

**EBSI, Diploma Use Case and  
EMREX: Enabling a new  
paradigm for education in  
Europe while aligning  
efforts**

**EMREX meeting  
20211123**

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# Agenda

- European Blockchain Partnership & European Blockchain Service Infrastructure
- Diploma UC
  - Purpose and objectives
  - Interoperability the Rosetta stone
  - MS agreement on Europass Learning Model
  - MS agreement on ESSIF
- ESSIF a new paradigm for citizens
- Diploma UC based on ESSIF
  - MS agreements
  - Early Adopters programme: Multi university cross-border pilot

**EBP & EBSI**

## EBP and EBSI

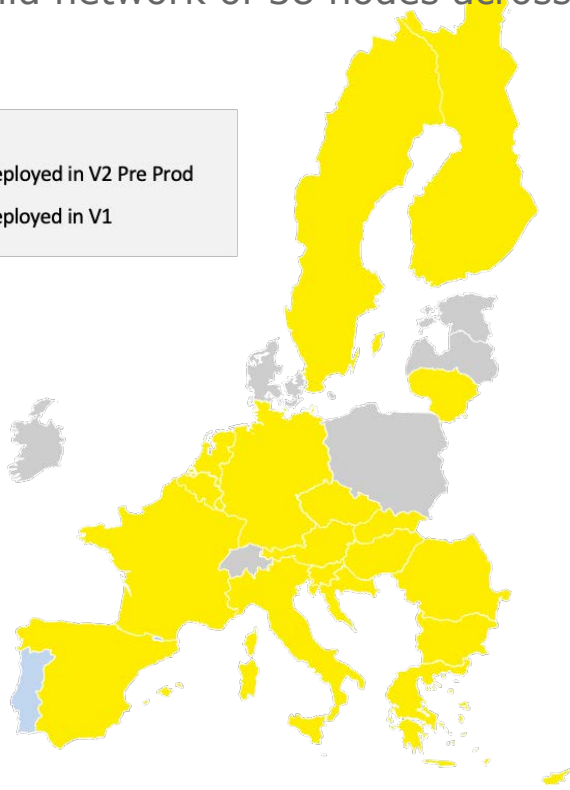
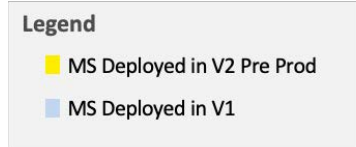
The European Blockchain Partnership (EBP) is a group of 29 countries and the EC. We help public administrations accelerate the creation of trustworthy cross-border digital services.

European Blockchain Service Infrastructure (EBSI) is the first EU-wide ledger infrastructure.



# EBSI is a reality

A solid network of 38 nodes across Europe



From 30 to 38 nodes in 21 countries

of which 30 on V2

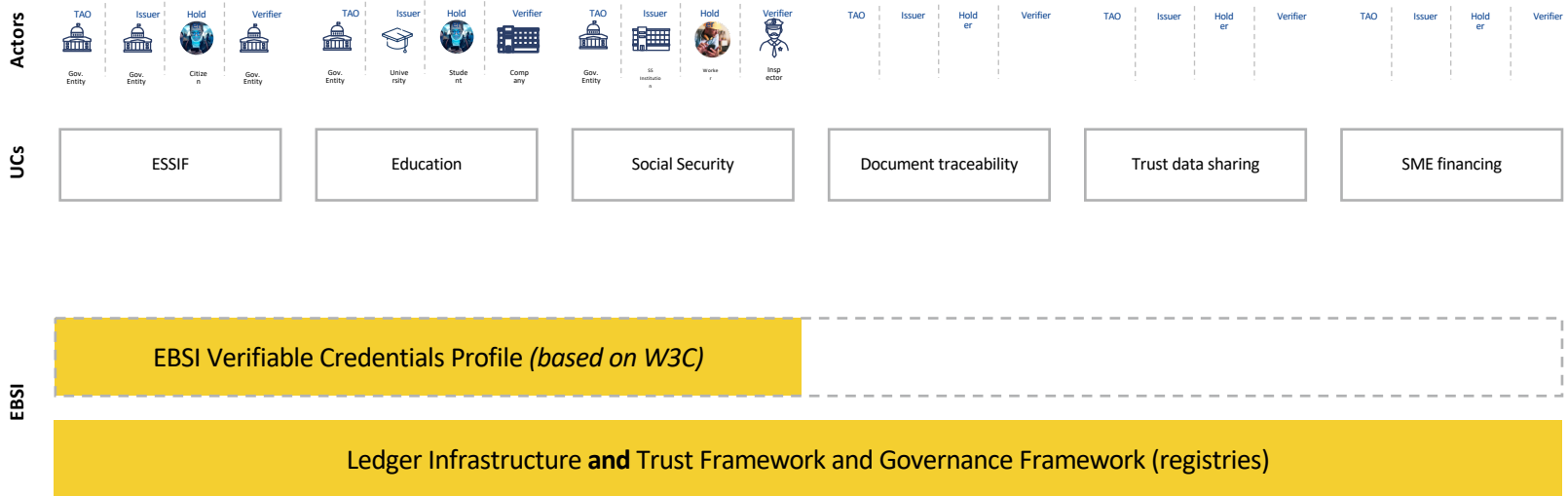
Nodes per country:

- Austria (1)
- Belgium (1)(1)
- Bulgaria (2)
- Croatia (1)
- Cyprus (1)
- Czechia (2)
- Finland (1)(1)
- France (2)
- Germany (2)(2)
- Greece (1)(1)
- Hungary (1)
- Italy (2)(1)
- Lithuania (1)
- Luxembourg (1)
- Netherlands (2)
- Norway (1)
- Portugal (1)
- Romania (1)(1)
- Slovakia (1)
- Slovenia (1)
- Spain (3)
- Sweden (1)
- EC Nodes

(Blue Italics are nodes on V1)

