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Commission



A European Blockchain technology for the use in accreditation and certification

A (European Blockchain) based technical solution for accreditation and certification - and how to (eFTI) pilot it

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01

Context

To enable the recognition of trusted products, services and systems, you need to establish trust relationships. How does the accreditation / trust model work today and what are the challenges?

How we trust in services and systems today?

We trust in accredited services and systems because we trust in the actors that participate in the accreditation and assessment processes, and the trust framework that recognises the actors

We trust in tangible outcomes because:

- We can uniquely **identify the actors that participate in the provision of trusted services, products or systems** in the context of a domain or a regulation
- The conformity of services/systems/products is evaluated **in the context of a regulation / best practices**

We trust in conformance services and systems because we trust national accreditation bodies and conformity assessment bodies

Overview

Regulations and sectorial agreements

national accreditation bodies

conformity assessment bodies

Services, products, people or systems

Example

Define the legal framework

Issue accreditation to CABs, under an accreditation scheme

Evaluate services, products and systems and issue certifications

Are certified under a conformity assessment scheme



Role of national accreditation and conformity assessment bodies

Regulation 765/2008 highlights the added value of accreditation for the EU market, considered as a public good

National accreditation bodies

- Are evaluated by other signatories of the Multi Lateral Agreement in a peer evaluation to ensure harmonized practices and continuous improvement.
- Are notified by Member States.
- Accredits conformity assessment bodies.
- Issue **accreditations** for conformity assessment bodies.

Accreditations

- **Distribution** of information:
 - Should be publicly accessible, when relevant
- **Lifecycle** of the certification:
 - Can be revoked, suspend or re-activated during its validity time.



Role of national accreditation and conformity assessment bodies

Regulation 765/2008 highlights the added value of accreditation for the EU market, considered as a public good

Conformity assessment bodies

- Are accredited by National accreditation bodies to verify that have the technical capacity to perform their duties
- Assess products, services and systems to ensure their conformity with standards or specifications.
- Issue **certifications / reports**.

