Educational Blockchain Initiatives in Romania

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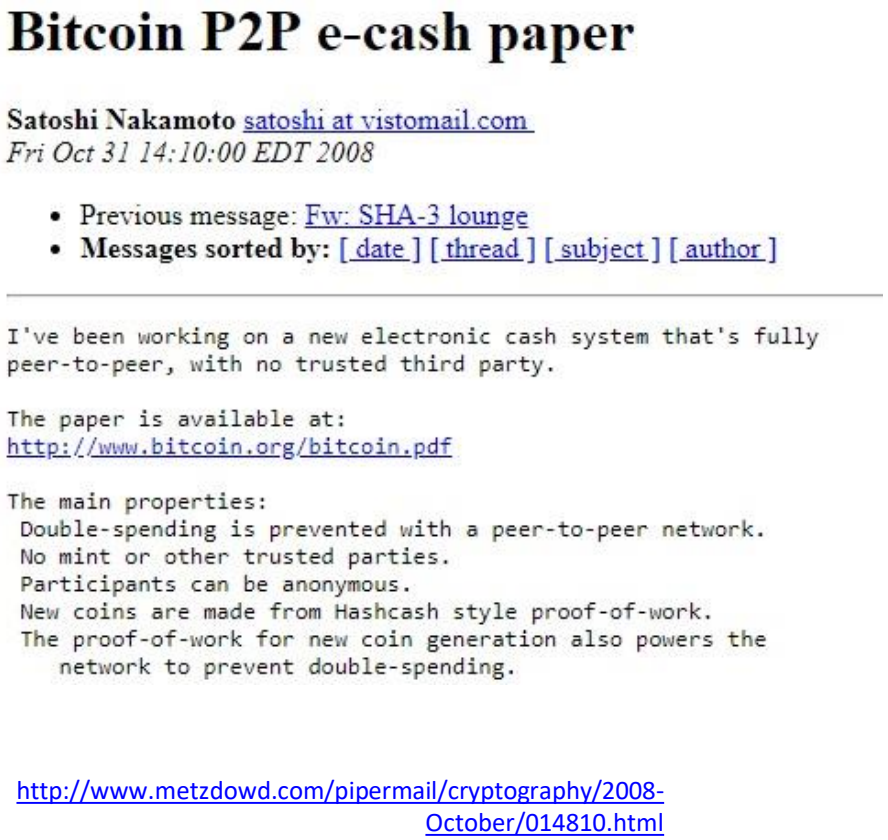
Content

1. Blockchain – the technology of trust
2. EU Blockchain Framework and Strategies in Education
3. Romanian Educational Blockchain Ecosystem
   - Academic courses and projects
   - Research
   - Other initiatives
   - Policies

Check: Carmen Holotescu. 2018. Blockchain and Open Education.
https://www.slideshare.net/cami13/blockchain-and-open-education

Blockchain Definition (1)



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 Definition (2)

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.

In March 2018, Merriam Webster Dictionary added the definitions for Blockchain, Cryptocurrency and Initial Coin Offering (ICO).

twitter.com/MerriamWebster/status/970667988964831232

Blockchain Advantages

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

— self-sovereignty - users identify themselves and maintain control over the storage/management of personal data;

— trust - the technical infrastructure offers secure operations(payments or issue of certificates);

— transparency and provenance - to perform transactions in knowledge that each party has the capacity to enter into that transaction;

— immutability- records are written and stored permanently, without the possibility of modification;

— disintermediation- no need for a central controlling authority to manage transactions or keep records;

— 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

EU Initiatives and Policies (1)

