Blockchain in Education.

EBSI4RO Connecting Romania through Blockchain

Prof.dr.ing. Radu Vasiu
President of the Politehnica University of Timisoara Senate

Prof.dr.ing. Carmen Holotescu
"Ioan Slavici" University of Timisoara

Drd. Victor Holotescu
Politehnica University of Timisoara

Content

1. Strategies for digital credentials and micro-credentials in EU
2. Blockchain – the technology of trust
3. Blockchain strategies in EU. EBSI
4. EBSI4RO: Connecting Romania through Blockchain

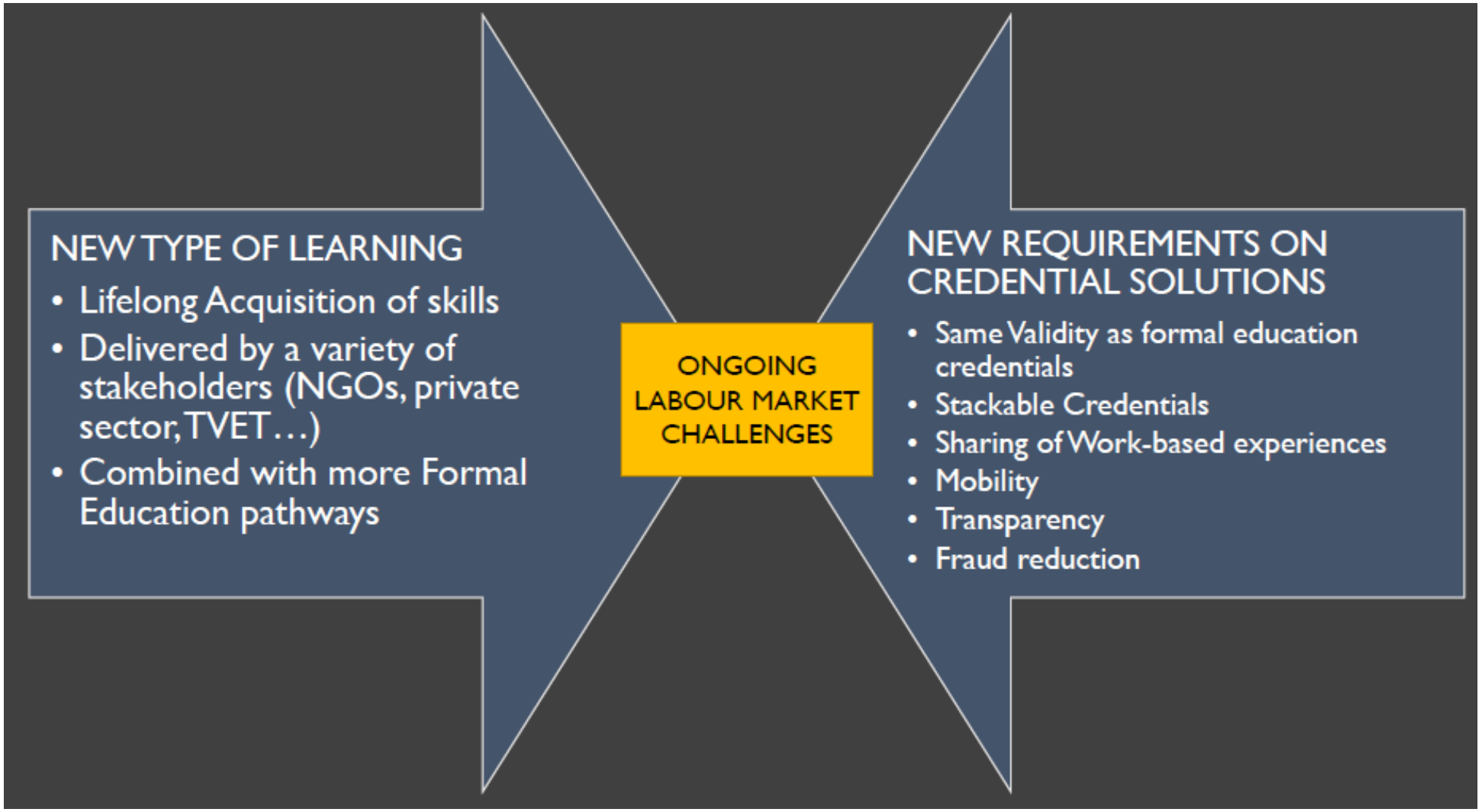
Education in EU

EU Digital Strategy – Key points for education

- The European Commission is promoting a digitalization strategy to place Europe at the forefront of the new digital economy
- The new presidency has strengthened and further strengthened this line of action
- The Commission has already recommended member states that they must have four items relevant in the educational field in the coming years, some by 2022:
  - Digital Strategy and Digital Action Plans
  - Digital education action plan
  - European education area (and research area)
  - Data strategy and Digital credentials strategy

Webinar Del4ALL, Nov 25, 2020 – http://del4all.eu
https://www.del4all.eu/news/2020/12/02/flagship-technology-projects-in-the-eu/

Education in EU



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

European Digital Credentials for Learning

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.

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

Micro-credentials

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

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

Trusted diplomas have great potential.

Students' mobility in Europe is **a broad market**. EBSI and EuroPass are its enablers.

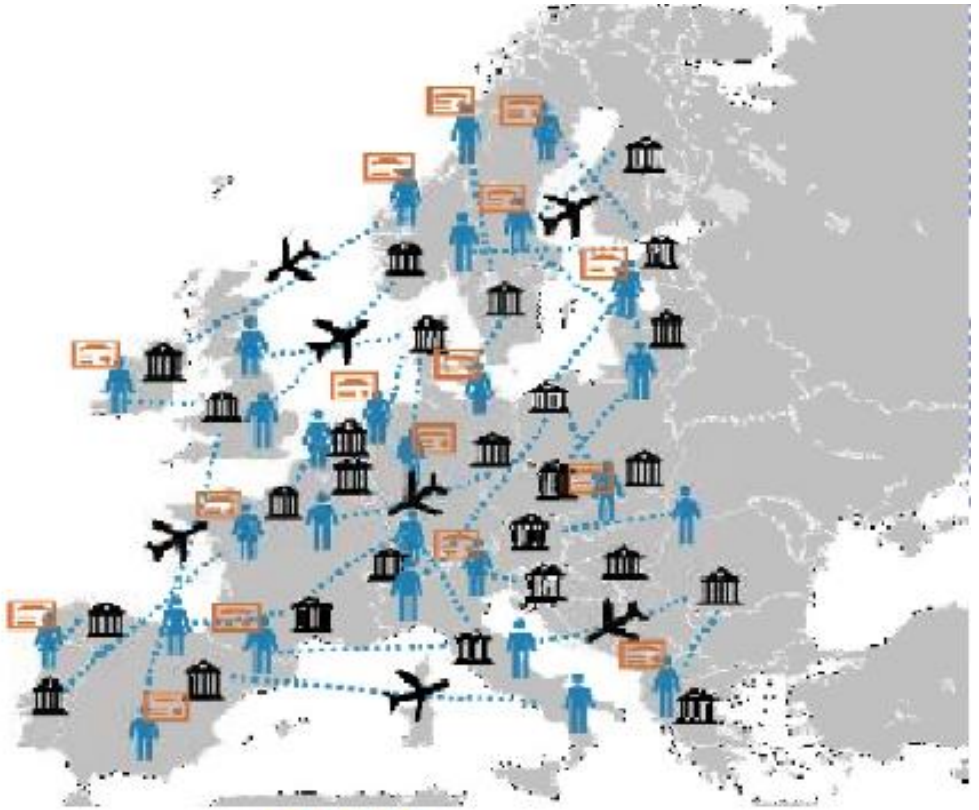
17 million
students (Bachelor, Master and PhD).