# What is EBSI today?

EBSI is user centric service/infrastructure, decentralized and reusable in multiple contexts and use cases. It is based on open standards to stimulate interoperability and the creation of cross-border public services



EBSI supports the creation of cross-border services e.g. for citizens to manage their own identity and data (e.g. educational credentials)



Traceability  
of digital information



European Self-Sovereign  
Identity



Educational  
Credentials  
(Diplomas)



Trusted data  
sharing

(Concerning TAXUD's Community  
at this stage)

3 new use cases are in initiation phase / design phase  
SME financing, European Social Security Pass, Asylum demand management

# **Diploma UC: purpose and objective**

# Purpose and desired outcomes of the use case


## Purpose

- To provide reusable specifications and services to **manage educational credentials across borders.**
- **Give control back to citizens**

## Desired Outcome

- **A common underlying building block** to: issue, manage and verify diplomas using the highest levels of security and privacy by leveraging EBSI blockchain technologies

**Scope of the Diploma Use  
Case is all levels of  
Lifelong Learning**



Diploma UC is making bridges and collaborating with major global and European entities, standardization bodies, ed. Consortia, etc.

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- W3C (VC,VC-EDU)
- DIF
- ISO
- ETSI
  
- MIT, Digital Credentials Consortium
- IEEE ILR
- **EMREX**
- Education 3.0
  
- DG-CNECT
- DIGIT
- DG-EMPL
- DG-EAC
- GEANT
- EQAR
  
- INATBA
- ESSIF-LABS
  
- GAIA-X
- ..
  
- Many others asking for collaboartion

# **Interoperability the Rosetta stone**

# EBSI Diploma Use Case

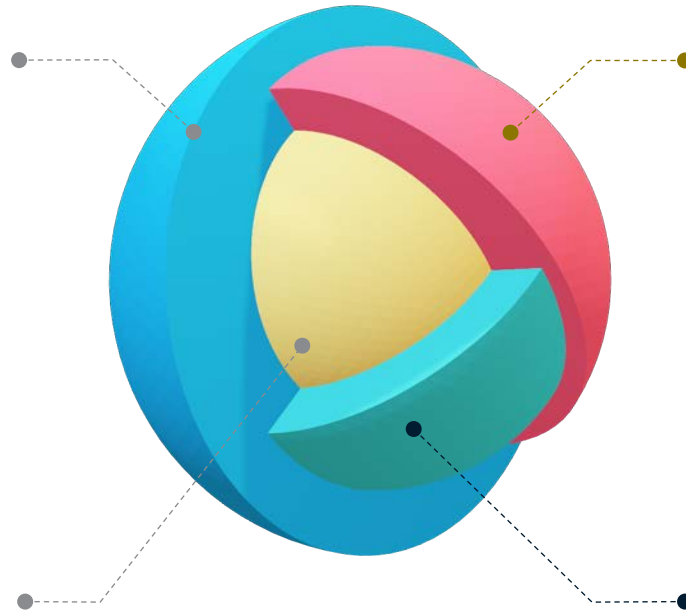
Interoperability (a key element): Dimensions

