

Digital Credentials Validation in Blockchain

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<https://tinyurl.com/cholotescu>

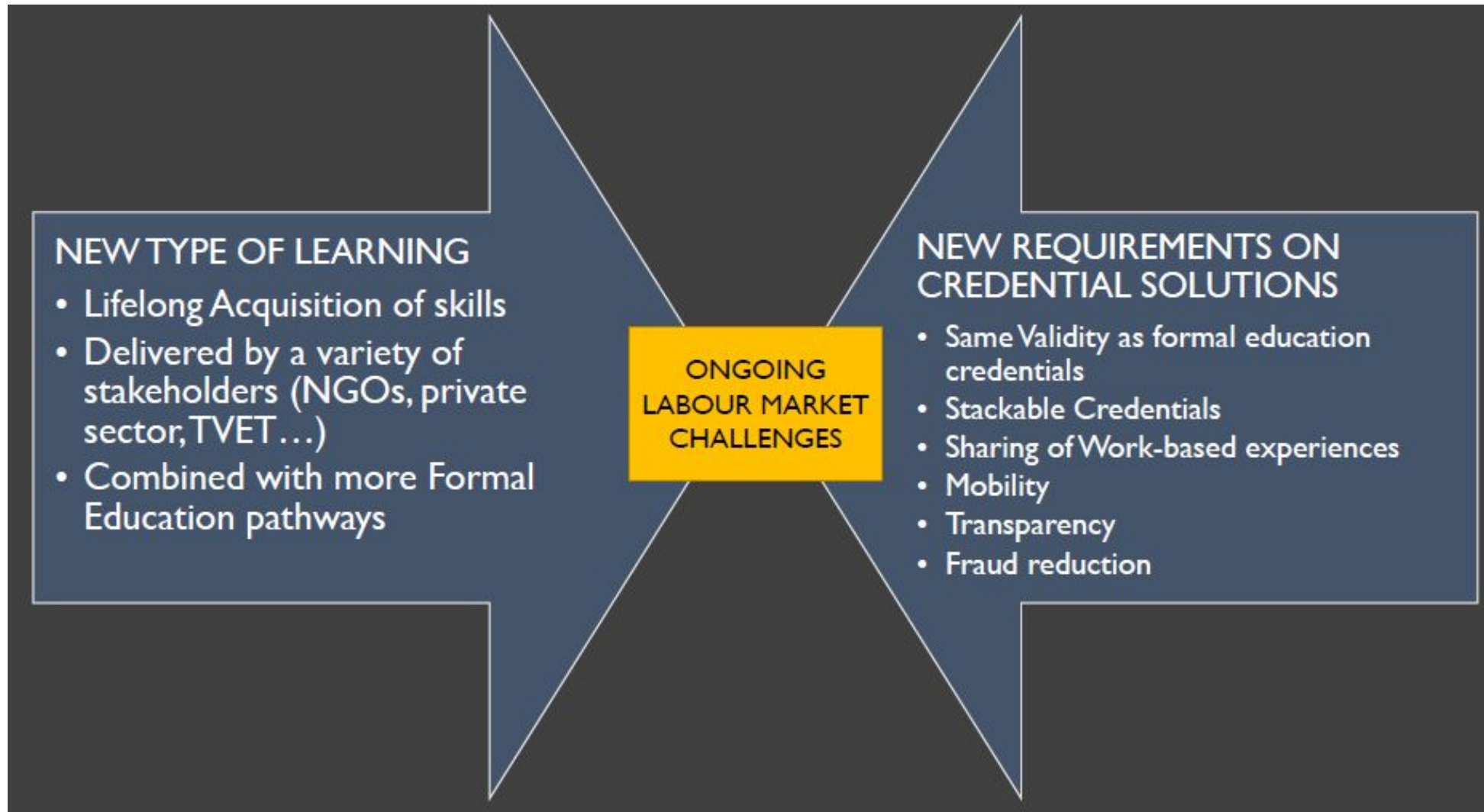


Content



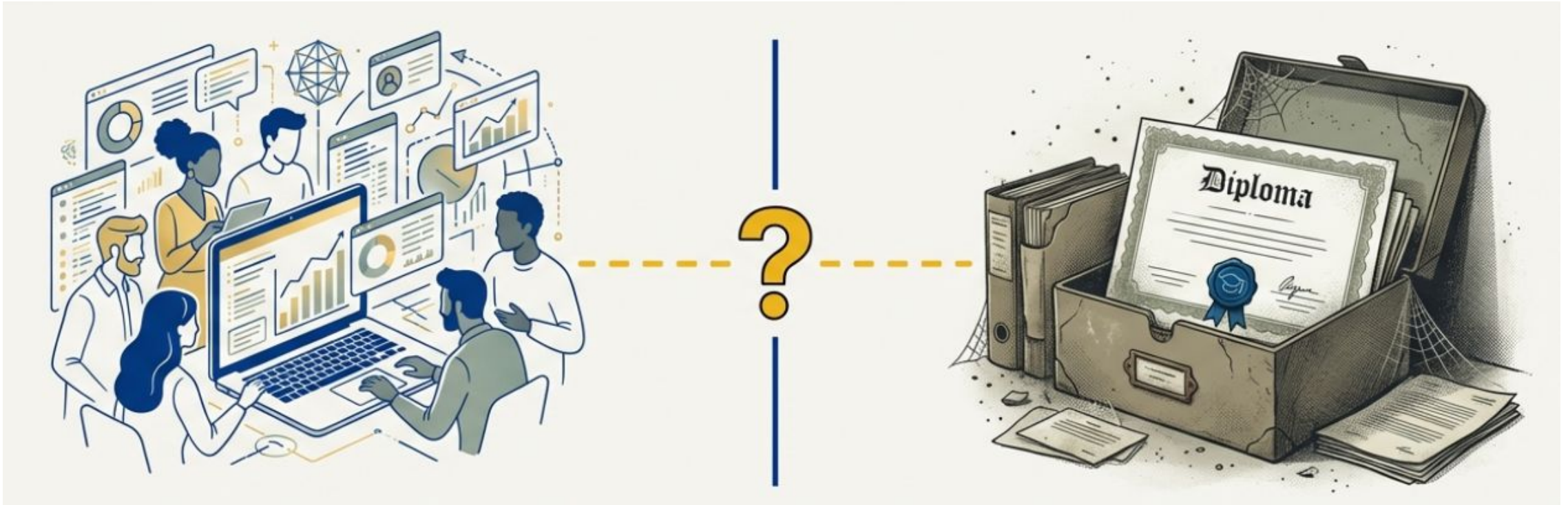
1. Challenges for Education in EU
2. Understanding Blockchain – the technology of trust
3. Verifiable Credentials and EBSI: European Blockchain Services Infrastructure
4. Exploring Blockchain projects implemented by UPT
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 - EBSI Early Adopters Programme – wave 2 and 3
 - EBSI Projects: DC4EU, Vector and EBSI-NE

Challenges for Education in EU



From Alex Grech - Blockchain, Self-Sovereign Identity and Credentials, March, 2021 – <https://www.slideshare.net/alexgrech/blockchain-selfsovereign-identity-and-credentials>

Challenges for Education in EU



Our credentials are stuck in the 20th century - our learners and workforce aren't.