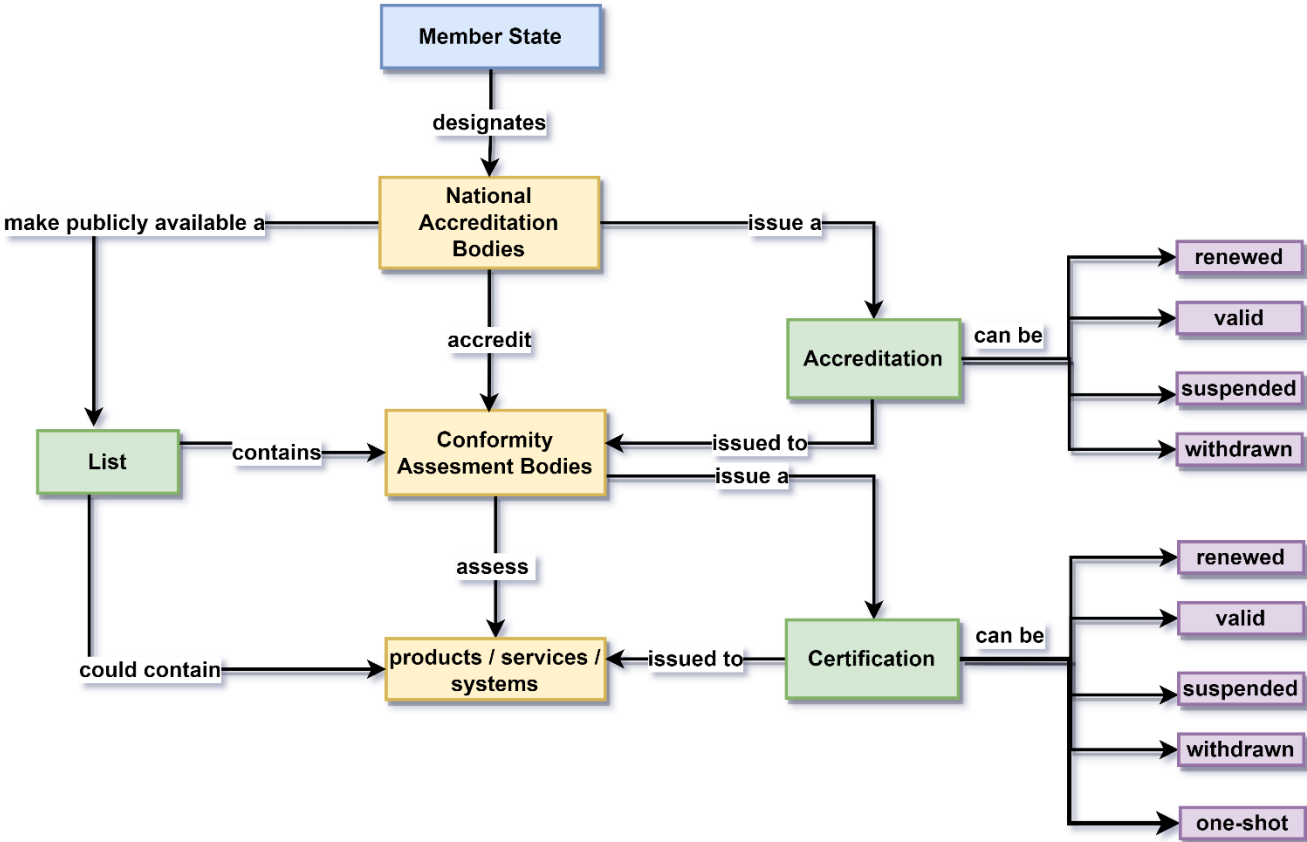
Certifications / reports

- **Distribution** of information:
 - Can be publicly accessible, when relevant
 - Can be considered restricted or confidential information.
- **Lifecycle** of the certification:
 - Can be revoked, suspend or re-activated during its validity time, when relevant.
 - Could be a “one-shot” certificate (not linked to a validity time, just certifying a product as it was presented).



How accreditation model works today?

To establish trust, we need an accreditation system to build a trust chain, this is how it works today



There is a natural ecosystem of already established trusted relationships



What are the responsibilities of actors?

Workload, time and costs

01

Member States

Maintain an up-to-date **list of the National Accreditation Bodies**

02

National Accreditation Bodies

Make publicly **available the information on the accredited conformity assessment bodies**

Manage the lifecycle of assessment bodies accreditations (valid, withdrawn or suspended)

Distribute the accreditations to enable consumers to verify information

03

Conformity Assessment Bodies

Maintain an up-to-date **list and services, products and systems that a CAB has certified**

Issue conformance certificates

Manage the lifecycle of accreditations for service and systems (valid, withdrawn or suspended) **when relevant**

Distribute the certifications of services and systems evaluated, **when relevant**



Challenges in verifying the accreditation information?

How can we improve the accreditation frameworks of today?

01

Lack of Digitalisation

In some cases, accreditations and certifications are represented in legal texts or issued as hand-signed or digitally signed PDFs.

Such information is sometimes:

- Difficult to obtain
- Hard or impossible to verify its status in real time
- Is not machine readable for automatic verification

02

Low level of Interoperability

Domains are using different formats and ways to express accreditation information, and also storing it in many places.

Within most domains accreditation information is implicit, and the verification rules are not always documented.

03

Costly distribution and revocation process

Actors have to maintain trusted lists up-to-date is crucial for successful verification, however information distribution is challenging and costly.

Today, trusted lists are not interoperable, and we can find lack of interoperability even when using same formats, like x509.

An efficient management of accreditations and certifications (i.e. revocation) is required to complete the verification path



Current challenges to solve and threats to a trusted infrastructure

Santa wish-list for systems that provides information about accreditation and certification bodies

Desirable properties for a repository of information to support accreditation and certification bodies

- Resilient, avoiding a single point of failure
- Highly availability and performance
- Trustable and verifiable
- Implemented in a common format
- Easy to access and to share
- Human readable AND Machine-readable formats
- Scalable
- Resistant to cyber attacks
- Implementation of chronological proof of historical information, to verify information in the past



02

EBSI

What about using a trust infrastructure supported by Member States which has already defined an accreditation trust model, including revocation?

Why EBSI? EBSI established a multi-domain trust infrastructure

A unique sovereign pan-European blockchain services infrastructure



01.

Provide transparent services that everyone can trust.

Open, Transparent and Privacy
Preserving information exchange

03.

