



# EBSI: Cross-border services for the public sector

08.12.2023



Funded by  
the European Union

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# Blockchain Technology

## Bitcoin P2P e-cash paper

Satoshi Nakamoto [satoshi at vistomail.com](mailto:satoshi@vistomail.com)

Fri Oct 31 14:10:00 EDT 2008

- Previous message: [Fw: SHA-3 lounge](#)
- Messages sorted by: [\[ date \]](#) [\[ thread \]](#) [\[ subject \]](#) [\[ author \]](#)

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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://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>

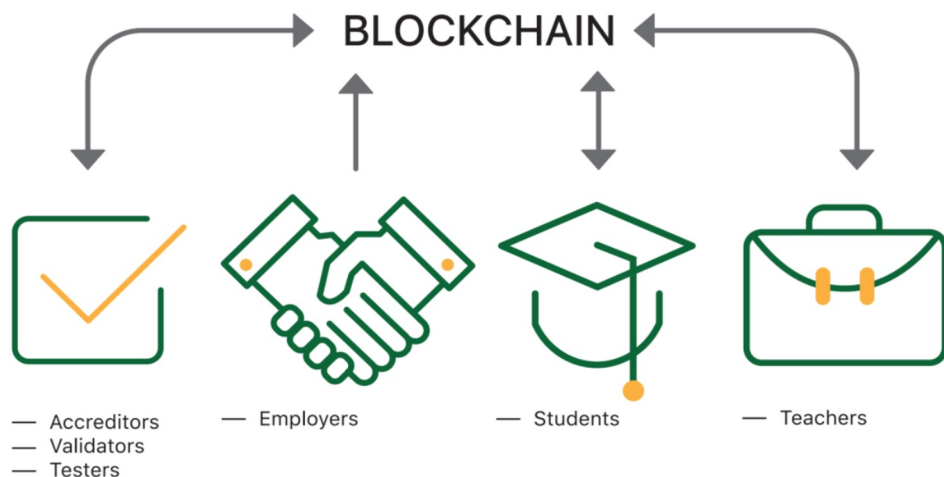
Blockchain technology enables the creation of a decentralized environment, where cryptographically validated transactions and data are not under the control of any third-party organization. Any transaction ever completed is recorded in an immutable ledger in a verifiable, secure, transparent, and permanent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

In March 2018, Merriam Webster Dictionary added the definitions for Blockchain, Cryptocurrency and Initial Coin Offering (ICO).  
[twitter.com/MerriamWebster/status/970667988964831232](https://twitter.com/MerriamWebster/status/970667988964831232)

# Blockchain in Education and Research

- Digital certification using an open infrastructure for credentials
- Intellectual property management (scientific papers, research)
- Public funding tracking
- Students' payments, grants management, students' services (e.g. academic records, transcripts), credit transfer, learning portfolios
- Pedagogical enhancement: anonymous marks/student performance comparison leading to personalised learning, reputation, proof of learning
- Decentralized Universities/Science
- Tokenization of Learning

<https://slideshare.net/inamor/open-education-blockchain-and-flexible-learning-pathways>



## Pioneering universities:

- University of Nicosia - <https://unic.ac.cy/blockchain> (2013)
- Open University UK - <http://blockchain.open.ac.uk> (2016)
- MIT USA - <http://certificates.media.mit.edu> (2016)

# EBSI: European Blockchain Services Infrastructure

- European Blockchain Services Infrastructure (EBSI) – is a project launched in 2018, under the coordination of the European Blockchain Partnership (signed on 10 April 2019);

4 use cases were selected in 2019, and 3 new cases in 2020; EBSI Experience Centre

Validation of diplomas, European Self Sovereign Identity, Notarization of documents, Trusted Data Sharing

SME financing, European Social Security Identification Number, Asylum process management

## 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



# Blockchain for public services and public policy: why?

A blockchain-based infrastructure offers a number of advantages (decentralized model)