- Diplomas, transcripts, and certificates are still mostly paper-based.
- Verification is slow, costly, and prone to fraud.
- Learners don't fully own or control their academic records.

We need to rethink how credentials are **issued, stored, shared, and verified**, to support **mobility, lifelong learning**, and **trusted recognition** across borders.

European Digital Credentials for Learning



English

Home > What are digital credentials

europass

Europass tools

Learn in Europe

Work in Europe

About Europass

Stakeholders

Login to Europass

What are Digital Credentials

Europass Digital Credentials describe a learning achievement. They can describe activities, assessments, and professional entitlements as well as qualifications.

The [European Commission](#) is developing the Europass Digital Credentials Infrastructure (EDCI) to support efficiency and security in how credentials such as qualifications and other learning achievements can be recognised across Europe.

Work is ongoing on the development of the Europass Digital Credentials Infrastructure (EDCI). The EDCI will support authentication services for any digital documents or representations of information on skills and qualifications as outlined in [Article 4 \(6\) of the Europass Decision](#).

A credential is a documented statement containing claims about a person issued by an educational organisation following a learning experience.

Europass Digital Credentials describe a learning achievement. They can describe:

- activities (e.g. classes attended),
- assessments (e.g. projects),
- achievements (e.g. skills developed),
- professional entitlements (e.g. registration as a medical doctor) and
- qualifications.

European Digital Credentials for Learning respond to the need of the citizens to easily share their diplomas, transcripts of records, and other certificates of learning achievements in formal, informal, and non-formal settings, in a secure and digital way, when applying for a job or for further studies and training in any Member State

Oct 25, 2021 - <https://europa.eu/europass/en/what-are-digital-credentials>

Micro-credentials

A European approach to micro-credentials

Micro-credentials offer more flexible and modular learning opportunities. Having a European approach will help widen learning opportunities and strengthen the role of higher education and vocational education and training institutions in lifelong learning.

Certifying the learning outcomes of short-term learning experiences, the micro-credentials could offer a flexible and targeted way to help people acquire new knowledge, upskill and reskill the competences needed for their personal and professional development.

What are micro-credentials?

A micro-credential is a proof of the learning outcomes that a learner has acquired following a short, transparently-assessed learning experience. They are awarded upon the completion of short stand-alone courses (or modules) done on-site or online (or in a blended format).

Flexible learning

Micro-credentials open education up to more people because of their flexible, short-term nature. They are open to all types of learners. They can be particularly helpful for people who

- are looking to build on their current knowledge rather than get a full degree
- want to bridge a gap between degrees or their initial formal education and emerging labour market skills
- want to upskill or reskill

Dec 14, 2020 - A European approach to micro-credentials

June 2022 - Council of the European Union: Recommendation on a European approach to micro-credentials for lifelong learning and employability

https://ec.europa.eu/education/education-in-the-eu/european-education-area/a-european-approach-to-micro-credentials_en

About education in the EU

European Education Area

About the European Education Area

Education for Climate Coalition

Micro-credentials

Mutual recognition of diplomas

Quality in early childhood education and care

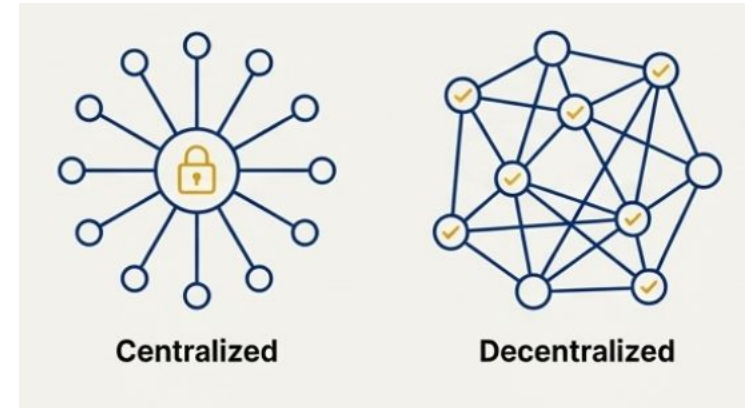
Language learning

A new foundation for Trust: the **Blockchain**

Think of blockchain as a shared digital notary:

A **decentralized ledger of transactions**, maintained by a network of **independent nodes** that each hold the same copy.

It is **transparent, tamper-resistant**, and **not controlled by any single organization**.



**You Own Your Data
(Self-Sovereignty):**
Users control their own
identity and data.



**Unforgeable Proof
(Immutability):**
Records, once written,
cannot be altered or
deleted.



**Built-in Confidence
(Trust & Transparency):**
The system's rules ensure
all parties can trust the
transaction.



**No More Middlemen
(Disintermediation):**
Enables direct interaction
without relying on a central
authority to validate.