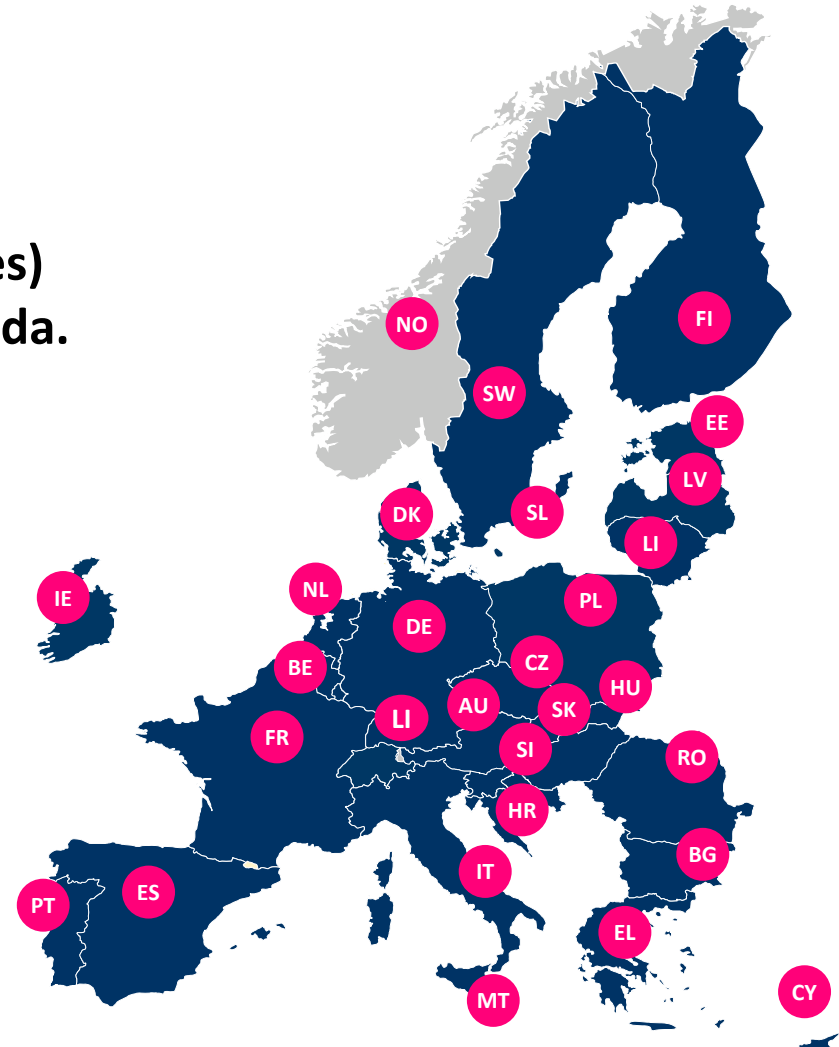
EBSI Services run in line with EU values and regulations.

EU governed, sovereign infrastructure – public information is always available and can always be trusted and verified

02.

Contribute to data spaces (discourage data monopolies) and support the green agenda.

Eco-friendly and efficient



Blockchain is one of the technologies that will pave the way to Europe's Digital Decade



European
Blockchain
Services
Infrastructure



Track and
Trace



Verification of
Information



Anti-counterfeiting



IP Rights
Management



European
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How was EBSI designed?

EBSI's accreditation models and revocation are being designed in close collaboration with numerous use cases

Diploma Use case

Issuance of HEI Diplomas, proof or records, My AcademidID, micro credentials, EUROPASS digital credentials