## Future-proof solutions for public services

for web 3.0 and evolution of the digital economy



**Trust and efficiency gains** in multiparty and traceability processes



**Improved identification processes,** issuance of certificates and official documents



**User centric approach** where users remain in control of the data they share



**Enhanced security and privacy** with no single point of failure or gateway



# The European Blockchain Partnership works together with the European Commission

**Our joint vision is to help Europe accelerate the creation of trustworthy cross border digital services using blockchain.**

EBSI is the first EU-wide blockchain infrastructure, driven by the public sector, in full respect of European values and regulations. EBSI is supported by **29 countries** (All EU Member States, Norway and Lichtenstein) and the EC forming the European Blockchain Partnership (EBP).



# EBSI's State of play – the node network

EBSI's pan-European network of nodes

## 45 nodes in 23 countries



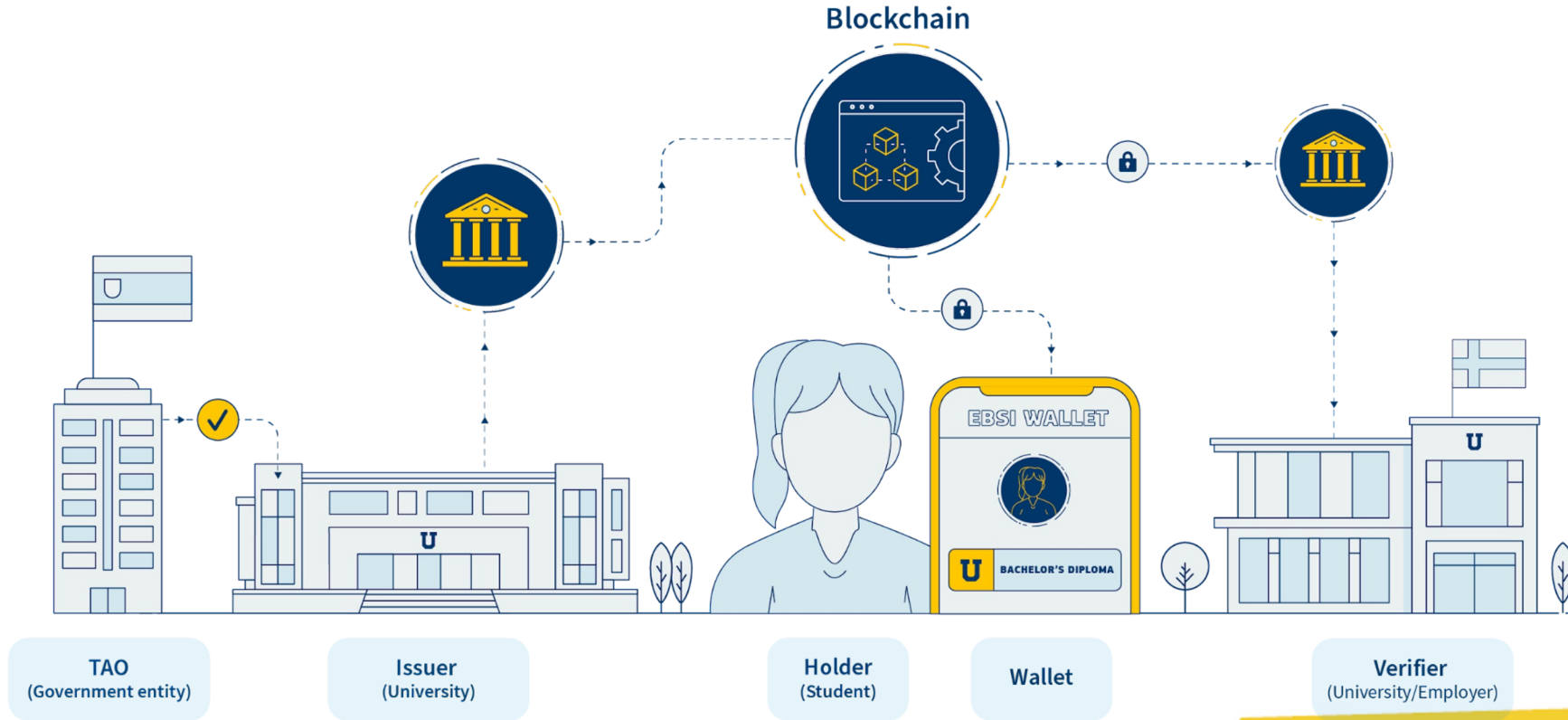
Nodes per country:

- |                                                                                                   |                                                                                                     |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
|  Austria (1)   |  Lithuania (1)   |
|  Belgium (2)   |  Luxembourg (2)  |
|  Bulgaria (2)  |  Netherlands (4) |
|  Croatia (1)   |  Norway (1)      |
|  Cyprus (1)    |  Poland (1)      |
|  Czechia (2)   |  Romania (3)     |
|  Estonia (1)   |  Slovakia (2)    |
|  Finland (1)   |  Slovenia (1)    |
|  France (2)  |  Spain (2)     |
|  Germany (3) |  Sweden (1)    |
|  Greece (2)  |                                                                                                     |
|  Hungary (3) |                                                                                                     |
|  Italy (2)   |                                                                                                     |

➤ 3 EBSI nodes in Romania: ICI (Dec 2020), UEFISCDI (June 2021), STS (Dec 2021); a new node will be installed by UPT in 2024 in the EBSI-NE project



# 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

# 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



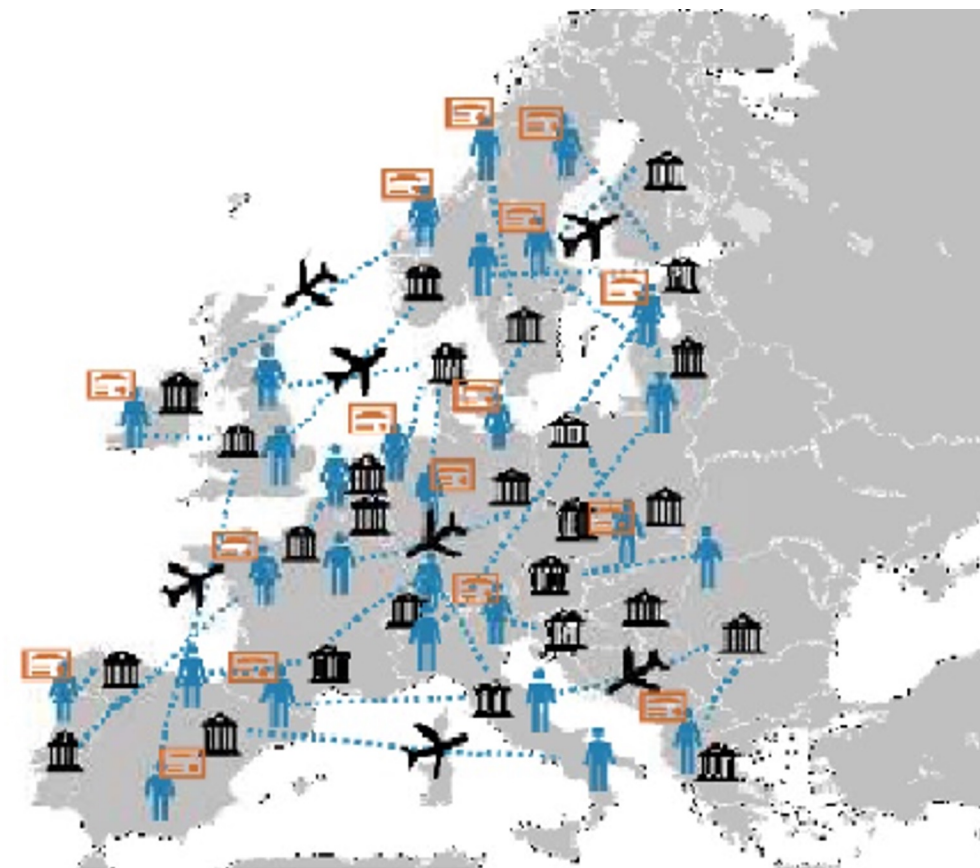