A new format of achievement: Verifiable Credential

- Think of it as a digital passport for your skills and diplomas. It lives in a secure wallet on your phone, not in a university's filing cabinet.
- A Verifiable Credential (VC) is a tamper-evident and privacy-respecting credential, with specific Metadata and Proofs, requested by the Holder and issued by a competent authority, called Trusted Issuer, and where the authorship can be cryptographically verified (W3C, DCC, 2020)

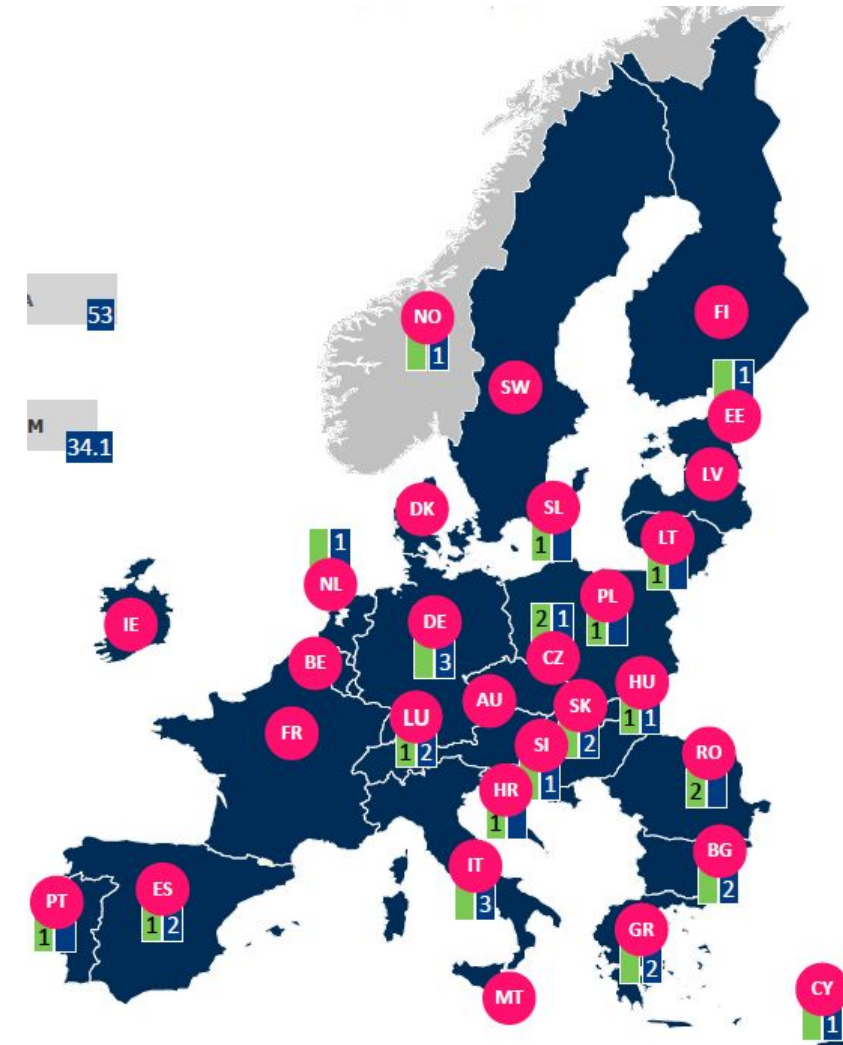


From Vision to Reality: the European Blockchain Services Infrastructure



- The European Blockchain Services Infrastructure (EBSI) was launched in 2019, as a project of EC and EBP;
- EBSI is a network currently consisting of 41 nodes out of which 27 are validators; secured through 9 distinct initiatives;
- EBSI consists of a growing ecosystem of more than 350 organizations from private and public sectors, from more than 30 countries;
- Through its Diploma use case, represents a cross-border decentralized credentialing ecosystem for issuing Verifiable Credentials.

4 EBSI nodes in Romania: ICI (Dec 2020), UEFISCDI (June 2021), STS (Dec 2021); UPT (EBSI-NE Project – June 2024)



Verifiable Credentials on EBSI

Digital wallets

Functionalities

Authenticate, Store, Share, Sign

Stores

Identities

- Represented by:
Set of asymmetric keys
DID – Decentralized Identifiers

Verifiable Credentials*

- Verifiable IDs
- Verifiable Accreditations
- Europass etc.

Example of EBSI Conformant Wallets

Walt.Id, Gataca, Altme

Development Libraries & Samples

The EU Digital Identity
Wallet Toolbox



Trusted Data Registries

Contains

DID Registries
Trusted Issuer Registries
Revocation Lists

In the form of
Smart Contracts on EBSI Ledger

GLOSSARY

Verifiable Credentials

Verifiable credentials (VCs) are **an open standard for digital credentials**. They can represent information found in physical credentials, such as ID, passport, diploma, license, as well as new things that have no physical equivalent, such as ownership of a bank account.

They have **numerous advantages over physical credentials**, most notably that they're digitally signed, which makes them tamper-resistant and instantaneously verifiable.



Exploring **Blockchain** Projects implemented by UPT

Team

- Prof.dr.ing.Radu VasIU
- Dr.ing. Diana Andone
- Prof.dr.ing.Carmen Holotescu
- Drd.Victor Holotescu
- S.I.dr.Andrei Ternauciuc

EBSI4RO Connecting Romania through Blockchain

Central scope: to create an extendable and sustainable ecosystem to facilitate and accelerate the awareness, knowledge and adoption of the Blockchain technologies and European Blockchain Services Infrastructure (EBSI) by the Romanian citizens, businesses, institutions and administration; proposals for Blockchain policies in education.

Partners:

- 1. Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI)**
 - Dr.Cosmin Cioranu
 - Elena Stefania Nicolaescu
- 2. Politehnica University of Timisoara (UPT)**
 - Prof.dr.ing.Radu Vasii
 - Dr.ing. Diana Andone
 - Prof.dr.ing.Carmen Holotescu
 - Drd.Victor Holotescu
 - S.I.dr.Andrei Ternauciu
 - Conf.dr.Gabriela Grosseck



April 2021 – March 2023

<https://ebsi4ro.ro>

<https://www.facebook.com/ebsi4ro>

<https://twitter.com/ebsi4ro>

Objectives and Outcomes of the project



01

Setup and operation of an EBSI node

Node operational from July 2021

02

Credentialing System for issuing Verifiable Credentials on EBSI for university diplomas and micro-credentials

Integrated with the National Student Enrolment Registry (Registrul Matricol Unic RMU) operated by UEFISCDI, and with UPT Unicampus platform

03

5 miniMOOCs on Unicampus and 6 workshops

04

Communication and Blockchain community strengthening in Romania, with the aim to raise awareness of Blockchain / EBSI