**Organizational**

**Legal**

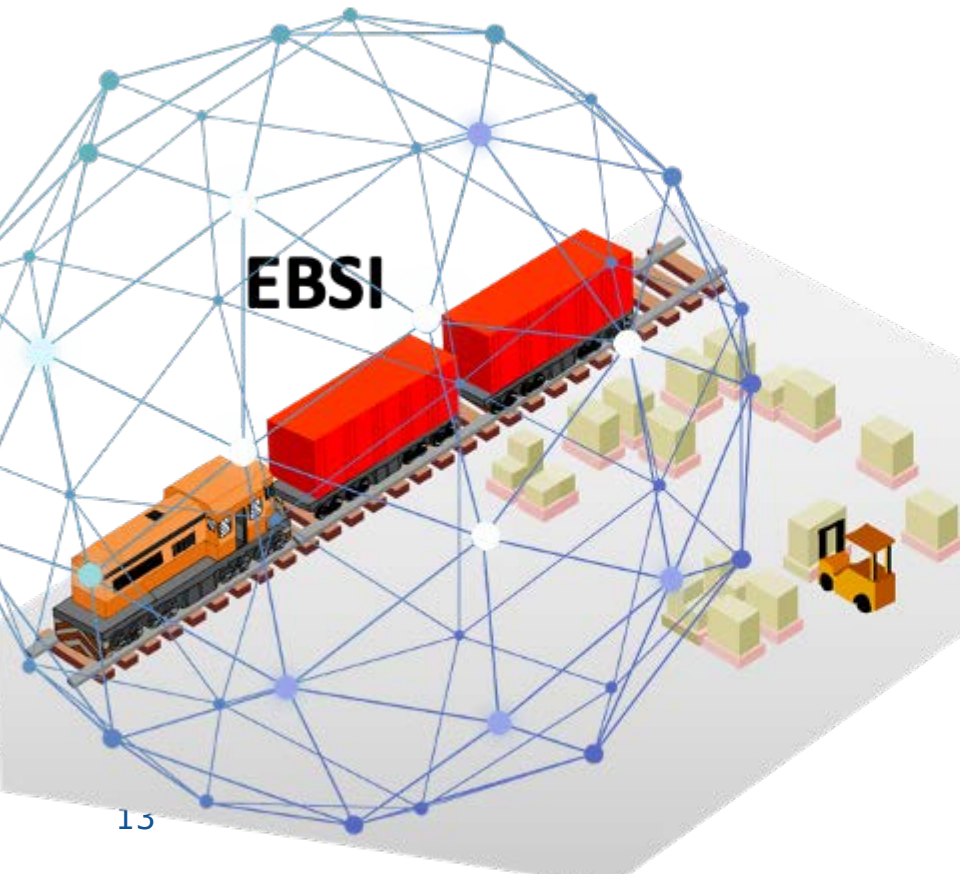
**Semantics**

**Technical**

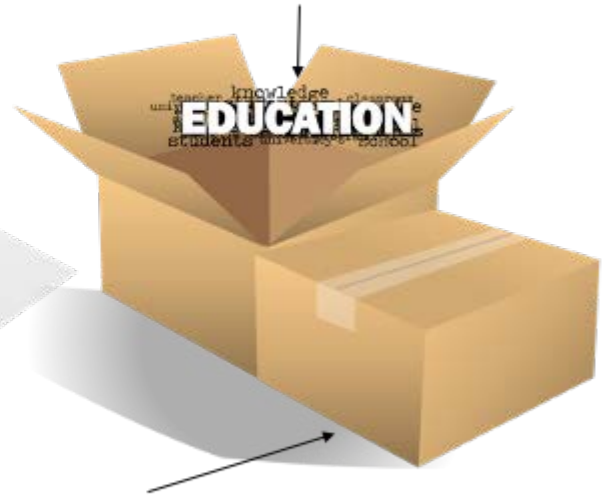


# EBSI Diploma Use Case

Key benefit of EBSI Diploma: Interoperability (Technical)

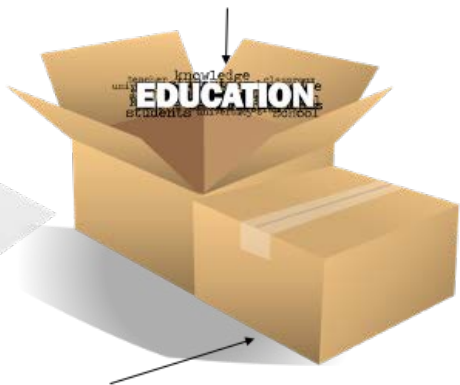


**Common Data Model**  
*The common way to describe educational credentials (contents)*

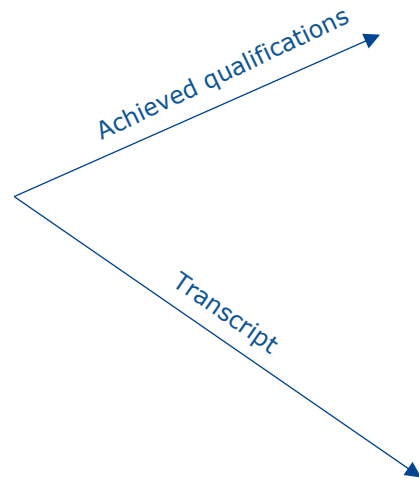


**Verifiable Credentials**  
*The common way to package information (content)*

**Common Data Model**  
*The common way to describe educational credentials (contents)*



*The common way to package information (content)*



# Interoperability: legal dimension



## Identity

The eIDAS trust framework: the common language for cross-border

Current eIDAS only defines “levels of assurance” for Verifiable IDs: Only IDs with substantial or high LoA must be accepted by Member States

but ... IDs with low LoA may also be accepted on a voluntary basis, according to the corresponding national legislation applicable to e-Government processes

## Data

Data typically embody juridical acts, such as certifying acts by public authorities and other authoritative sources (including private sector bodies with respect to data they’re authoritative for).

Therefore, in the logic of eIDAS, they constitute **legally binding electronic documents, that should be authenticated according to the national legislation** (so national legislation/rules applies for cross-border mobility data)

# Interoperability: governance dimension



MECHANISM  
SYSTEM  
MANAGE  
LAW  
PARTICIPANTS  
MS Governance  
**GOVERNANCE**  
EU Governnace  
DECISION  
INTEGRITY  
CONTROL  
Market  
DIRECTION