Product Authenticity Use case

Issuance of IP Assets attestations for Brand Owners

ESSPASS Use Case

Issuance of Portable Document A1 Digital Credentials

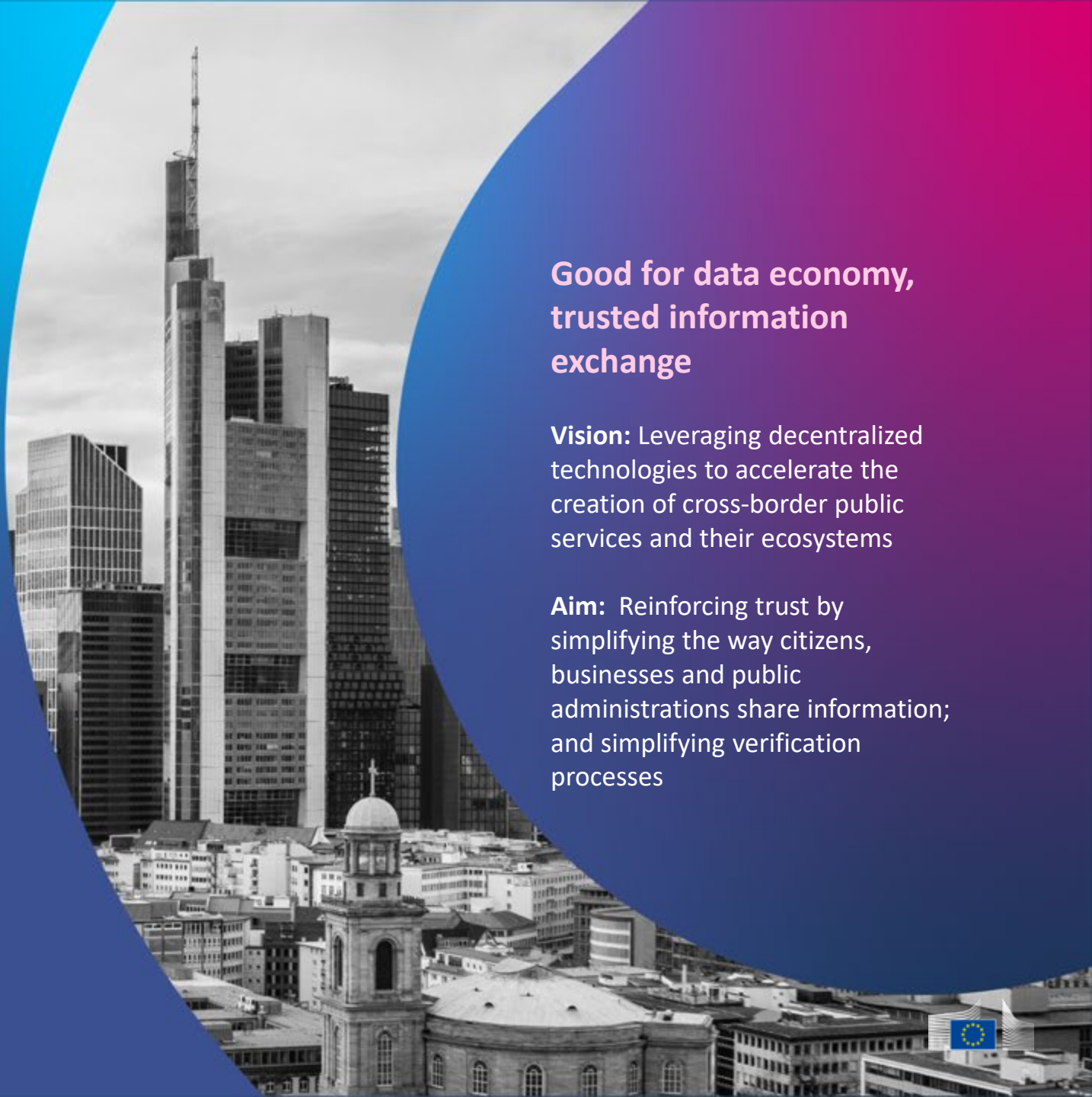
Traceability Use Case

Track and trace capabilities

Good for data economy, trusted information exchange

Vision: Leveraging decentralized technologies to accelerate the creation of cross-border public services and their ecosystems

Aim: Reinforcing trust by simplifying the way citizens, businesses and public administrations share information; and simplifying verification processes



What EBSI offers to accreditation bodies?

EBSI helps to make accreditation frameworks digital and interoperable

01

Issuer's trust model and info distribution

Efficient and domain-agnostic **digitalisation** of accreditation models. A unified way of expressing trust relationships and accreditations in a digital and machine-readable form.

EBSI delivers a highly-secure and resilient information distribution and revocation framework, that enables reliable **information distribution**.

02

Verifiable Credentials and digital signatures

Standardised data and signature formats bring a high-degree of **interoperability** and reusability for a seamless cross-domain information distribution.

03

Revocation framework

In cooperation with use cases EBSI delivers a modular **revocation and suspension framework**.



Benefits of the utilization of EBSI in the accreditation ecosystem

Easy to manage and to verify by design



MS driven

Use an infrastructure **that is managed by Member States** as part of the European Blockchain Partnership



Ready to implement

Member states can integrate **their current services** with EBSI thanks to **detailed specifications and available APIs, libraries and software providers** to register public keys, certificates and actors



Shared costs

Using an infrastructure already in place and shared with other public services **will mean a reduction of costs** in the operation of the services



Aligned with EU principles

EBSI is **aligned with EU regulations** like GDPR and compatible with the eIDAS regulation



Tested by public Administrations

Use cases from the educational and social security public ecosystem **have already tested EBSI in cross-border projects**



Implementation possibilities for repositories of information

Blockchain technologies supports a resilient, tamper-proof trust model – with low energy consumption thanks to proof of Authority

Distributed static single files

- Integrity
- Authenticity
- Proof of existence

Distributed database

- Integrity
- Authenticity
- Proof of existence
- Distribution and replication
- Resilience
- High performance

Blockchain technology

- Integrity
- Authenticity
- Proof of existence
- Distribution and replication
- Resilience
- High performance
- Accountability
- Chronological set of data records
- Access management provided in an accountable way and incorporated in the protocol (smart contracts)
- Information can not be deleted
- Integrity / tamper proof protection by a network, not single nodes

Current implementation of some Trusted Lists



A Hybrid approach.



EBSI decentralized network



03

EBSI's Trust Model and info distribution

What about expressing trust relationships in a simple and cross-domain interoperable way?

Three roles of EBSI's Trust Model

We identified that all trust models can be modelled using a three-role model



Trusted Accreditation Organisation (TAO)

TAOs are the organisations responsible for accrediting Trusted Issuers, of a specific sector/ domain in a specific geography, to issue certain types of Verifiable Credentials (VCs).

For example, in the education domain, the Ministry of Education of a Country is responsible for accrediting the Universities of that country.

EBSI

EBSI acts as a decentralised public registry of Accredited Entities, containing the list of trusted Legal Entities that are accredited by TAOs to issue certain types of credentials.

Trusted Issuers (TI)

The **legal entities authorised to issue certain types of credentials**, e.g. A university is trusted to issue diplomas according to a specific Trusted Schema.