EBSI Early Adopters: Multi-University Pilot

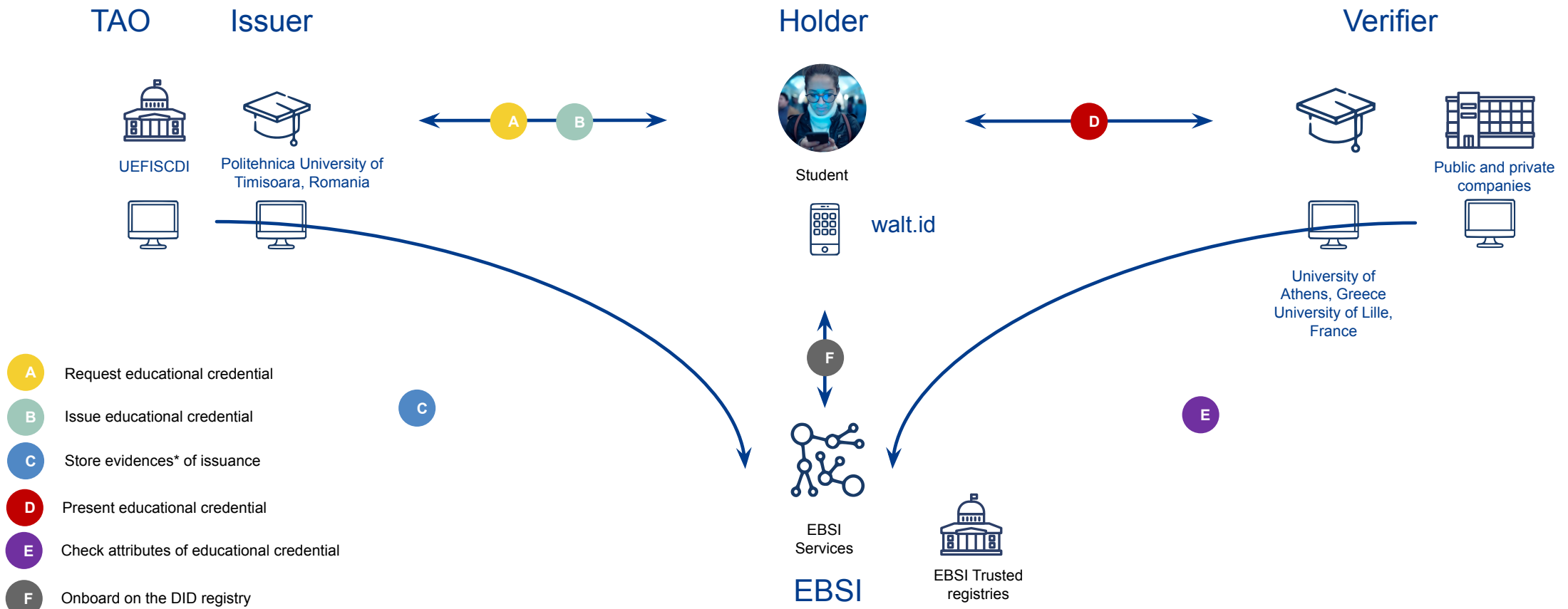
2 European universities alliances, +20 universities from +15 countries

EBSI4RO participated in the EA Programme Wave 2 – July 2021 – May 2022



Verifiable Credentials workflow

Diploma use case



TAO (Trusted Accreditation Organisation)

The ministry

Reduce friction in interactions, increase trust (transparency) and security in shared data.

Ministry of Education, UEFISCDI, Romania
Ministry of Education, Ministry of Digital Governance, GRNET Greece
Ministry of National Education, France



Build a new trust paradigm

Issuer

The university A

Position your university as a pioneer brand, reduce friction in interactions, increase trust (transparency) and security in shared data. At scale, decrease administrative costs.

Politehnica University of Timisoara, Romania
University of Athens, Greece
University of Lille, France



Lead the change

Holder

The student

Take control of their own data in a secure way and easily move with their own credentials across Europe.