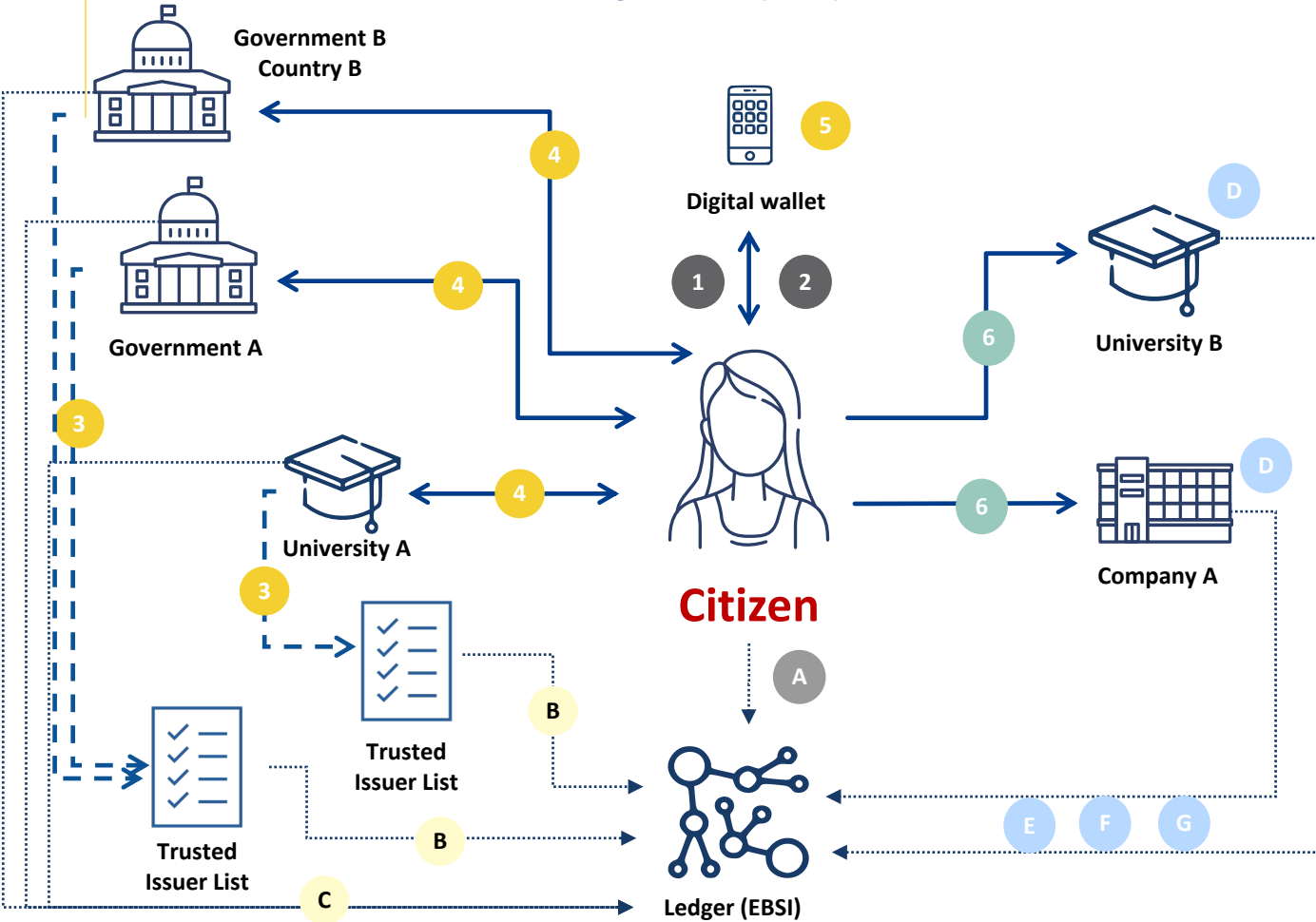
**ESSIF a new paradigm for citizens**



**'Self-Sovereign Identity** [decentralized identity] is the next step beyond user-centric identity and that means it begins at the same place: the user must be central to the administration of identity.'

— **Christopher Allen**

# A new model for identity data (s.I.)



## Wallet

- 1 Configure Digital wallet
- 2 Create Decentralized Identifier - DID
- A Anchor DID (high LoA cases)

W3C standards

## Issue credentials

- 3 Define trusted issuer - DID
- B Create trusted issuer list on ledger
- 4 Request and Issue verifiable credentials (or Verifiable Identity)

Domain Governance

W3C standards  
Semantic Standards

- C Anchor hash credential
- 5 Store credential in wallet

## Sharing credentials

- 6 Share/present credentials (combination, selective disclosure, ZKP, etc)

W3C standards

## Verifying credentials

- D Verify credentials
- E Verify revocation
- F Verify issuer
- G Verify DID (high LoA cases)

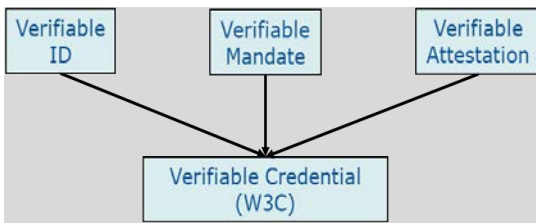
# Zoom into Verifiable Credentials

**ESSIF will be based on Open standards but implement them in a European way**

W3C Decentralized Identifiers (DIDs) v1.0  
 W3C Peer DID Method Specification (Jan. 03 2020)  
 W3C Verifiable Credentials Data Model 1.0  
 W3C Verifiable Claims Use Cases  
 DKMS (Decentralized Key Management System) Design and Architecture V4  
 W3C Linked Data Proofs 1.0

.. aligned with eIDAS and GDPR

From Technical Specs to  
 Legal/Business Concepts



```

ESSIF Verifiable ID
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://essif.europa.eu/schemas/vc/2019/v1",
    "https://essif.europa.eu/schemas/eidas/2019/v1",
    "id": "did:ebssi-eth:00000001/credentials/1872",
    "type": ["VerifiableCredential", "EssifVerifiableID"],
    "issuer": "did:ebssi-eth:00000001",
    "issuanceDate": "2019-06-22T14:11:44Z",
    "credentialSubject": {
      "id": "did:ebssi-eth:00000002",
      "currentFamilyName": "Frans",
      "currentGivenName": "Hinterberger",
      "dateOfBirth": "1999-03-22T00:00:00Z",
      "placeOfBirth": "Salzburg, Austria"
    },
    "proof": {
      "type": "EidasSeal2019",
      "created": "2019-06-22T14:11:44Z",
      "proofPurpose": "assertionMethod",
      "verificationMethod": {
        "type": "EidasCertificate2019",
        "certSerial": "1088321447"
      },
      "proofValue": "BD214fdInBvBA+y6D...frCBY="
    }
  ]
}
    
```

Eg eIDAS Minimal dataset

```

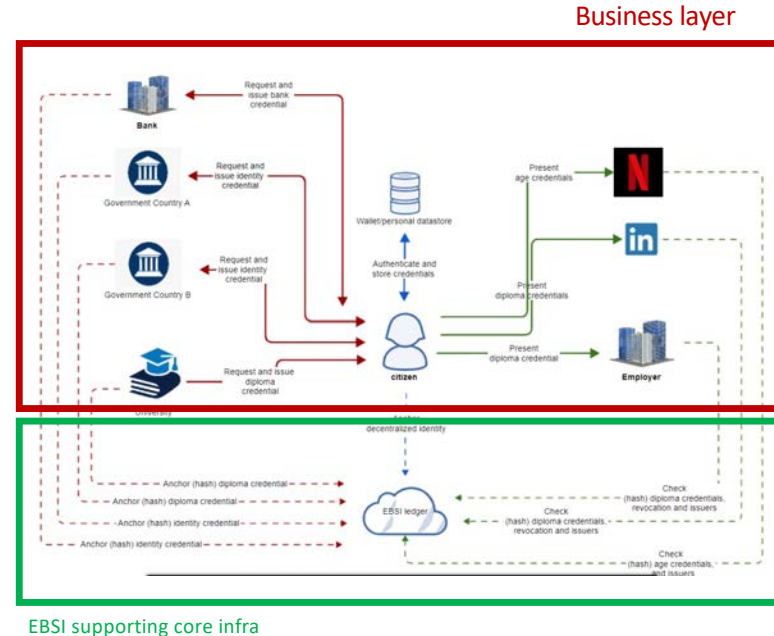
ESSIF Verifiable Attestation
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1",
    "https://essif.europa.eu/schemas/diploma/v1",
    "id": "did:ebssi-eth:00000001/credentials/1872",
    "type": ["VerifiableCredential", "DiplomaCredential"],
    "issuer": "did:ebssi-eth:00000001",
    "issuanceDate": "2019-06-22T14:11:44Z",
    "credentialSubject": {
      "id": "did:ebssi-eth:00000002",
      "alumniOf": {
        "name": "Barcelona University"
      }
    },
    "graduatedAtTime": "2017-06-30T12:00:00Z",
    "degree": "MBA"
  },
  "proof": {
    "type": "EidasSeal2019",
    "created": "2019-06-22T14:11:44Z",
    "proofPurpose": "assertionMethod",
    "verificationMethod": {
      "type": "EidasCertificate2019",
      "certSerial": "1088321447"
    },
    "proofValue": "BD214fdInBvBA+y6D...frCBY="
  }
}
    
```