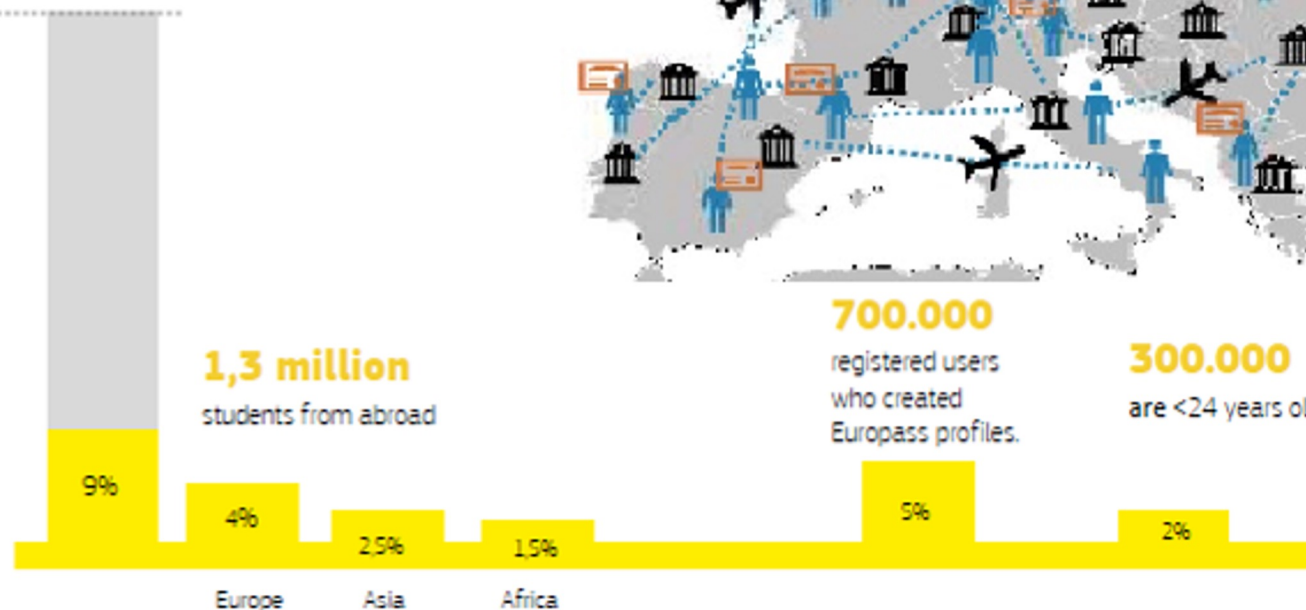
**27**  
European countries



**1.35 million**  
teachers



**4.0 million**  
students graduated (diplomas)



From Early Adopters EBSI Programme Webinar - March 2021 -

<https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/EBSI+Early+Adopters+programme+kick-off+webinar>

# 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



# Project Team

Apply for a PhD with a Bachelor/Master degree from a foreign country (RO/GR/FR)



## EBSI4RO: Connecting Romania through Blockchain

The EBSI4RO project aims to create an extendable and sustainable ecosystem to facilitate and accelerate the awareness, knowledge, and adoption of EBSI in the country.

The partners are the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI) and Politehnica University of Timisoara, Romania.

<https://ebsi4ro.ro>



## Hellenic Distributed Ledger Technology Infrastructure

The ELEDGER project aims at establishing a solid pillar for the development and spreading of the European Blockchain Partnership (EBP) initiative in Greece.

Another project goal is to support the participation and contribution of Greek stakeholders to the European Blockchain Service Infrastructure (EBSI).