Enjoy mobility across borders

Verifier

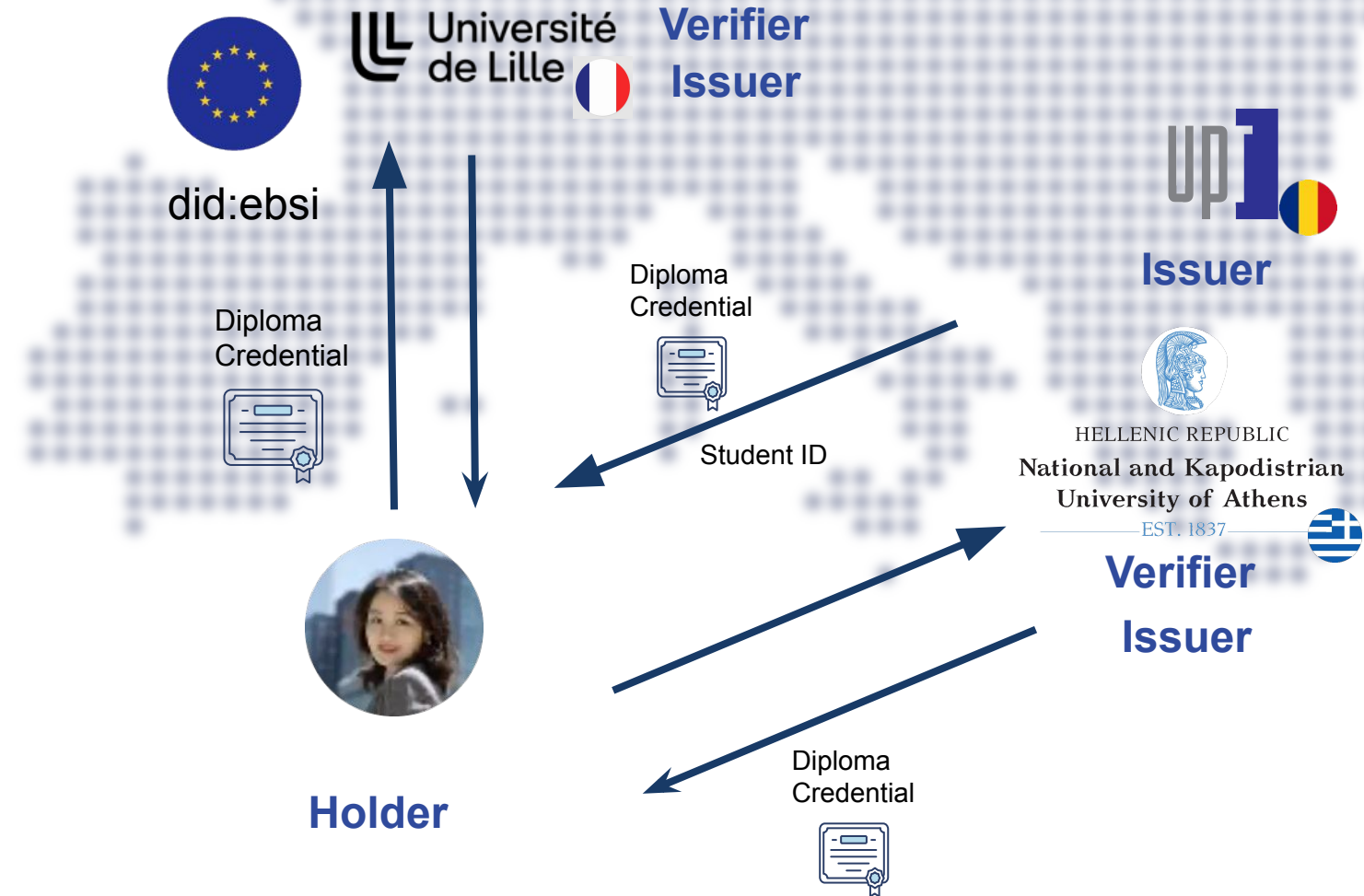
The company / university B

Reduce mistakes and protect against fraud, effortlessly interact with government agencies as well as reduce friction and reduce verification costs.



Reduce costs

The implemented cross-border scenario



Current Scenario for issuing and verifying VCs at UPT (1)

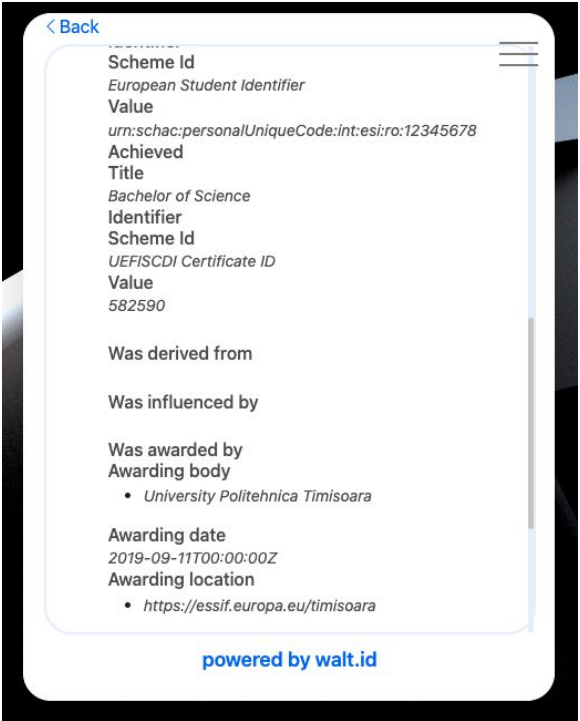
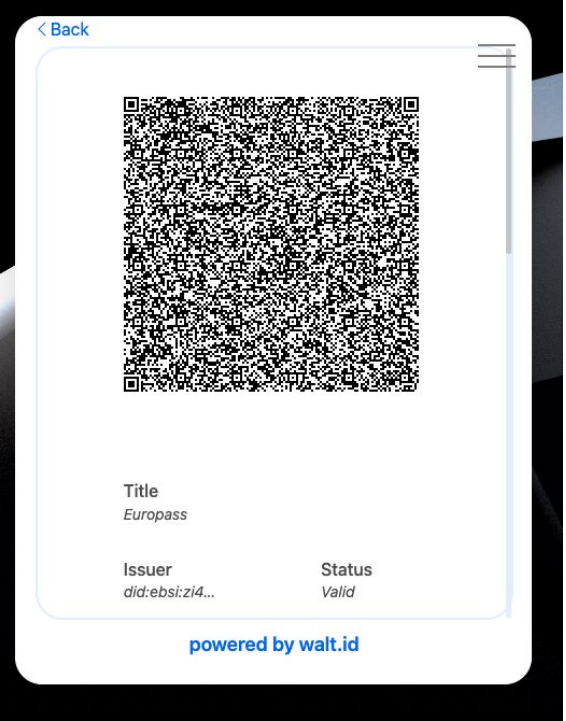
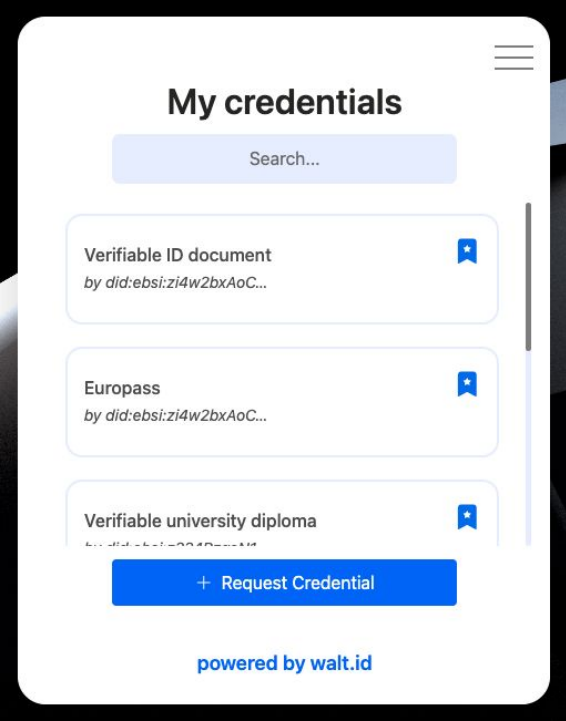
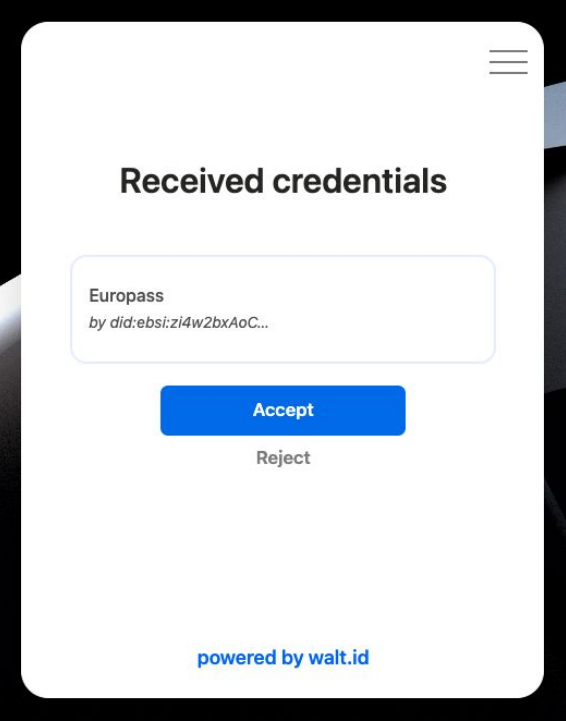
Issuing Diploma Credentials on EBSI4RO Demo Issuer