- 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

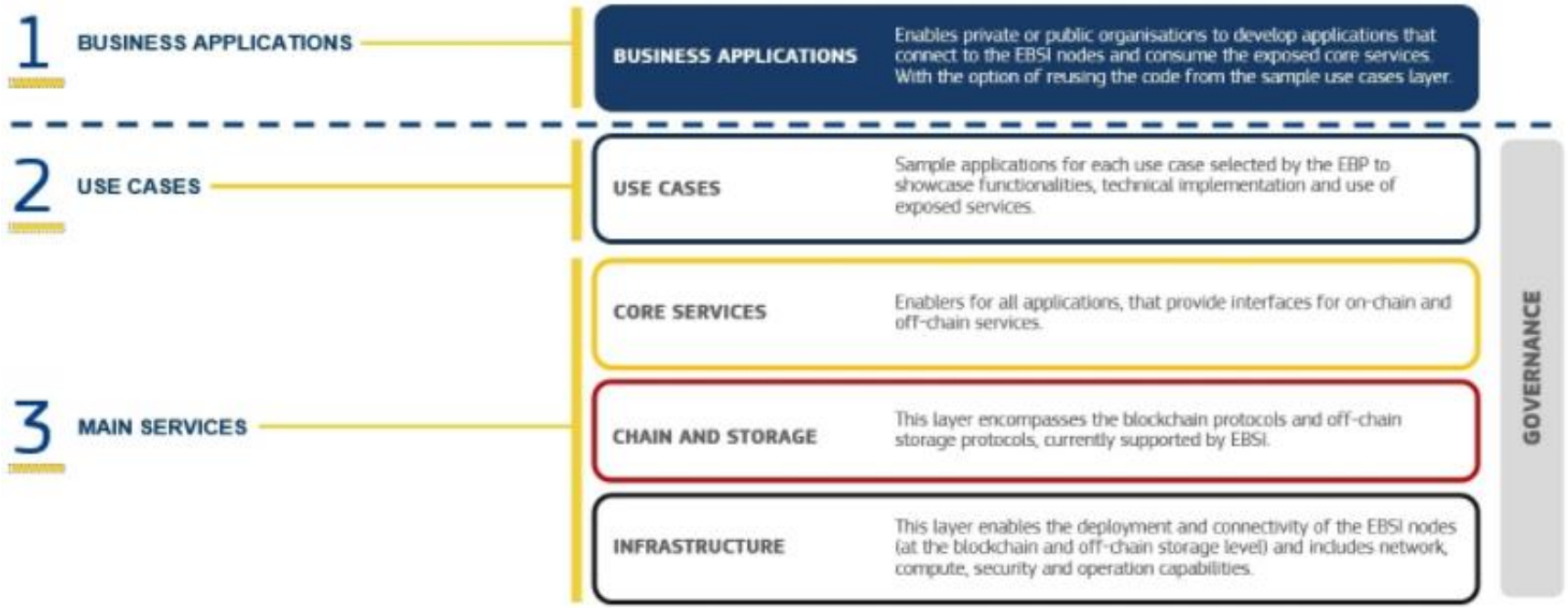
- EU Blockchain Observatory and Forum was launched on 1 March 2018, as a knowledge hub on blockchain – http://www.eublockchainforum.eu
  - 2018-2020 - 60 experts: Irina Albita (FilmChain) and Vlad Zamfir (Ethereum)
  - From 2021 – 90 experts: Anca Bogdana Rusu, Dr.Ingrid Vasiliu-Feltes and Irina Albita
  - Online Forum - http://eublockchain.mobilize.io
  - A MOOC related to AI and Blockchain, policies, funds will be launched soon

- European Blockchain Partnership (EBP) was signed on 10 April 2018 (Romania on 29 May 2018); Dr.Carmen Elena Cirnu (ICI) is the representative in EBP since Sept 2020 -
- https://ec.europa.eu/digital-single-market/en/news/european-countries-join-blockchain-partnership , https://www.crypto-economy.net/en/europe-advances-seriousness-new-blockchain-project

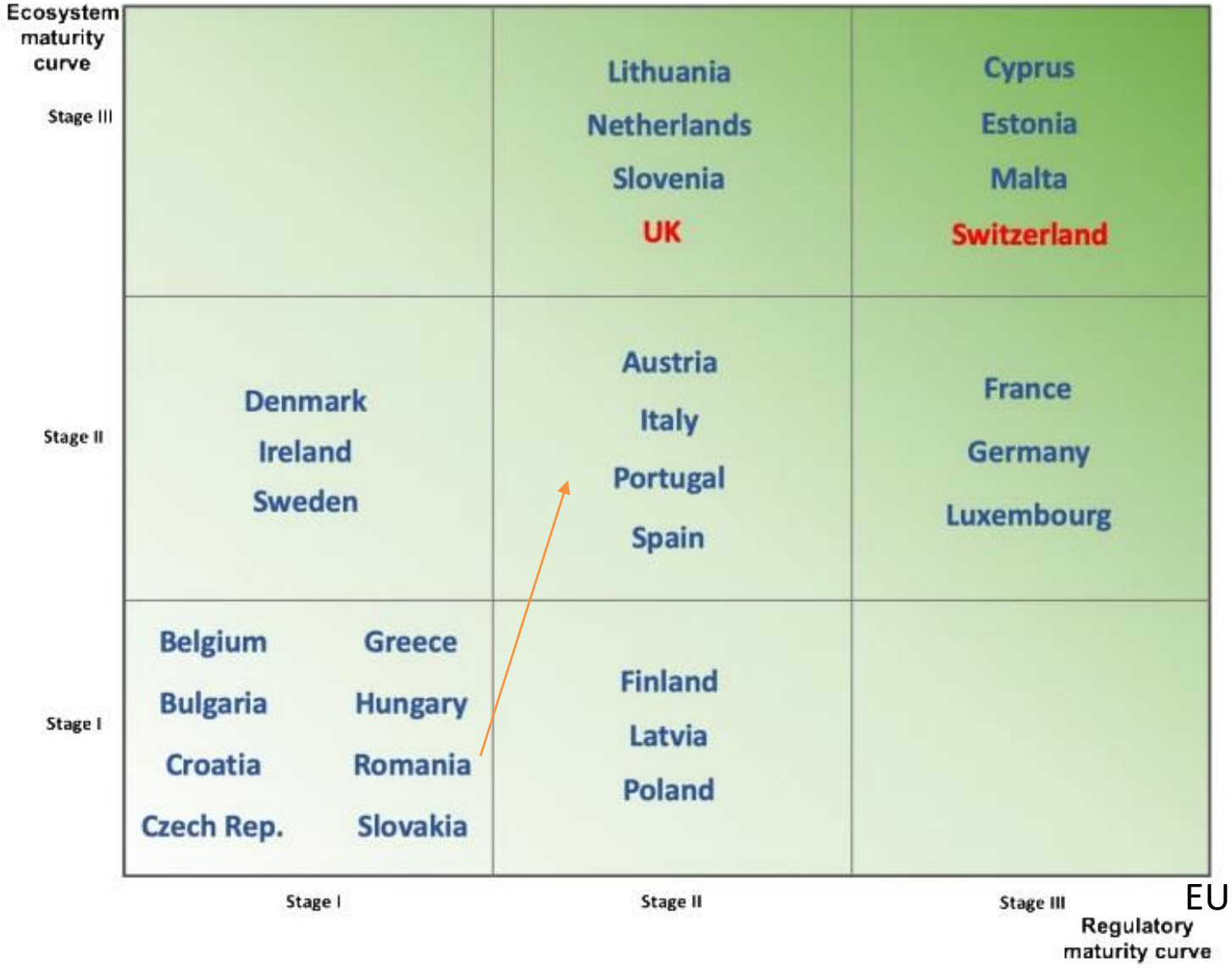
- European Parliament resolution on distributed ledger technologies and blockchains: building trust with disintermediation, 3 October 2018:
  - http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P8-TA-2018-0373&language=EN&ring=B8-2018-0397
  - https://medium.com/@operagroup/eu-parliament-passes-blockchain-resolution-737d0ce99e38