Possibly  
 Qualified  
 eSeal

# ESSIFv2 Conceptual/Logical Overview

## Key take-aways:

- Exchanges go direct between actors
- The EBSI-ledger is used to enable the following Primary Trust Anchors:
  - \* Trusted Registries
  - \* DID- & VC-status-Registry
- The registries provide trust anchors for ESSIF. Parties receiving VCs (because they are presented to them) can validate not only the eSeal on the VC, but also validate it was issued by a Trusted Issuer, whether that TI is authorized, whether the DID-of the subject was not revoked, ...
- Actors can off course “anchor” more then only ESSIF-info. They can eg “notarize” something.



**Diploma UC based on ESSIF and  
alignment with the principles of citizen  
empowerment and EU sovereignty**

# MS agreement on ESSIF

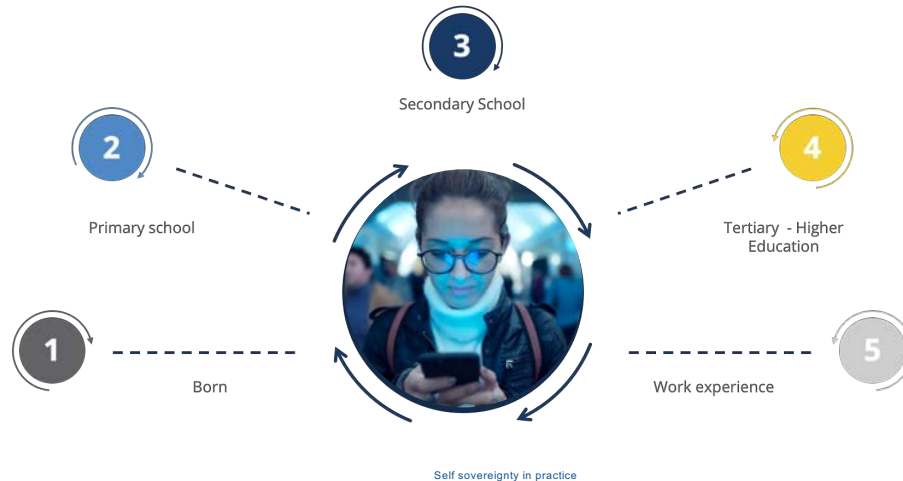
- On September'19 MS agreed to re-use the ESSIF framework as the underlying capabilities to enable a new paradigm for education
- Previous commercial scenarios were reviewed to obtain the full potential of the new paradigm, and new opportunities, new scenarios, enabled by it, were identified
- From that moment on, ESSIF went from being a vertical use case to being a transversal enabling capacity where, in addition to the identity use case itself, it could be instantiated in other business domains (e.g., European Social Security Pass led by Italy and DG-EMPL)
- From an educational institution perspective:
  - ESSIF fully empowers citizens/students gaining real control over their identity(es) and data
  - Verifiable credentials are the "containers" for the educational credentials (just like the containers did for the shipping sector in early 60s)
  - Most of us will be moving to a more just-in-time skilled education where stacking credentials will be the normal, enabling new educational paradigms for real (Lifelong Learning & Personal Learning Pathways)

# MS agreement on European Learning Model

- On June'19 MS agreed to
  - reuse the European Learning Model for achieved learning outcomes (formal qualifications)
  - Cooperation agreement in place between DG-CNECT (EBSI) and DG-EMPL to evolve European Learning Model serialization in both, XML and JSON

# Diploma UC based on the new paradigm

Focusing on citizen, breaking educational SILOs, enabling LLL, PLP & stacking credentials



Aligned to:

- EU Digital Strategy
- EU Data Strategy
- EU digital credentials action plan
- EU Digital action plan
- Europass decision
- Europass Digital Credentials
- European education area
- European research area
- European universities initiative
- European skills agenda
- eIDAS trust framework
- GDPR
- Once only principle (enabling the citizens perspective)
- State of the Union address (091620) and European Council Conclusions (100220) for both, identity and data

- Student mobility for both, identity and records, will be a reality (through Student's Mobile wallet)
- Lifelong Learning will be a reality: credentials are owned, managed and controlled by the citizen
- Personal Learning Pathways: even easier thanks to the stacking credentials feature (as for micro-credentials)

# Some FAQs related to identity, data and ledgers

## Identity

- European Self-Sovereign Identity Framework (ESSIF) is the underlying identity framework for Diplomas UC
- Entities (natural and legal persons) will have 1 or more identifiers (DIDs), and will be able to link identities and data to those DIDs
- Identity can be understood as a set of attributes that identifies a natural or legal entity