All Trust Relationships are following the same pattern

Example: eFTI domain in Member State X

Level 1
Set-up of root TAO



Request TAO to be authorised to issue accreditations for a given domain in a given Member State

Authorises TAO to issue accreditations in a specific domain in a specific country



Accreditation

Level 2
Set-up of sub-TAOs

Accredits a (sub-)TAO to issue accreditations



Accredits to issue Compliance Certificates

Accredits to issue Compliance Certificates

Level 3
Set-up of Issuers

Accredits Issuers to issue Compliance Certificates



Issues a CC

Issues a CC

Issues a CC

Compliance Certificates can be issued as Verifiable Credentials or not



Credential/
Certificate
issuance



What information do we need to enable digital cross-domain verification?

Information about entities

Identifiers

Identifiers (DIDs) and public keys of:

Trusted issuers

and Trusted accreditation organisations

Identity

Verifiable ID

- Legal Entity identity information

Accreditations

Verifiable Accreditations

- mandates to issue a specific type of credential

OR mandates to accredit issuers

Information about credentials

Trusted schemas

A list of recognised and trusted Verifiable Credential types (schema) – e.g. European Learning Model for Diplomas

Revocation

Information to obtain the status of verifiable credentials and verifiable accreditation

We never store personal data or any information about *persons* on the blockchain



W3C Verifiable Credentials and Digital Signatures

Open and interoperable data model and JAdES-compliant digital signatures

W3C Verifiable Credentials

- Widely adopted core data model
- Open and easily extensible
- Support for information and semantic interoperability (JSON or JSON-LD)

JAdES-compliant digital Signatures

- Simple to advanced digital electronic signatures
- eIDAS v1 compliant
- JSON variant of Advanced Digital Electronic Signatures



Revocation and Suspension framework

EBSI supports a wide range of revocation options

On-chain revocation

- Trust relationships are managed and expressed in EBSI's Trusted Registries
- Accreditations can be revoked or suspended in the registry

Off-chain revocation

- A variety of revocation options
- Revocation information is managed off-chain

Want to know more? Access to the online EBSI revocation whitepaper: ["What to do when good Verifiable Credentials go bad"](#)



EBSI could be an answer to your challenges

Web3 technologies to improve the European accreditation framework

Format

Rely on manual PDFs,
great number in terms
of efficiency,
verification, fraud pov..)

How to express a
Certification in a
machine readable
and automatically
verifiable format?

Real-time

Not possible to check
certification
information in real-
time

How to make
Certification
information, including
status, in real-time to
ensure compliance?

Traceability

Not possible for
actors to
properly trace
changes and
audit actions

How to express the
Certification chain so
that all actors are
traceable?

Discoverability

Not easy for
customers for actors
to find trusted
information

How to facilitate the
discovery and distribution of
the accreditation,
certification and even service
certificate products, services
and systems?

EBSI and web3 technologies to differentiate the added value of European accreditation bodies