2,465
higher education institutions

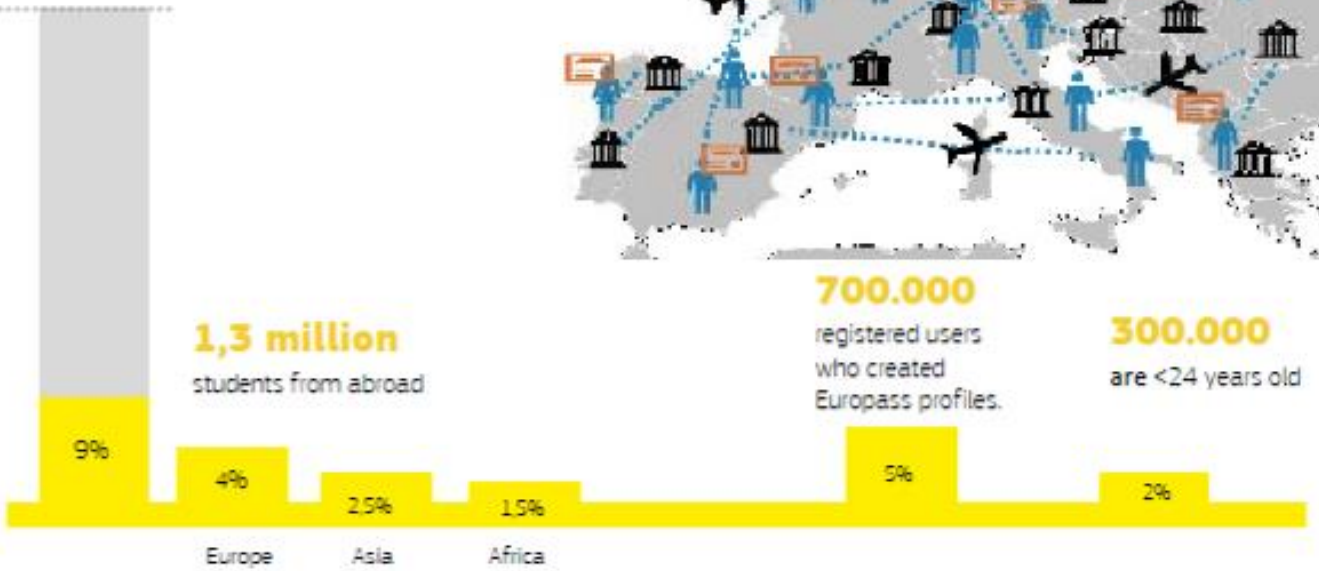
27
European countries

1.35 million
teachers

4.0 million
students graduated (diplomas)



1,3 million
students from abroad



700.000
registered users who created Europass profiles.

300.000
are <24 years old

From Early Adopters EBSI Programme Webinar - March 2021 -
https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/EBSI+Early+Adopters+programme+kick-off+webinar

Blockchain – the technology of trust

Bitcoin P2P e-cash paper

Satoshi Nakamoto satoshi at vistomail.com
Fri Oct 31 14:10:00 EDT 2008

- Previous message: Fw: SHA-3 lounge
- **Messages sorted by:** [date] [thread] [subject] [author]

I've been working on a new electronic cash system that's fully peer-to-peer, with no trusted third party.

The paper is available at:
http://www.bitcoin.org/bitcoin.pdf

The main properties:
Double-spending is prevented with a peer-to-peer network.
No mint or other trusted parties.
Participants can be anonymous.
New coins are made from Hashcash style proof-of-work.
The proof-of-work for new coin generation also powers the network to prevent double-spending.

http://www.metzdowd.com/pipermail/cryptography/2008-October/014810.html

The blockchain term, originally *block chain*, was first coined in 2009, by (the still unknown) *Satoshi Nakamoto*, in the original source code for the virtual currency Bitcoin: "Nodes collect new transactions into a block, hash them into a hash tree"; "when they solve the proof-of-work, they broadcast the block to everyone and the block is added to the block chain." (Nakamoto, 2009).

https://github.com/trottier/original-bitcoin

Blockchain technology enables the creation of a decentralized environment, where the cryptographically validated transactions and data are not under the control of any third party organization. Any transaction ever completed is recorded in an immutable ledger in a verifiable, secure, transparent and permanent way, with a timestamp and other details.

