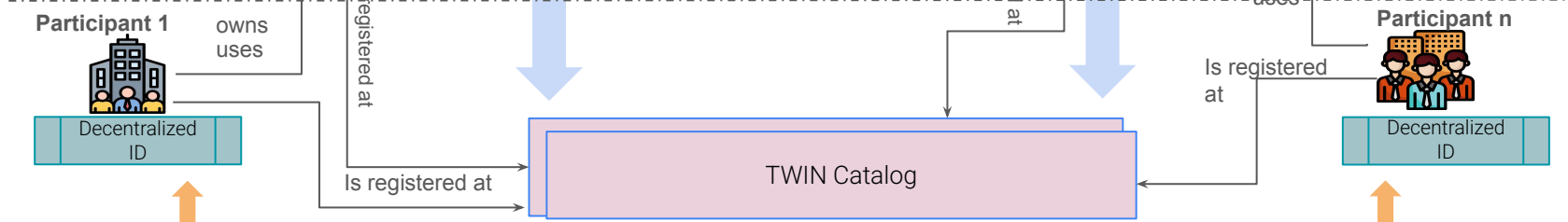
<https://twin.org>



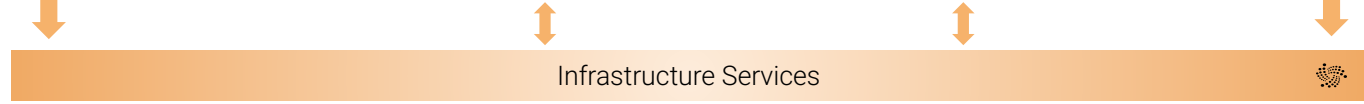
Application plane



Data & Services plane



Infrastructure plane





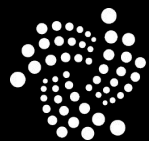
About Us

Founded in 2015, IOTA is a public goods infrastructure to bring trust in our digital world. Through IOTA, governments, organizations and people are able to interact with each other in a secure, trusted and verifiable way.

IOTA is one of the most established blockchain projects in the world and is primarily driven by a global ecosystem of non-profit organizations.

www.iota.org

info@iota.org



IOTA Tokenize
Everything