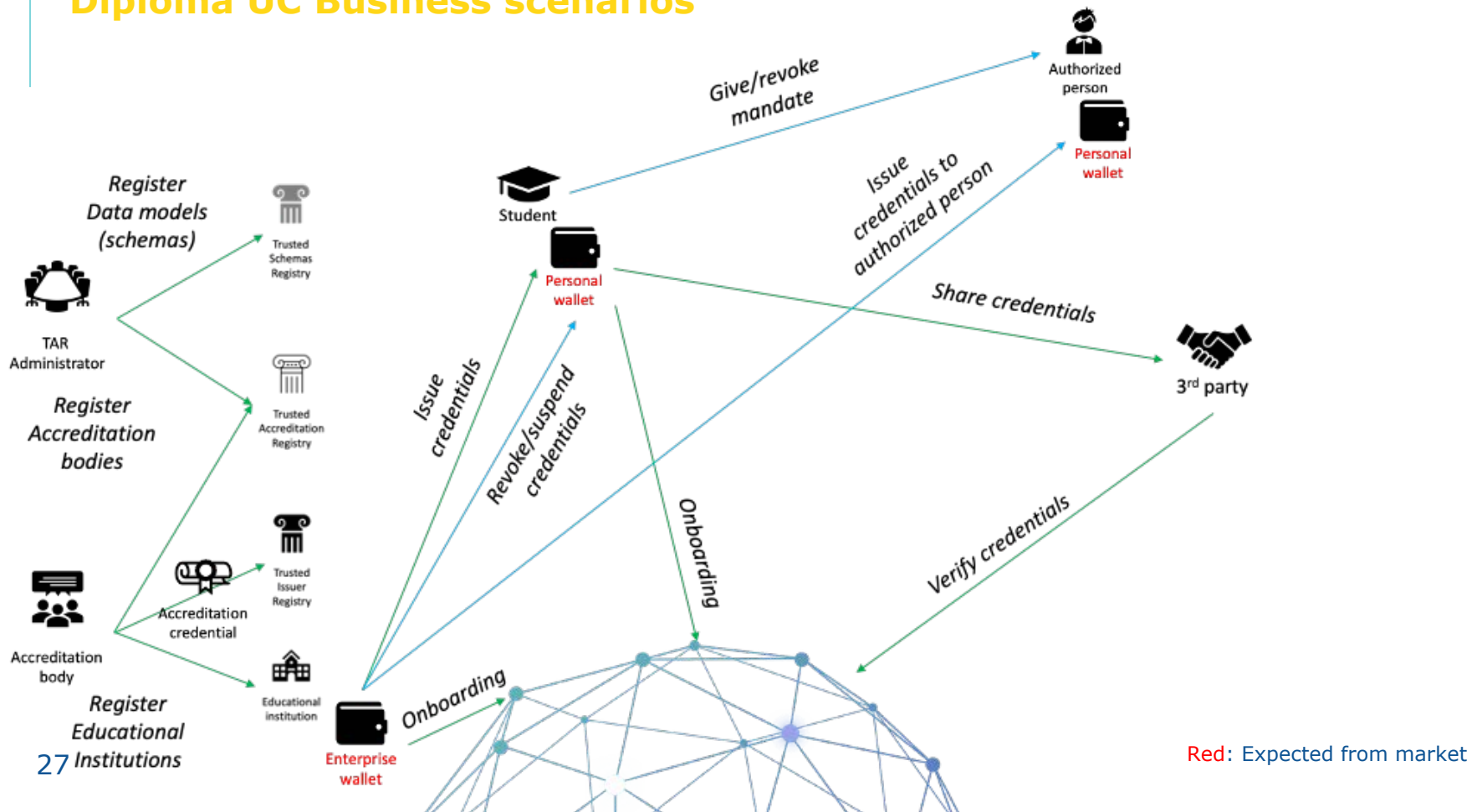
## Data

- Digital credentials will be issued directly to entities (natural person, legal entity, thing). Entities will store and manage digital credentials in their personal or entity wallets

## Ledgers

- Public permissioned ledger
- It will allow to prove the origin of the issuers (provenance) and real time credentials' status
- The relevant fact that something happened will be stored on-chain, so anyone will be able to verify that something has, or no, happened. E.g: The fact that a digital credential has been issued to students, will be stored on-chain (but not the digital credential itself)
- Ledger can ensure that trust service providers of qualified attestations of attributes cannot receive any information about the use of these attributes

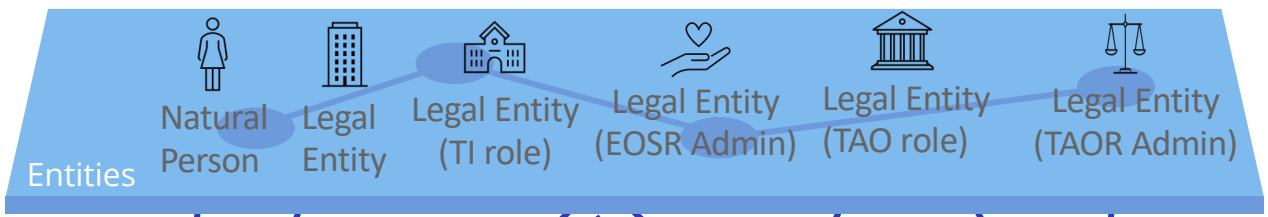
# Diploma UC Business scenarios



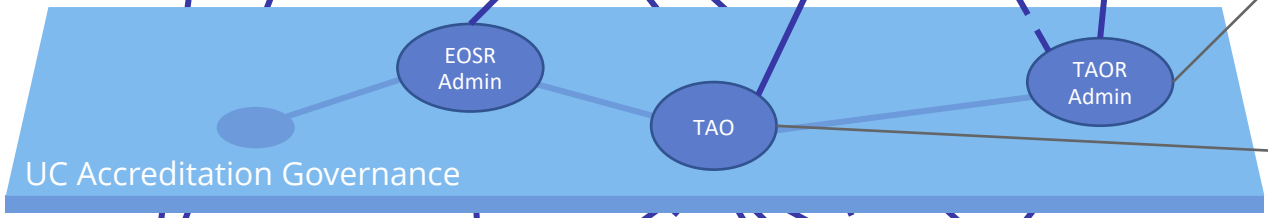
# **MS agreement: Governance framework**

# Generic

Entities: Natural Persons and Legal Entity



Domain Accreditation Governance. Each domain may have a different legal meaning for accreditation processes, bodies, etc.