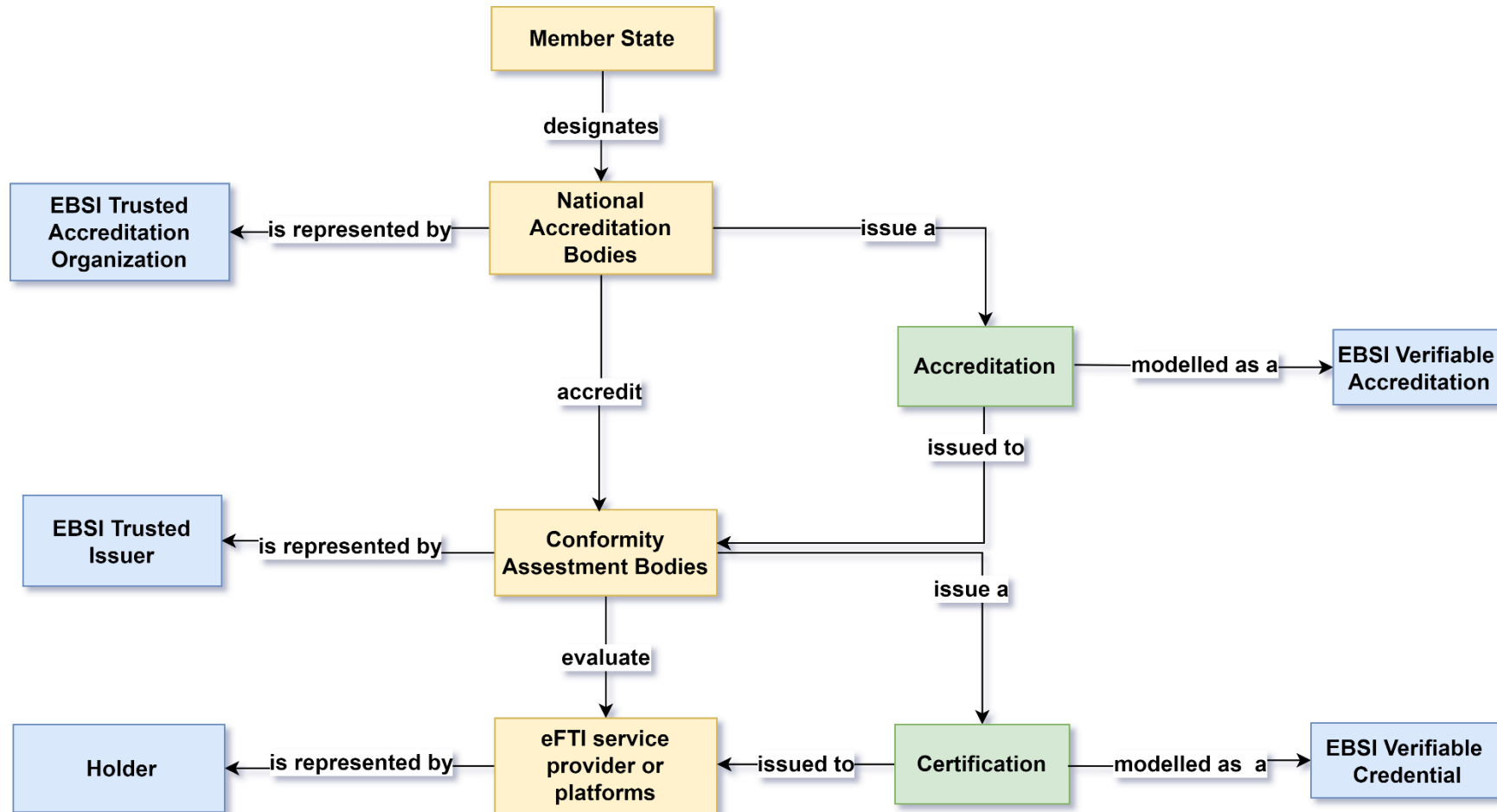


04

How to make it happen?

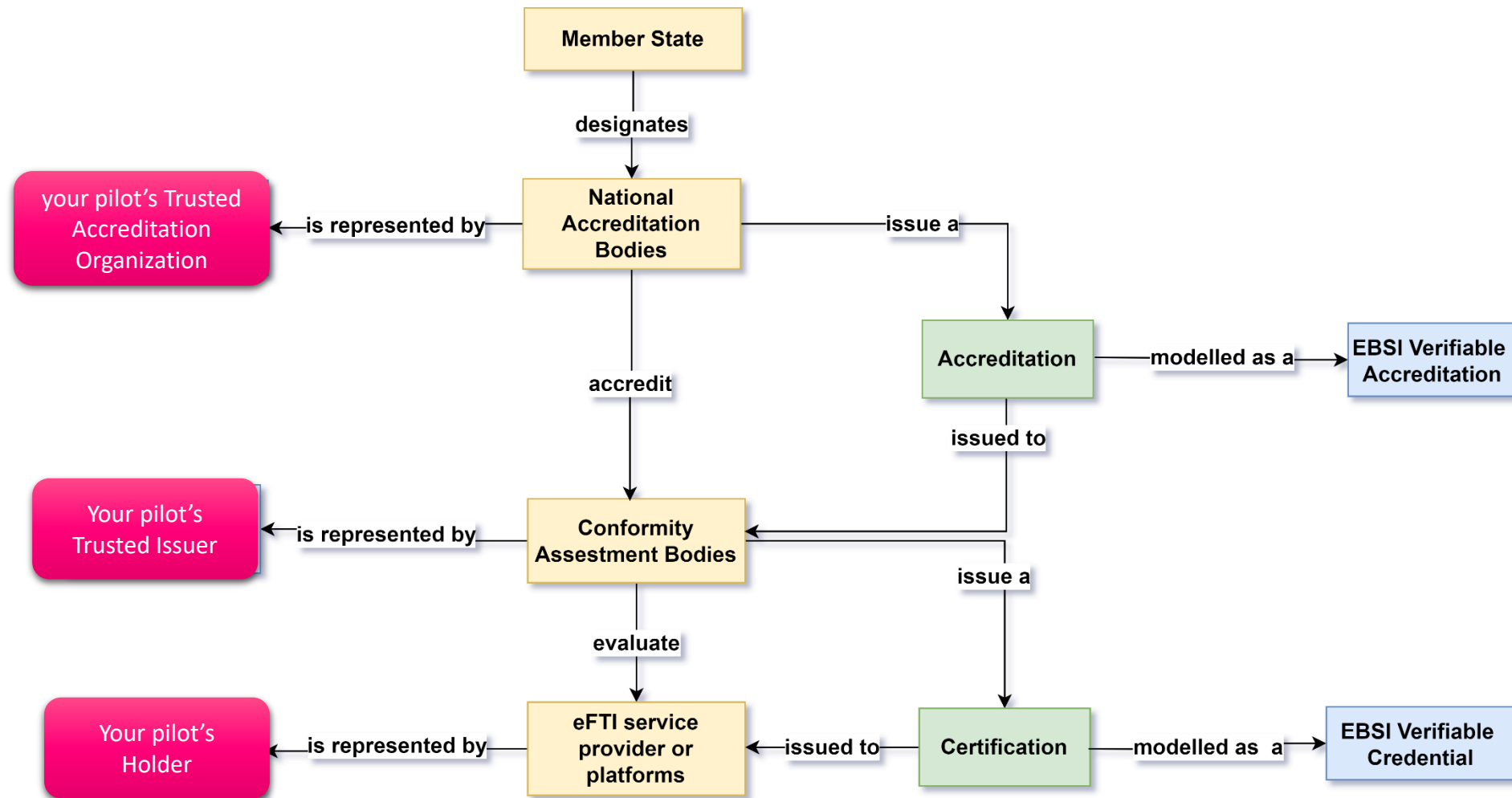
In only three steps establish an interoperable trust model: example from the eFTI regulation