Blockchain Advantages and Applications

https://www.stateofthedapps.com
https://positiveblockchain.io

1. self-sovereignty - users identify themselves and maintain control over the storage/management of personal data;
2. trust - the technical infrastructure offers secure operations(payments or issue of certificates);
3. transparency and provenance - to perform transactions in knowledge that each party has the capacity to enter into that transaction;
4. immutability- records are written and stored permanently, without the possibility of modification;
5. disintermediation- no need for a central controlling authority to manage transactions or keep records;
6. collaboration - ability of parties to transact directly with each other without the need for mediating third parties.

Grech, A. & Camilleri, A. 2017. Blockchain in Education JRC Report - https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/blockchain-education

Blockchain in Education and Research

- Digital certification using an open infrastructure for credentials
- Intellectual property management (scientific papers, research)
- Funding tracking from higher level authorities
- Students' payments, grants management, students' services (e.g. academic records, transcripts), credit transfer, learning portfolios
- Pedagogical enhancement: personalised learning, reputation, proof of learning
- Tokenization of learning, distributed universities

Romanian Blockchain Ecosystem

Report by Carmen, Victor & Tudor Holotescu

Photo by Lidia on Unsplash

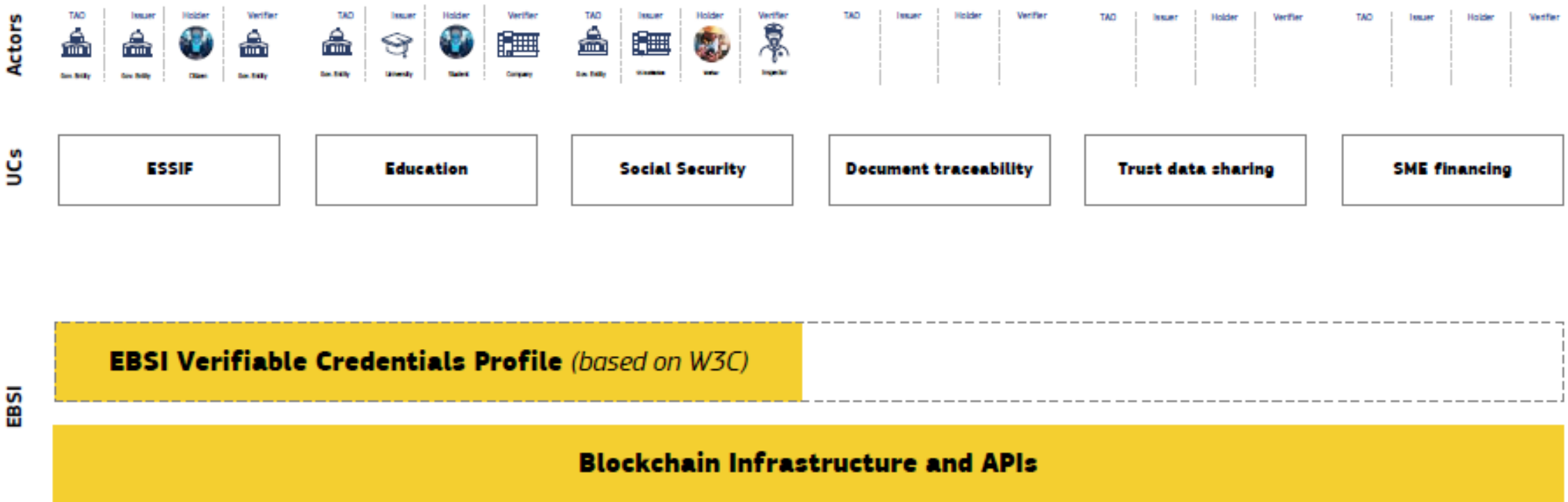
https://ebsi4ro.ro/romanian-blockchain-ecosystem/