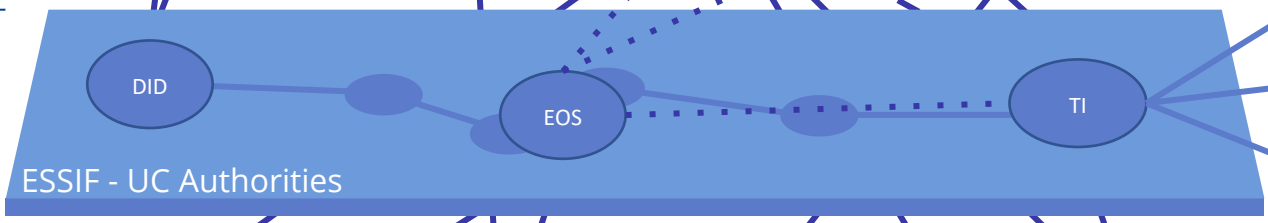


TAOR Admin: offline check to verify Legal Entity entitlement to become TAO

TAO: offline check to verify Legal Entity entitlement to become TI

UC Domain

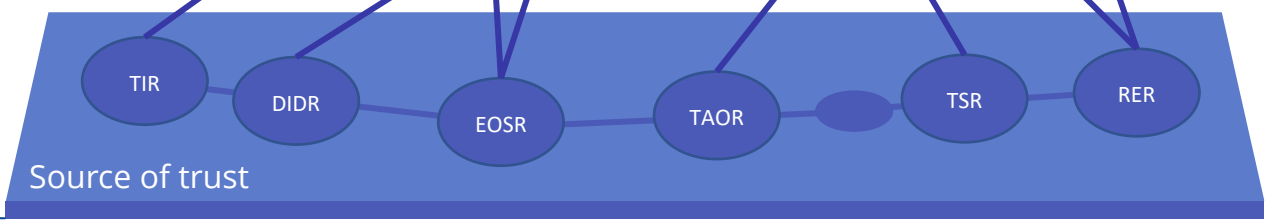
V Credential Authoritative source (Domain UC' legal entities can play different roles)



- High LoA
- Substantial LoA
- Low LoA

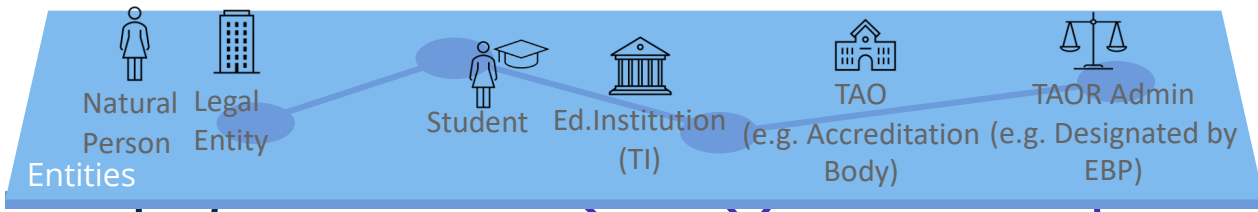
ESSIF Domain

Ledger

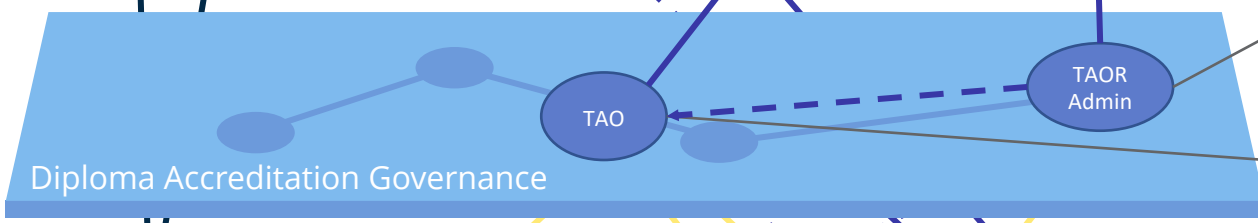


# Diploma UC

Entities: Natural Persons and Legal Entity



Domain Accreditation Governance. Each domain may have a different legal meaning for accreditation processes, bodies, etc.

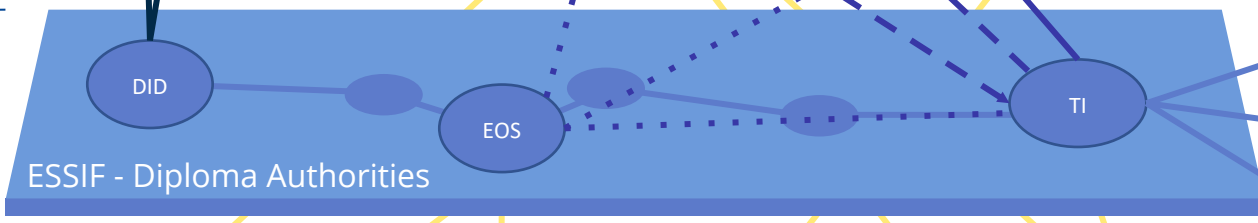


TAOR offline check to verify Legal Entity entitlement to become TAO

MS' TAO will do an offline check to verify Educational Institution entitlement to become TI