Step 0: Matching EBSI roles and artifacts with accreditation trust relationships



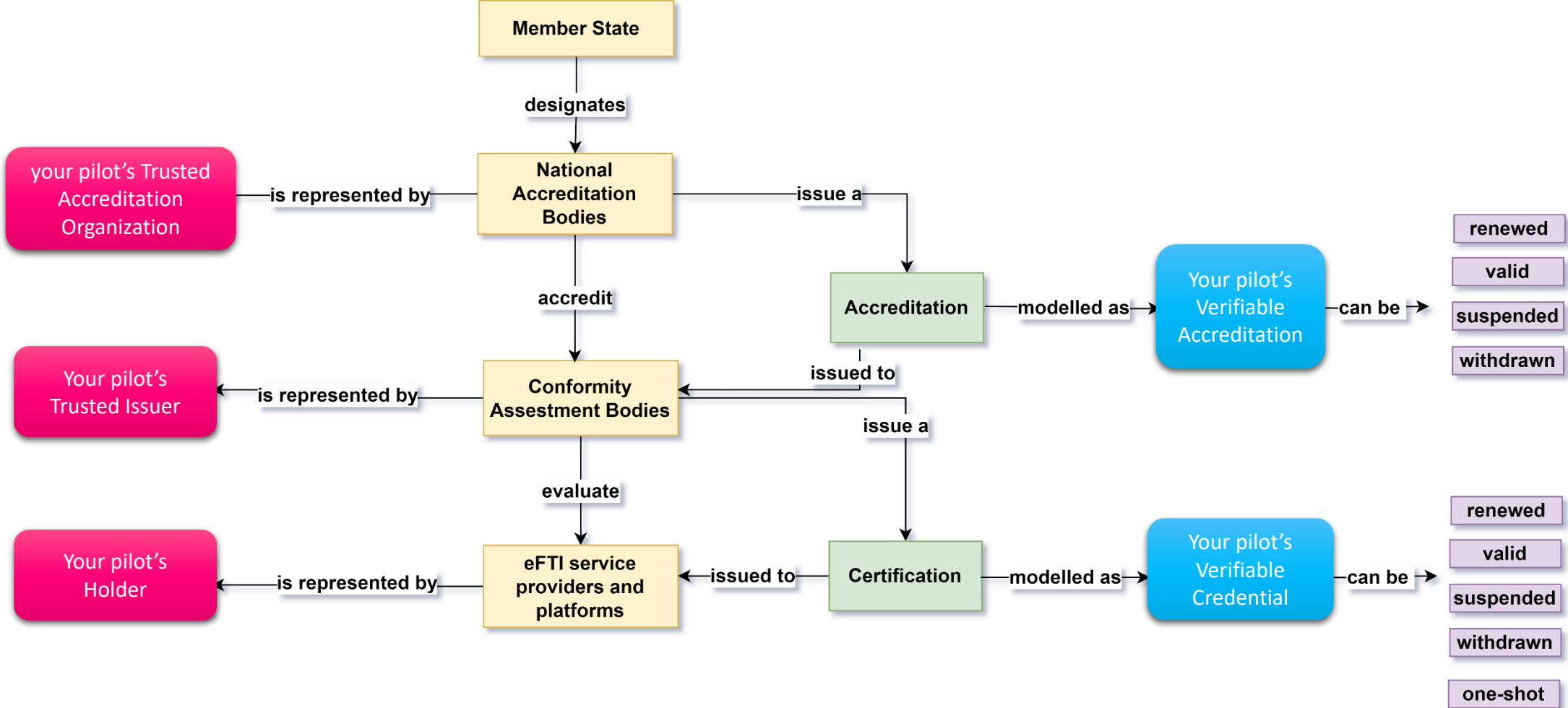
Step 1: Identify roles of your trust relationship model