<https://ebsi-diplomas.dev.grnet.gr>



## fr.EBSI: Ready-to-use Academic Credentials on EBSI

The fr.EBSI project aims to deliver verifiable digital diplomas on the EBSI blockchain, as well as the necessary tools to universities for a large-scale use.

This project is led for France by the University of Lille, with the GIP Renater, and BCdiploma as technical operator.

<https://www.bcdiploma.com/blog/ebsi-verifiable-credentials>





## 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



EBSI's success stories

# Bachelor/Master Degree



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

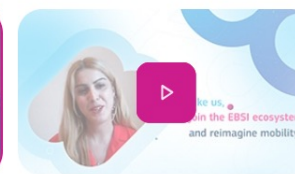


<https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Bachelor+-+Master+Degree+Adopters+Programme>

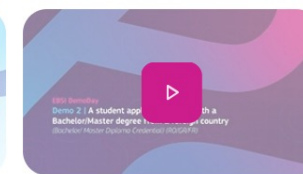
<https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Verifiable+Credentials+Success+Stories>



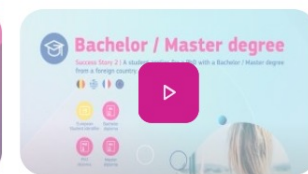
Short Demo Story 2



Interview of Actors



Full Demo



Scenario



# 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
- 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**

## Tehnologia Blockchain. European Blockchain Services Infrastructure

[Acasă](#) / [Cursurile mele](#) / [Cursuri EBSI4RO](#) / [ebsi4ro\\_bc\\_tech](#)

Bun venit! Modul de lucru

**Due:** Friday, 13 October 2023, 3:43 PM

Coffee House



1. Blockchain technology. Applications in different domains and in education
2. EU priorities and projects related to Blockchain. Romanian Blockchain projects
3. EBSI specifications and use-cases
4. Diploma use-case
5. Developing applications on EBSI

- Micro-credentials will be issued on EBSI for the participants in the MOOC on Unicampus
- 5 miniMOOCs integrate OEP/OER/MOOCs, respecting the CHAISE/INATBA recommendations

<https://ebsi4ro.ro>  
<https://unicampus.ro>

## Glossary

BY: CARMEN HOLOTESCU

The **EBSI Glossary** was collaboratively translated by the participants in the project miniMOOCs, and the result is the useful resource below – thank you to the EBSI team for granting us the translation permission and to the participants for the interest and work.

### A

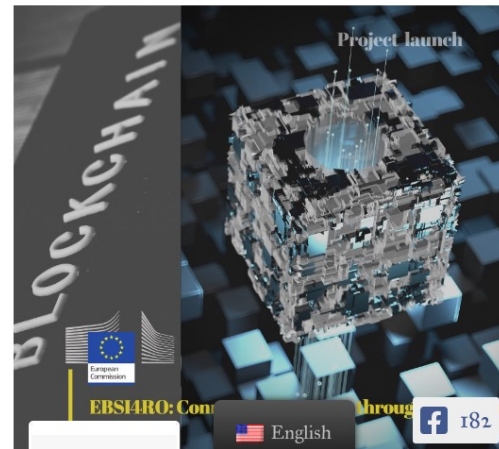
#### Acreditare

Acțiunea sau procesul de recunoaștere oficială a unei persoane ca având un anumit statut sau ca fiind calificată pentru a desfășura o anumită activitate.

#### Autorizare

Procesul de atribuire a drepturilor. Face parte din controlul accesului și, de obicei, reușește în procesul de autentificare.