Diploma

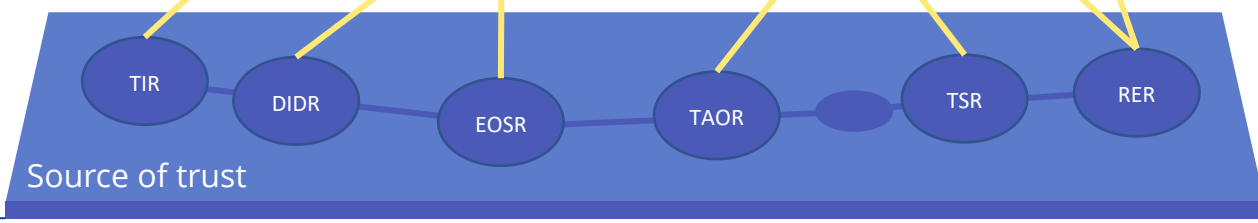
V Credential Authoritative source (Domain UC' legal entities can play different roles)



- High LoA (eID)
- Substantial LoA (MyAcademicID)
- Low LoA (other means)

ESSIF

Ledger



- ..... "Can act as"
- "Is"
- - - -> "Accredits"
- "Owns"
- "Responsible"

# **MS adoption request: Early Adopters (EA) programme**

A dedicated programme to guide early adopter Member States and their partners in imagining, building and launching their pilot(s) with EBSI.



# MS agreement on European Student eID and ELMO

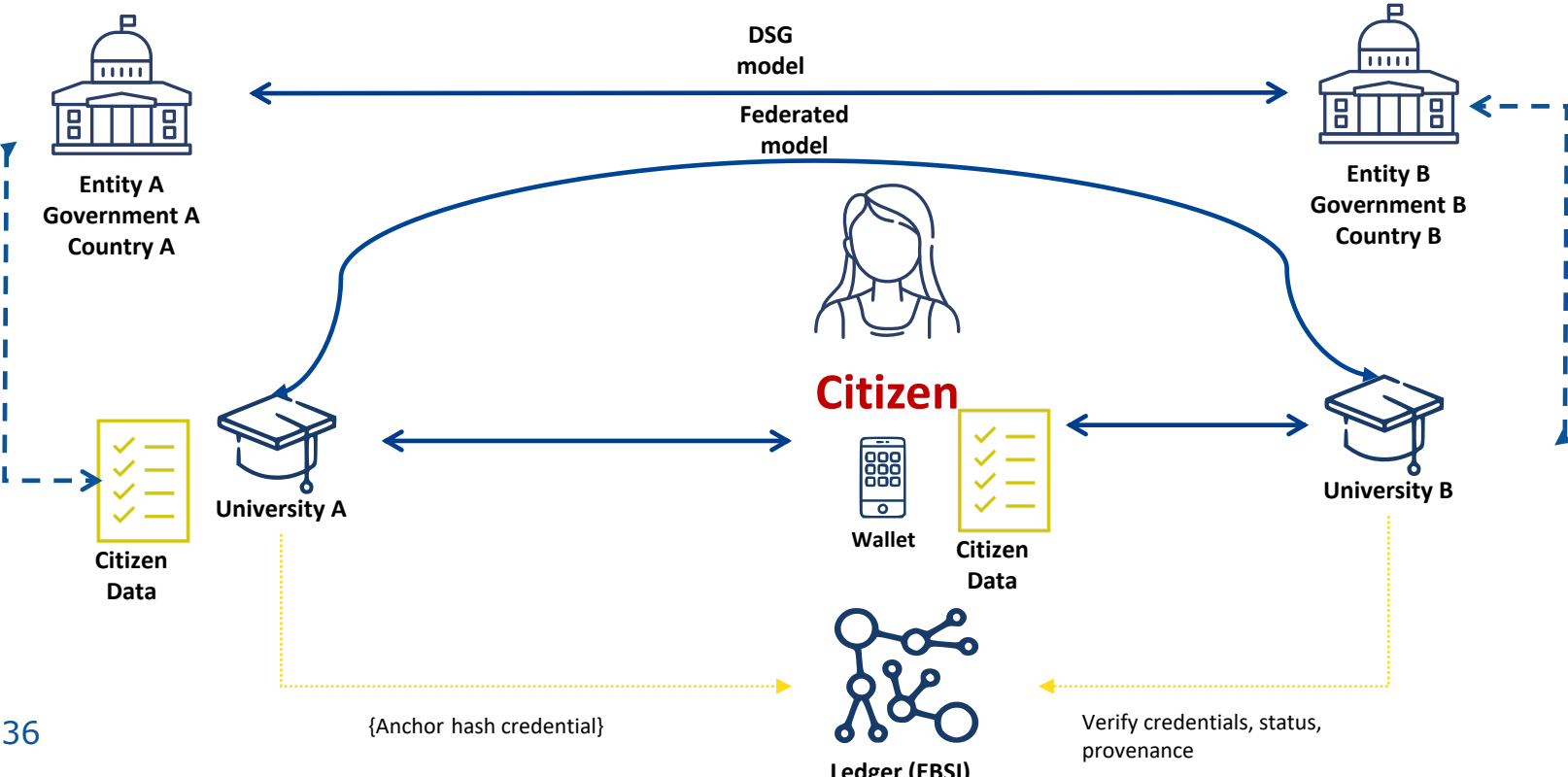
- Early Adopters (MS) requested real live scenarios for HEIs. MS were interested on student's international mobility:
  - identity (adding substantial level of assurance to previous scenarios)
  - data (adding the transcript to previous scenarios)
- On October'21 in the context of the MUP, MS agreed to
  - reuse the ELMO data model for the transcript in alignment with international mobility projects (EWP, OLA, EDSSI, Knowledge HUB, etc.)
  - reuse the European Student eID data model in alignment with international mobility projects (MyAcademicID, eduGAIN)



2 European universities alliances, +18 universities from +15 countries, +EQAR



# A parallel way for data exchange (empowering students)



**How are we going to work together?**



CEF Digital  
Connecting Europe