The screenshot shows the issuer.ebsi4ro.ro web portal. The page features the EBSI4RO logo at the top left and a navigation bar with a 'Log out' button. The main content area is divided into two sections. On the left, there is a sign-in section with the text 'Sign in to the UPT Issuer Portal' and two blue buttons: 'Sign in with UPT' and 'Sign in with eID'. Below these buttons, it says 'EBSI4RO, powered by walt.id'. On the right, there is a user greeting 'Hello, Anca Popescu' followed by the message 'We have found 2 credentials for you. Please select the ones you want to be issued:'. Below this message are two radio button options: 'Student ID document | View details' and 'Europass Diploma | View details'. A blue 'Confirm' button is positioned below the options. A modal window titled 'Europass Diploma' is open on the right side of the screen, displaying the following details: Title: Bachelor of Science, UEFISCDI Certificate ID: 582590, Awarded by: University Politehnica Timisoara, and European Student Identifier: urn:schac:personalUniqueCode:int:esi:ro:12345678. A blue 'Close' button is located at the bottom right of the modal window.

EBSI4RO, powered by walt.id

Current Scenario for issuing and verifying VCs at UPT (2)

Receiving credentials in an Open-Source Wallet (walt.id)



Current Scenario for issuing and verifying VCs at UPT (3)

Verifying credentials by 3rd party



Thanks, you just
presented credentials.

✓ VerifiableId

The verification was successful

Verification Policies
{ "SignaturePolicy": true, "ChallengePolicy": true,
"VpTokenClaimPolicy": true }

Authenticated session established

- [View authenticated DID](#)
- [View session token](#)

© 2022 walt.id

YOUR CREDENTIAL IS VALID

✓ Signature

Verify the signature of the credential using the [public key resolved with the issuer's identifier](#).

✓ JSON schema

Verify the [data model](#) of the credential's type.

✓ Issuer DID

Verify the [issuer's DID](#) was found in EBSI DID registry.

✓ Subject DID

Verify the [subject's DID](#) was found in EBSI DID registry.

✓ Issued date

Verify the [issued date](#) is before the current date.

✓ Valid from

Verify the [date when the credential is valid](#) is before the current date.

✓ Expiration date

Verify the [expiration date](#) is after the current date.

Content of your credential

```
{
  "@context": [
    "https://www.w3.org/2018/credentials/v1"
  ],
  "credentialSchema": {
    "id": "https://api.preprod.ebsi.eu/trusted-schemas-registry/v1/schemas/0x6b304591b86b7e5e4c8a713ddf84ee5810a56334827adda4e741f80b9aa49ed",
    "type": "FullJsonSchemaValidator2021"
  },
  "credentialSubject": {
```

**The verification was
requested successfully**

The confirmation code is:
HDJ2123F

The accuracy of the information submitted with this statement can be
verified based on the file.



Confirmation code

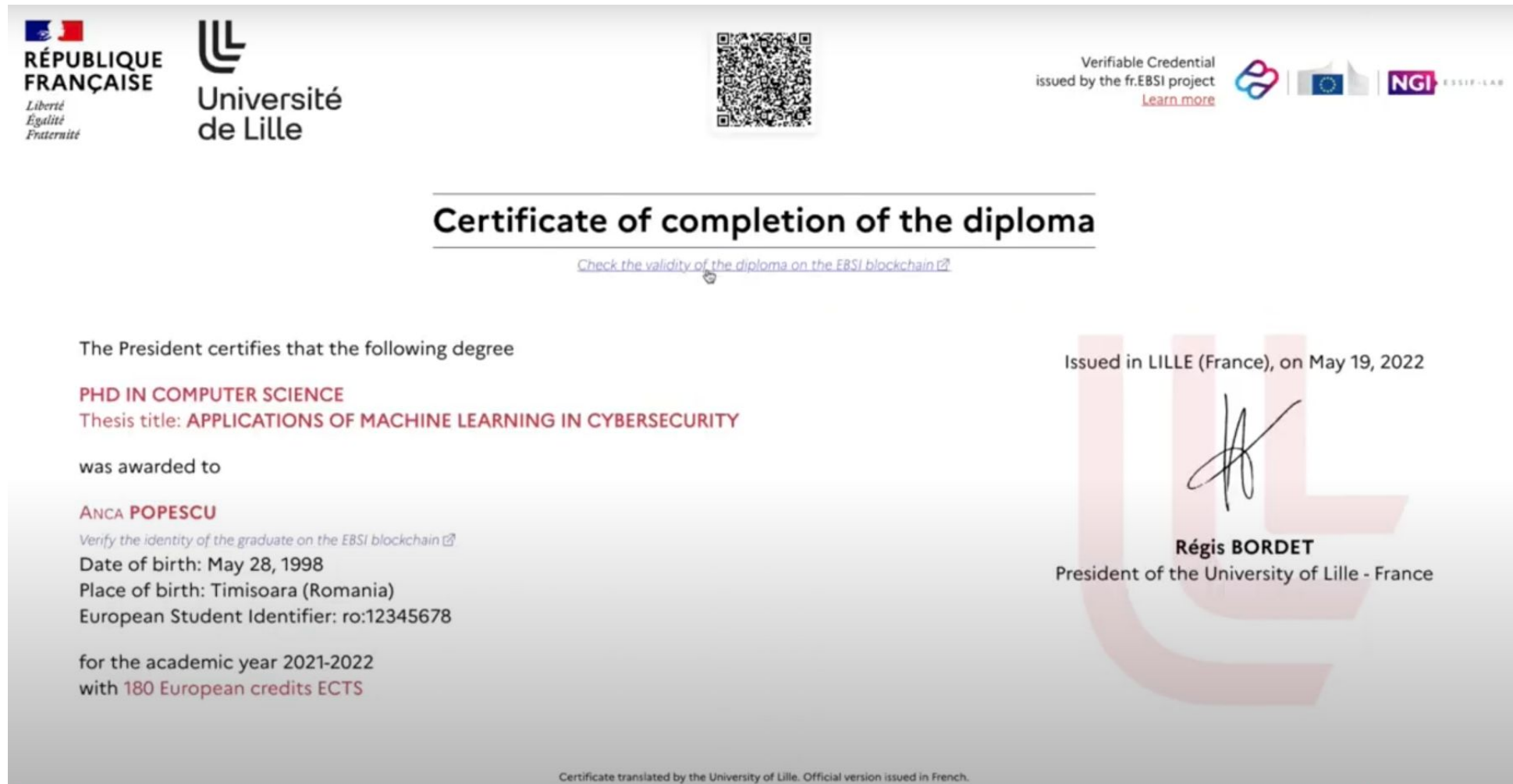
HDJ2123F

Status

The document was issued

Current Scenario for issuing and verifying VCs at UPT (4)