EU Initiatives and Policies for Blockchain

- Blockchain Technologies are considered strategic for EU: "Blockchain and Distributed Ledger Technologies (DLT) have the potential to bring great improvements to the European industry and citizens. These technologies are transforming the way we use the internet and digital services globally." - https://ec.europa.eu/digital-single-market/en/blockchain-techonologies
- European Parliament resolution on distributed ledger technologies and blockchains: building trust with disintermediation, 3 October 2018 - http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P8-TA-2018-0373&language=EN&ring=B8-2018-0397
- EU Blockchain Observatory and Forum was launched on 1 March 2018, as a knowledge hub on Blockchain – http://www.eublockchainforum.eu
  - 2018-2020 - 60 experts: Irina Albita (FilmChain) and Vlad Zamfir (Ethereum);
  - From 2021 – 90 experts: Anca Bogdana Rusu, Dr.Ingrid Vasiliu-Feltes and Irina Albita
  - Online Forum - http://eublockchain.mobilize.io
- European Blockchain Partnership (EBP) was signed on 10 April 2018 (Romania on 29 May 2018); Monica Chiffa (ADR) is the Romanian representative (July 2021) https://ec.europa.eu/digital-single-market/en/news/european-countries-join-blockchain-partnership
- European Blockchain Services Infrastructure (EBSI), a project of EBP (9 April 2019) – 4 use cases were selected in 2019, 3 new cases in 2020 https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/ebsi , https://www.youtube.com/watch?v=m2uj7fgb2JI&t=7s

What is EBSI ?

EBSI is user centric, decentralised 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