FACEBOOK @EBSI4RO



- the 5 miniMOOCs piloted with 90 students from 3 Master courses at UPT
- over 300 participants
- the MOOC will remain open and will be updated
- integration in 10 Bachelor courses at UPT (4), Ioan Slavici University of Timisoara (2), West University of Timisoara (3), Vasile Goldis University of Arad (1)

The Romanian translation of the EBSI Glossary – one of the collaborative activities of the MOOC participants

<https://ebsi4ro.ro>  
<https://unicampus.ro>

# Blockchain and EBSI Dissemination

Report by Carmen, Victor & Tudor Holotescu

Published in January 2022, last updates  on September 23, 2022

## Romanian Blockchain Ecosystem

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

Extensively cited in:

 **EUBlockchain**  
Observatory and Forum

## EU Blockchain Ecosystem Developments




A Thematic Report Prepared By  
The European Union Blockchain Observatory & Forum

An initiative  
of the  European  
Commission

Based on an active implication, extensive research, and monitoring of the Romanian Blockchain scene since 2017, this work is a continually updated report of the **first attempt to map the Romanian Blockchain Ecosystem** published in 2018, followed by the **report** published on Medium

The new report is published under the auspices of the project “**EBSI4RO: Connecting Romania through Blockchain**”, the most important Blockchain educational initiative of the moment in Romania, the first two authors being part of the implementation team.

Without claiming exhaustiveness, the report offers a fresh perspective of the vibrant, diverse and mature initiatives in the field. Romania has a growing number of experienced companies, innovative startups and projects ( over 120 are presented below), active accelerators, many communities and events (section 1), and also numerous educational programs, initiatives and policy proposals (section 2).

During the last two years there were registered numerous innovative government projects, including the developing of a Blockchain strategy and initiatives for specific national legislation for crypto-assets and Blockchain, also some pioneering projects in Europe, such as the Blockchain voting reporting tool for the national parliamentary elections in 2020, and a national system and policies for verifiable diplomas and micro-credentials on the **European Blockchain Services Infrastructure (EBSI)** (sections 1.11, 1.12, 2.6).

 Part of the findings of this work are presented in the new **EU Blockchain Ecosystem latest developments**, a report of the **EU Blockchain Observatory**, published on September 9, 2022, for which **Carmen Holotescu** was the **Romanian expert**.

### 1.General Initiatives

#### 1.1.Regulations

#### 1.2. Companies and Start-ups

#### 1.3. NFT initiatives

#### 1.4. Mining

#### 1.5. Media and News

#### 1.6. Conferences and Events

#### 1.7. Hackathons

#### 1.8. Payments

#### 1.9. Communities

#### 1.10. Training

#### 1.11. EU Funded Projects

#### 1.12. National projects and policies

#### 1.13. Activities at European Level

#### 1.14. Influencers

### 2. Educational initiatives and projects

#### 2.1. Academic Courses and Programs

#### 2.2. Research

#### 2.3. Educational Conferences and Workshops

#### 2.4. Educational Blockchain projects

#### 2.5. Other educational initiatives

#### 2.6. Educational Policy Proposals

# Participation in EBSI Early Adopters Wave 3

**UEFISCDI, UPT, “Ioan Slavici” University of Timisoara, Lideea Ltd, OncoGen, “Vasile Goldis” University of Arad, UVT & UNITA – from December 2022 – Microcredentials Cluster**

## EBSI Early Adopters Programme

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





# UPT participates in 3 new EBSI projects

- UPT has gained a valuable experience in Blockchain, EBSI, Web3
- UPT is a partner in 3 new projects related to EBSI (2023-2025)