Verifying credentials by 3rd party



RÉPUBLIQUE FRANÇAISE
*Liberté
Égalité
Fraternité*

Université de Lille

Verifiable Credential
issued by the fr.EBSI project
[Learn more](#)

NGI ESSIF-LAR

Certificate of completion of the diploma

[Check the validity of the diploma on the EBSI blockchain](#)

The President certifies that the following degree

PHD IN COMPUTER SCIENCE
Thesis title: **APPLICATIONS OF MACHINE LEARNING IN CYBERSECURITY**

was awarded to

ANCA POPESCU
[Verify the identity of the graduate on the EBSI blockchain](#)

Date of birth: May 28, 1998
Place of birth: Timisoara (Romania)
European Student Identifier: ro:12345678

for the academic year 2021-2022
with **180 European credits ECTS**

Issued in LILLE (France), on May 19, 2022

Régis BORDET
President of the University of Lille - France

Certificate translated by the University of Lille. Official version issued in French.

Addressing the challenge of student mobility in Europe

For services requiring student identity or degree verification

01

Using the same personal student wallet in 3 countries and 3 universities

The **WaltID wallet (walt.id)** used for this project has been used successfully

- Thanks to [walt.id](https://www.walt.id) support, and
- Using a DID and Verifiable Identity Attributes issued by Politehnica University of Timisoara, Romania.

02

Issuing EBSI compliant credentials recognized in other countries

The 3 participating countries have issued Europass diplomas valid on EBSI

- Thanks to a successful collaboration between the 3 teams involved, and
- The constant and professional support of the EBSI team.

03

Allowing a university department or recruiter to verify a credential submitted by a student

The open source verification service is online

- Provided by the fr.EBSI project team,
- Thanks to walt.id SSI kit libraries.

EBSI's success stories

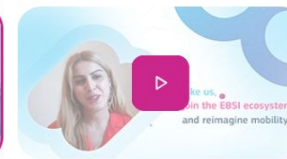
Bachelor/Master Degree



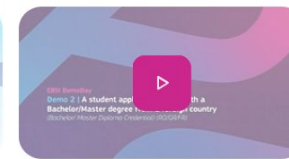
A student applies for a PhD with a bachelor/master degree from a foreign country



Success Story 2



Interview of Actors



Full Demo



Scenario

<https://ec.europa.eu/digital-building-blocks/sites/display/EBSI/Bachelor+-+Master+Degree>

<https://ec.europa.eu/digital-building-blocks/sites/display/EBSI/Verifiable+Credentials+Success+Stories>

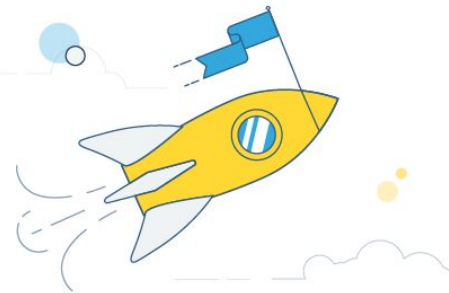
Participation in EBSI Early Adopters Wave 3

UEFISCDI, UPT, “Ioan Slavici” University of Timisoara, Lideea Ltd, OncoGen, “Vasile Goldis” University of Arad, UVT & UNITA – December 2022 – May 2024 – Micro-credentials cluster

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

EBSI Early Adopters Programme

An incubator programme to help imagine, build and launch blockchain pilot project(s) to improve the life of European citizens.



Micro-credentials

Participating countries:



Government ministries:



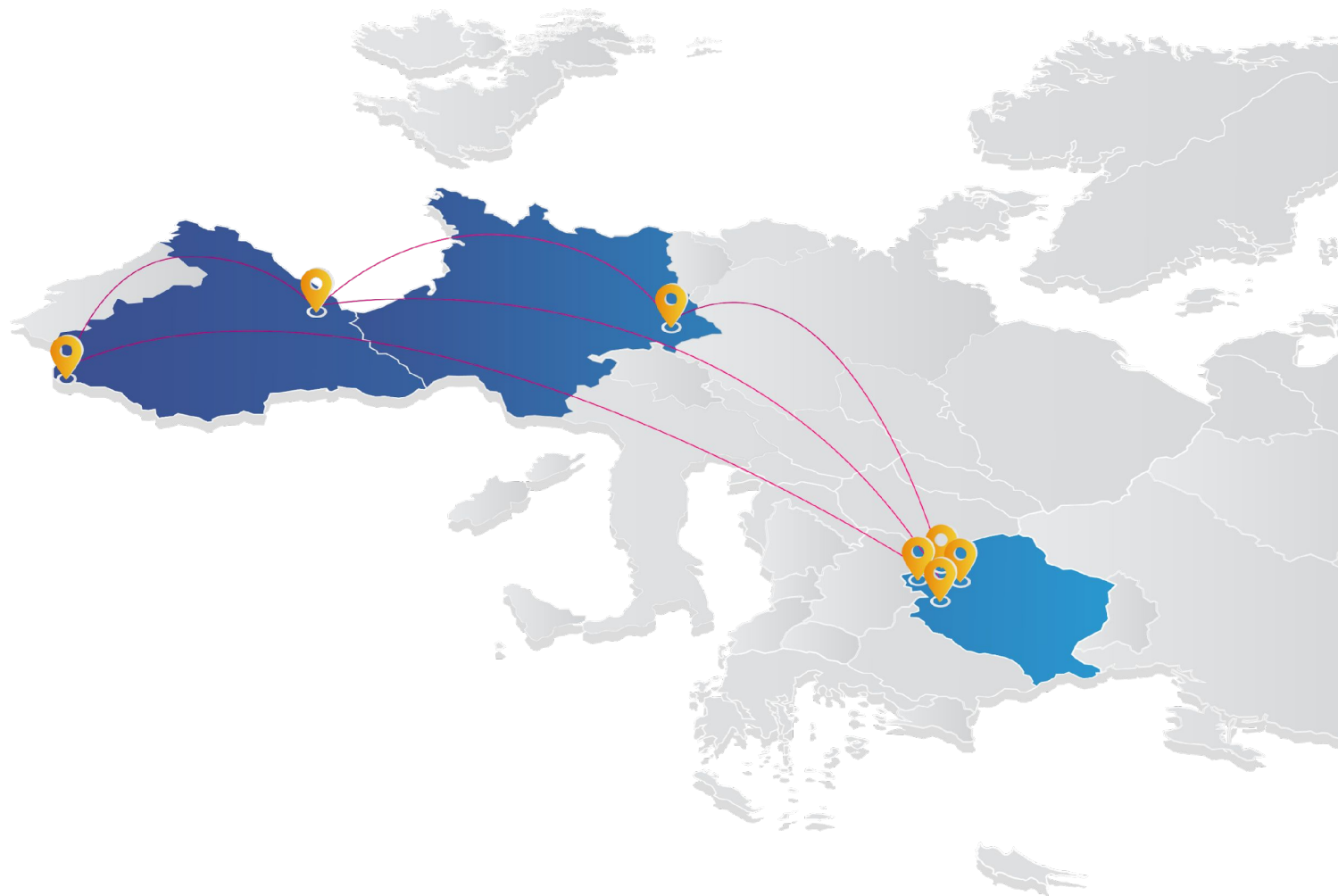
Universities: (Issuers of educational credentials)