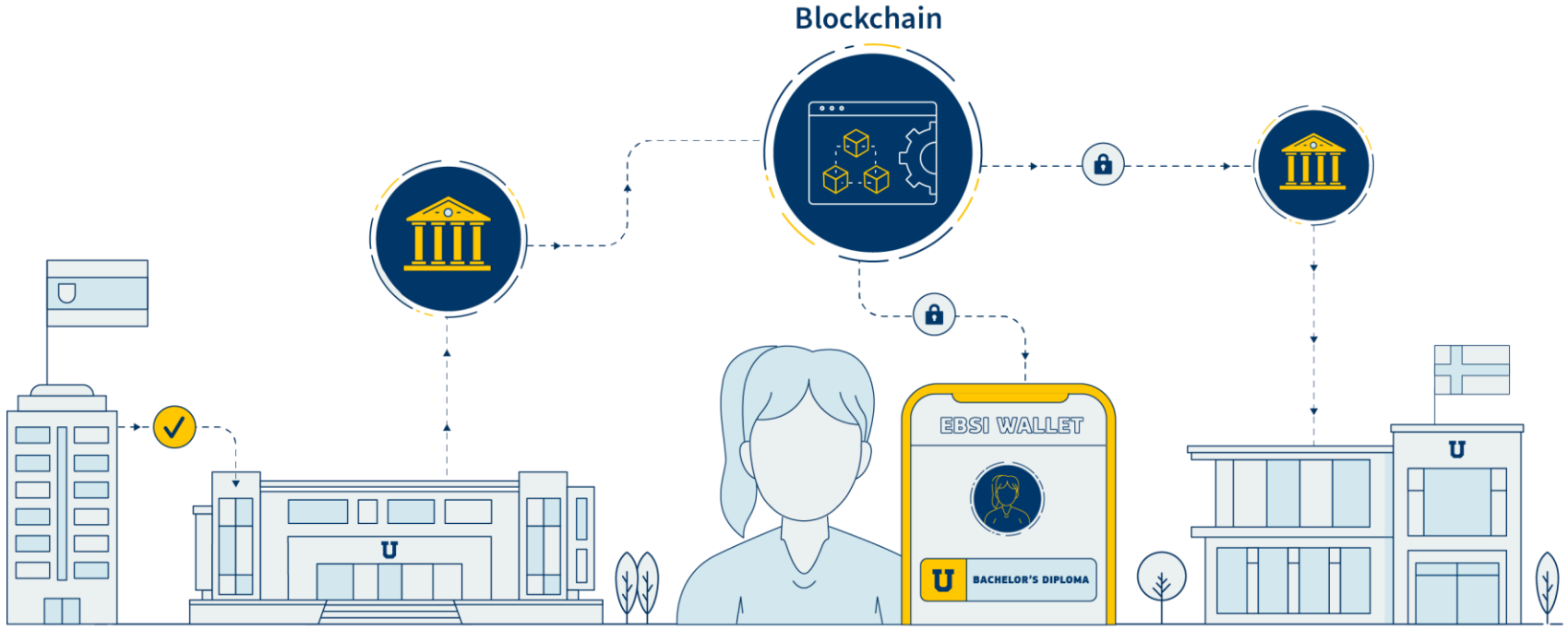


https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/EBSI

EBSI nodes

Governments, and society, need technology to verify the authenticity of information. Having this challenge in mind, DG CNECT and DIGIT are currently developing the EBSI, in close cooperation with the EBP, to accelerate the creation of cross-border services and **putting blockchain technology at the service of public administrations for the purpose of verification of information, making the services trustworthy.**

Verifiable Credentials on EBSI



Impossible to fake, easy to verify

Standards

- W3C VCs & DIDs
- OpenID Connect

- High level of certainty that the issuer is trusted alongside the time of issuance
- High level of certainty that the holder is the one that the Verifiable Credential was issued to
- The holder keeps data control and ownership

TAO Trusted Accreditation Organisation

The ministry

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

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.

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

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 Vasiu
   - Dr.Diana Andone
   - Prof.dr.ing.Carmen Holotescu
   - Drd.Victor Holotescu
   - S.l.dr.Andrei Ternauciuc

April 2021 – March 2023

https://ebsi4ro.ro
https://www.facebook.com/ebsi4ro
https://twitter.com/ebsi4ro

Objectives of the project

01

Setup and operation of an EBSI node

Node operational from July 2021

02

Credentialing System is implemented for verifiable digital qualification (official diplomas), but also for verifiable micro-credentials

The system will be integrated with the National Student Enrolment Registry (Registrul Matricol Unic RMU).
An example for micro-credentials use-case: the certificates for the teachers trained in the CRED national project will be issued on EBSI.

03

5 Massive Open Online Courses (MOOCs) on Unicampus.ro

1. Blockchain technologies. Applications in Education
2. EU priorities and programs
3. EBSI open technical specifications. EBSI Use cases
4. How to deploy EBSI applications
5. Developing Dapps

from January 2022

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, +18 universities from +15 countries

EBSI4RO participates in the EA Programme – July-December 2021

https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/Early+Adopters+Programme

The actors and their roles

Credentialing System integrated with the Single National Student Enrolment Registry (Registrul Matricol Unic or RMU)

Romania

mobile

Other Member States

Trusted Accreditation Organisation (TAO)

Ministry of Education through UEFISCDI

will certify the students' diplomas existing in the National Students Enrollment (RMU) platform