01

Increase/enhance existing EBSI capabilities

Revocation, Suspension, Mandates, Consent, ZKP

---

**EBSI -VECTOR**

UEFISCDI  
UPT  
ICI  
certSign

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

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**DC4EU**

UEFISCDI  
UPT  
ICI  
certSign

03

Enhance EBSI nodes requirements

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

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**EBSI-NE**

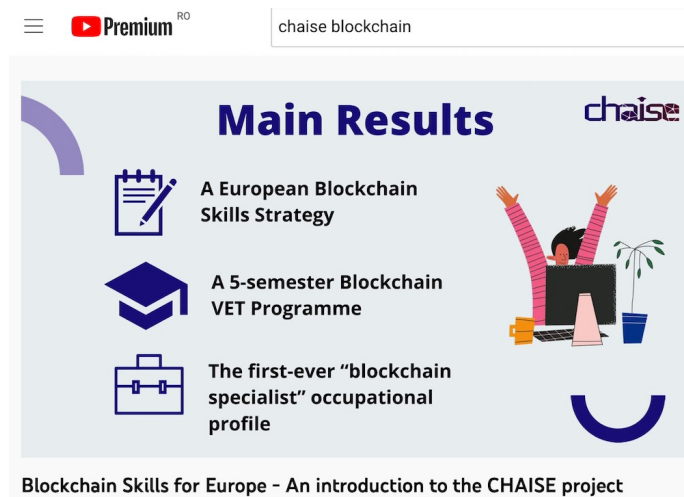
UEFISCDI  
UPT

# UPT involvement in other Blockchain Projects

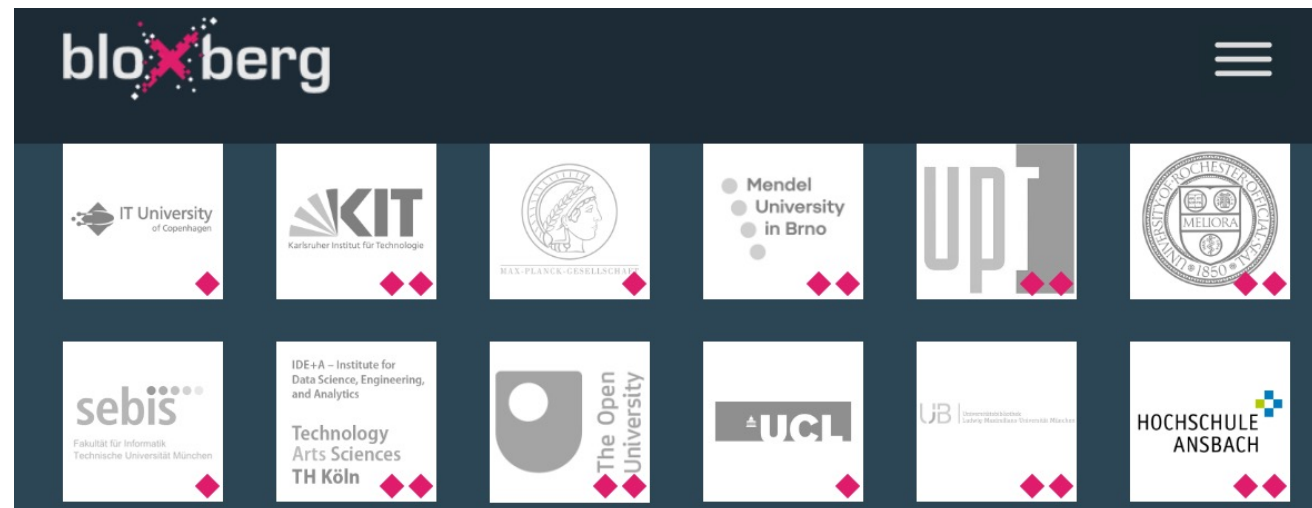
- Associated partner of the CHAISE project - <https://chaise-blockchainskills.eu/>
- Participant in the EDIC - European Digital Infrastructure Consortium
- Member of bloxberg: the Association for the Advancement of Science and Blockchain - <https://bloxberg.org>
- NFT Spotlight Heritage Timișoara 2023 - the first Romanian academic NFT - <https://nft.spotlight-timisoara.eu/>

## Kind invitation:

- Follow UPT activities in EBSI-NE and the other EBSI projects
- Participate in the EBSI4RO miniMOOCs – <https://ebsi4ro.ro>; also in the CHAISE online courses - <https://chaise-blockchainskills.eu/>
- Claim a Spotlight Heritage Timisoara 2023 NFT - <https://nft.spotlight-timisoara.eu/>



Blockchain Skills for Europe - An introduction to the CHAISE project



# Thank YOU!

Professor PhD Carmen Holotescu

<https://tinyurl.com/cholotescu>



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