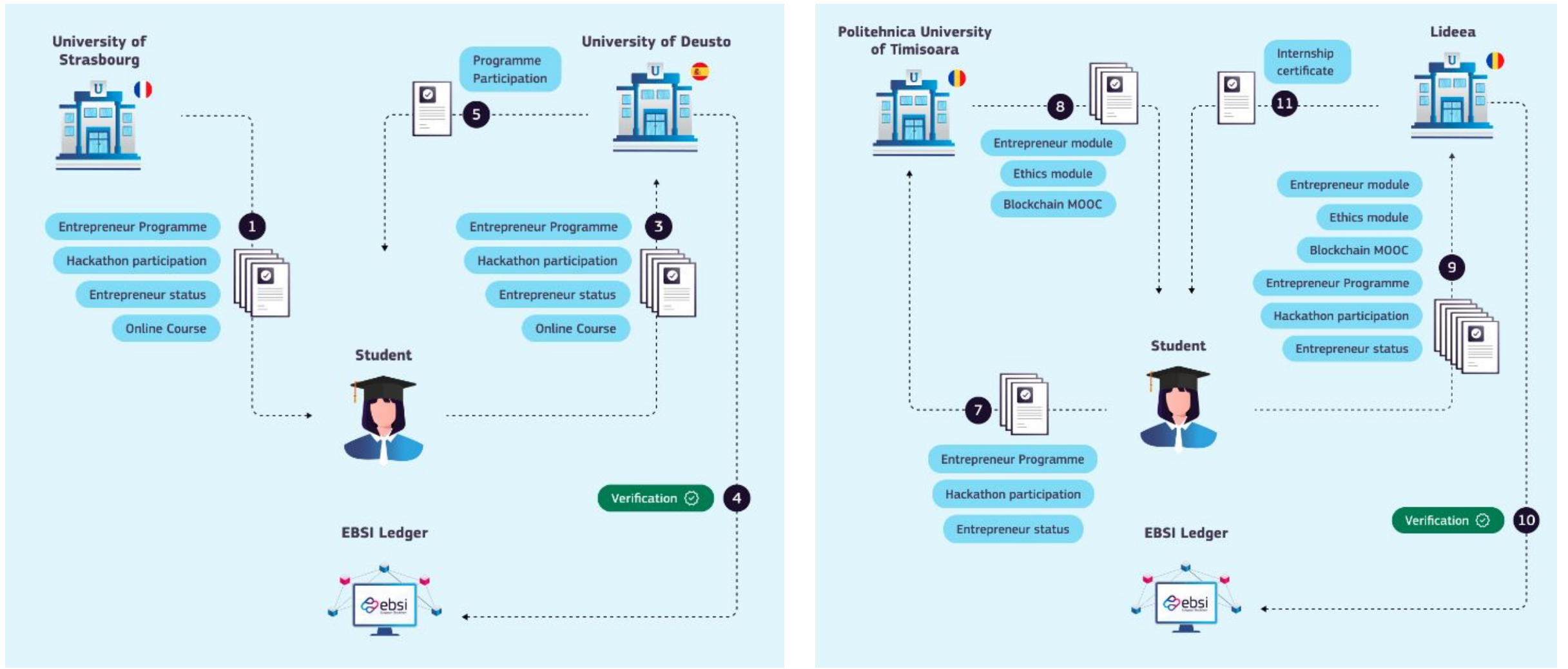


IT providers:



Others:





UPT completed the participation in 3 new EBSI projects

- UPT participated in 3 new projects related to EBSI (2023-2025)

01

Increase/enhance existing EBSI capabilities

Revocation, Suspension, Mandates, Consent, ZKP

EBSI -VECTOR

EBSI-enabled Verifiable Credentials and Trusted Registries

UEFISCDI
UPT
ICI
certSign

<https://www.ebsi-vector.eu>

02

Educational credentials, professional qualifications and Social Security

Combining the best of identity and signature provided by the eID, with the potential and flexibility of verifiable credentials and the increased privacy provided by the EBSI ledger

DC4EU

Digital Credentials for Europe

UEFISCDI
UPT.
ICI
certSign

<https://www.dc4eu.eu>

03

Enhance EBSI nodes requirements

EBSI to become a Trust Anchor (ISO27001, etc.)

EBSI-NE

Node Expansion

UEFISCDI
UPT

<https://ebsi-ne.com/>

VCs on EBSI: more than Diplomas - a Pedagogical Shift

What if we could recognize and validate skills learned anywhere—at work, online, or in the community?



*Enabler:
Micro-credentials

What if learning itself became a portable, verifiable asset that students accumulate throughout their lives?



*Enabler: Tokenization
of Learning

What if we could build new, more flexible learning pathways and even entirely decentralized universities?



*Enabler: Decentralized
Science & Education

Thank you!