Issuer

Politehnica University of Timisoara, Romania

is issuing the diploma in the RMU platform right after graduation

Holder

Alumni

The graduated student is the holder of the diploma

Verifier

University of Lille, France

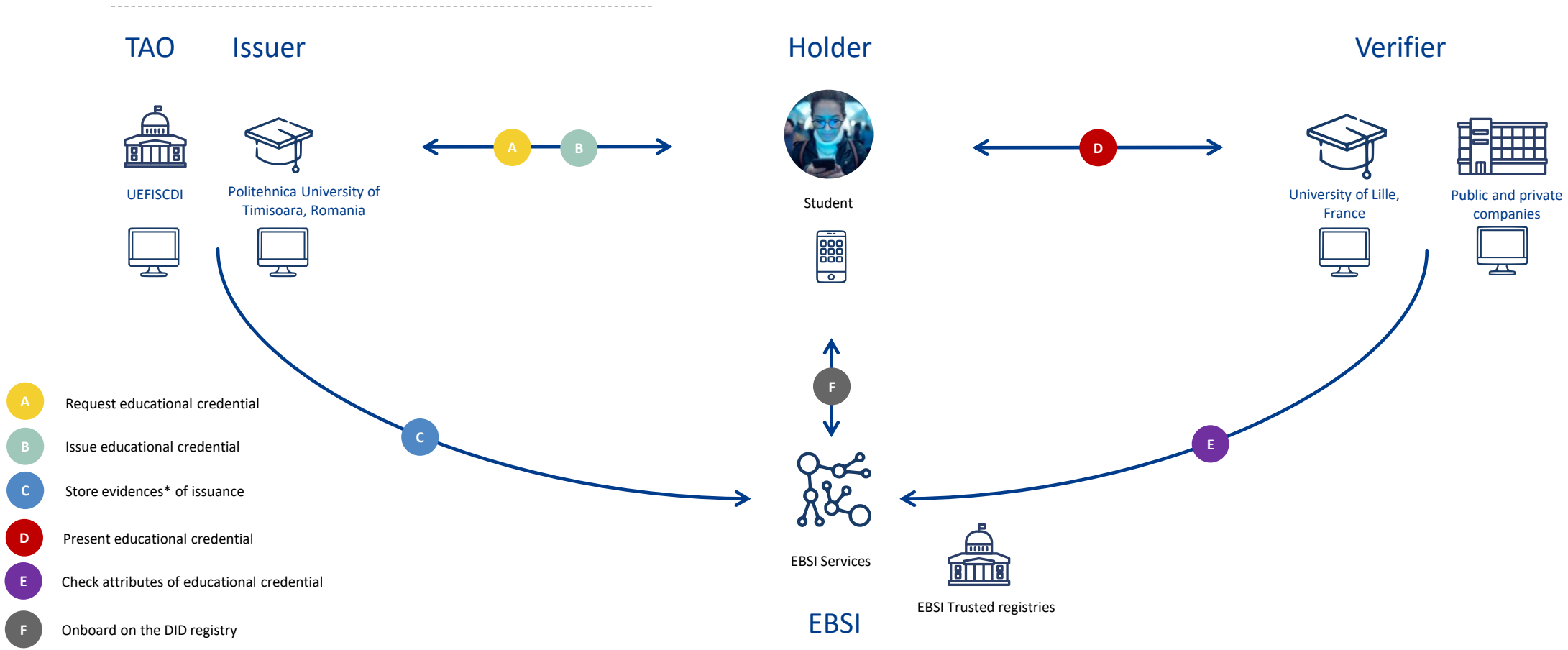
will be able to verify the authenticity of the diploma on EBSI

Private company of public institution

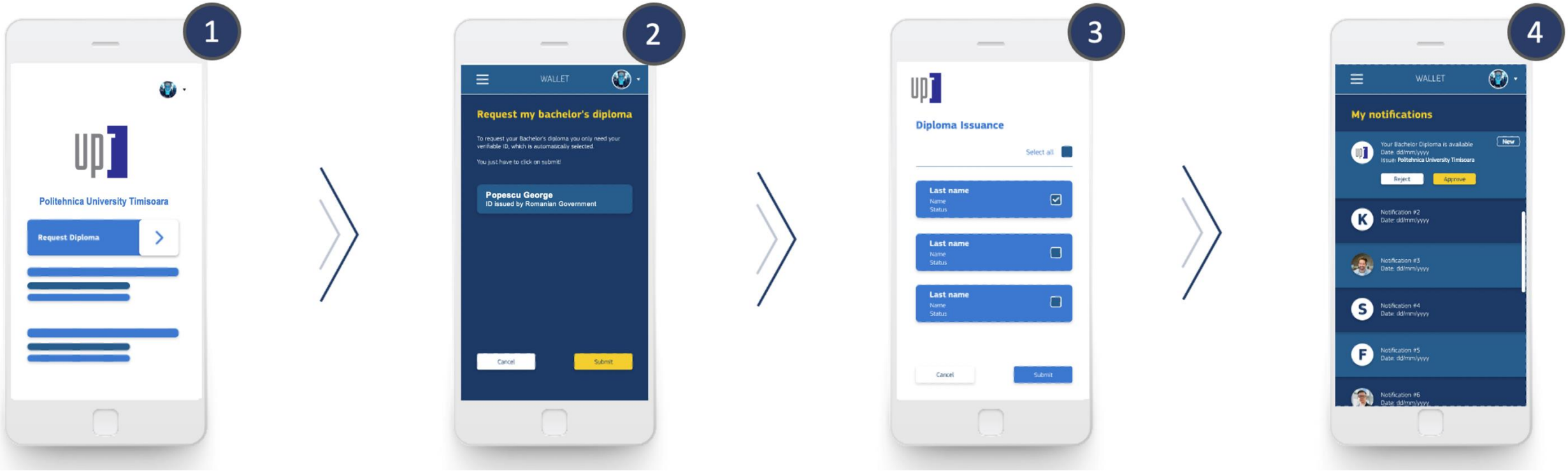
will be able to verify the authenticity of the diploma on EBSI