Identify the actors and their roles within your ecosystem



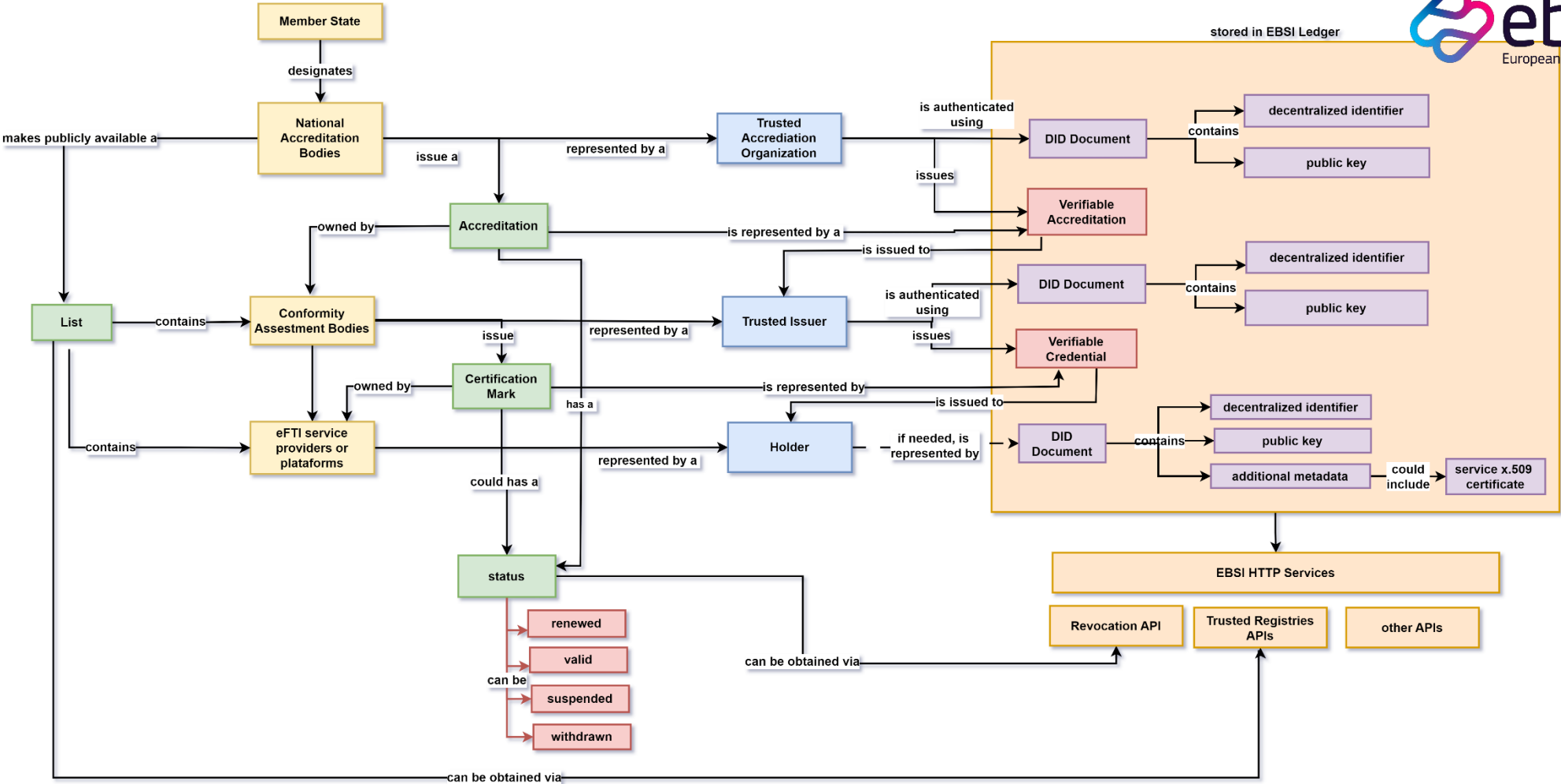
Step 2: Express the information using Verifiable Credentials

Express the identity and trust relationships in an open and transparent way



Step 3: Integrate your ecosystem with and EBSI services & artifacts

Start implementing your interoperable trust model



05

Next steps to test EBSI in a pilot

Next steps to participate in a pilot with EBSI

An opportunity to test EBSI technologies in a sandbox environment

01.

Preparatory steps

- Express your interest and join the EBSI Early adopters programme

<https://ec.europa.eu/digital-building-blocks/sites/display/EBSI/Early+Adopters>

- Define your user journeys:
"I, as a CAB, I want to request an accreditation"
- Deep dive in the EBSI onboarding toolkit

<https://hub.ebsi.eu/get-started/start>

02.

Kick-off online workshop

- Mapping the user journeys to EBSI roles and services
- Showcase a real-time demo

03.

Execution of pilots

- Select a software providers between EBSI conformance technology providers
- Large scale pilot and final showcase

<https://ec.europa.eu/digital-building-blocks/sites/display/EBSI/Conformant+wallets>



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