Scenario in practice

Diploma use case



Diploma Use-Case workflow



Adapted from Early Adopters EBSI Programme Webinar, July 2021
https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/Early+Adopters+Programme

EBSI Early Adopters – EBSI4RO Progress

- ✓ Defined the actors of the pilot program
- ✓ Onboard actors on EBSI and receive Verifiable Accreditation as TAO and TI
- ✓ Issue Verifiable Attestation (Diploma)
- ✓ Generate Verifiable Presentation
- ✓ Present and Verify Verifiable Presentation
- ✓ Contribute to Walt.id open-source solution for EBSI compliant wallet

Proposals for Digital Education Strategy in Romania - SmartEDU

The first proposals of educational policies related to diplomas/micro-credentials on EBSI made by the EBSI4RO team – December 2020

Măsură	Argumentare
Implementarea unui **sistem descentralizat pe Blockchain**, utilizând *Infrastructura Europeană de Servicii pe Blockchain* (EBSI - European Blockchain Services Infrastructure). Opțional: instalarea unui nod EBSI gestionat de MEC.	Pentru învățământul pre-universitar: Se vor stoca pe Blockchain certificate digitale echivalente unor documente ca: situațiile școlare anuale, (parte a) portofoliile, certificatele/diplomele de finalizare a ciclurilor de învățământ. Beneficii: sporirea integrității certificatelor prin digitalizare, îmbunătățirea confidențialității informațiilor personale, transparență mărită în ceea ce privește procesul de învățământ, recunoașterea studiilor și competențelor la continuarea studiilor, la transferul la altă unitate de învățământ, în țară sau străinătate și la angajare. Măsura vine și în sprijinul sutelor de mii de elevi români, care învață în străinătate pentru anumite perioade de timp și au dificultăți în recunoașterea studiilor în alte țări sau la revenirea în țară.
	Se vor stoca pe Blokchain certificate digitale echivalente unor documente ca: diplomele universitare, postuniversitare, de doctorat și microcredențiale (certificând participarea la module/cursuri în alte instituții/țări). Beneficii: sporirea integrității certificatelor prin digitalizare, îmbunătățirea confidențialității informațiilor personale, transparență mărită în ceea ce privește procesul de învățământ, acuratețe mai precisă în portofoliul de aptitudini și competențe, portabilitate și mobilitate crescute pentru documente la continuarea studiilor sau la angajare, incurajarea personalizării parcursului educațional. Pentru sistemul educațional: Registru pe Blockchain cu fondurile investite în educație, pentru monitorizare, transparență, auditabilitate, performanță a proceselor de gestionare financiară, urmărirea rezultatelor.

https://www.smart.edu.ro/

Kind invitation:

- Participate in the MOOCs and pilots of “EBSI4RO: Connecting Romania through Blockchain” – https://ebsi4ro.ro
- Follow EBSI4RO on Facebook - https://www.facebook.com/ebsi4ro and Twitter - https://twitter.com/ebsi4ro