EU Initiatives and Policies (2)

- International Association for Trusted Blockchain Applications (INATBA) -industry, startups and SMEs, policy makers, regulators, civil society and standard setting bodies, 3 April 2019 – http://inatba.org, https://ec.europa.eu/digital-single-market/en/news/eu-blockchain-roundtable-supports-efforts-deploy-blockchain-technologies-eu, https://ec.europa.eu/digital-single-market/en/news/launch-international-association-trusted-blockchain-applications-inatba
- 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, https://www.youtube.com/watch?v=LXyNrOvaGyk&list=PLPMb0otsCuFLrm-xtsxSnUSkw4rYoN3RV
  - Notarization of documents, Validation of diplomas, European Self Sovereign Identity, Trusted Data Sharing
  - SME financing, European Social Security Identification Number, Asylum process management



Blockchain Maturity in EBP member countries



EU Blockchain Ecosystem latest developments, Nov 2020
https://www.eublockchainforum.eu/reports

4 Factors favoring Blockchain development

- **Regulatory certainty**
  - including sandboxing & taxation
- **State support**
  - national strategy, public sector pilots, etc.
- **Innovation-friendly climate**
  - including access to the traditional financial services industry
- **Skilled workforce**

EU Blockchain Ecosystem latest developments, Nov 2020
https://www.eublockchainforum.eu/reports

European Parliament Resolution about Blockchain in Education

- Stresses the potential of DLT *for verification of academic qualifications*, encrypted educational certification (e.g. 'blockcerts') and credit transfer mechanisms;
- Stresses that *lack of knowledge about* the potential of DLT discourages European citizens from using innovative solutions for their businesses;
- Highlights the *need to establish non-profit-making entities*, for example research centres, that would be innovation hubs which would specialise in DLT technology in order to perform educational functions regarding the technology in Member State;
- Calls on the Commission to explore the possibility of creating an *EU-wide, highly scalable and interoperable network* that makes use of the technological resources of educational institutions in the Union(…); also encourages Member States *to adapt specialised curricula at university level* in order to include the study of emerging technologies such as DLT;
- Recognises that for DLT to be trusted, awareness and understanding of the technology need to be improved; calls on the Member States to address this through targeted *training and education*.

EPR, Oct 2018 http://www.europarl.europa.eu/sides/getDoc.do?type=TA&reference=P8-TA-2018-0373&language=EN&ring=B8-2018-0397

European Blockchain Services Infrastructure (EBSI) (1)

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

EBSI (2)

IDENTITY & CREDENTIALS

European health insurance card

Upgraded diplomas

Sovereign identity in immunization

Unique European social security number

Immigration control

Azylum procedures coordination

DISTRIBUTED REGISTRY

DLT for the tourism sector

Network of trust for SMEs

eHealth – Digital Service Infrastructure

Supply Chain Visibility

360° vehicle lifecycle management

IMZ – electronic markets for media assets

ENERGY & ENVIRONMENT

BLICK – sustainable cities

Unique Building Identity (UBI) or Unique Object Identifier (UOI)

Green product portfolio

LAW & COMPLIANCE

Compliance by design

Fraud & supply chain integrity

FINANCING & PROCUREMENT

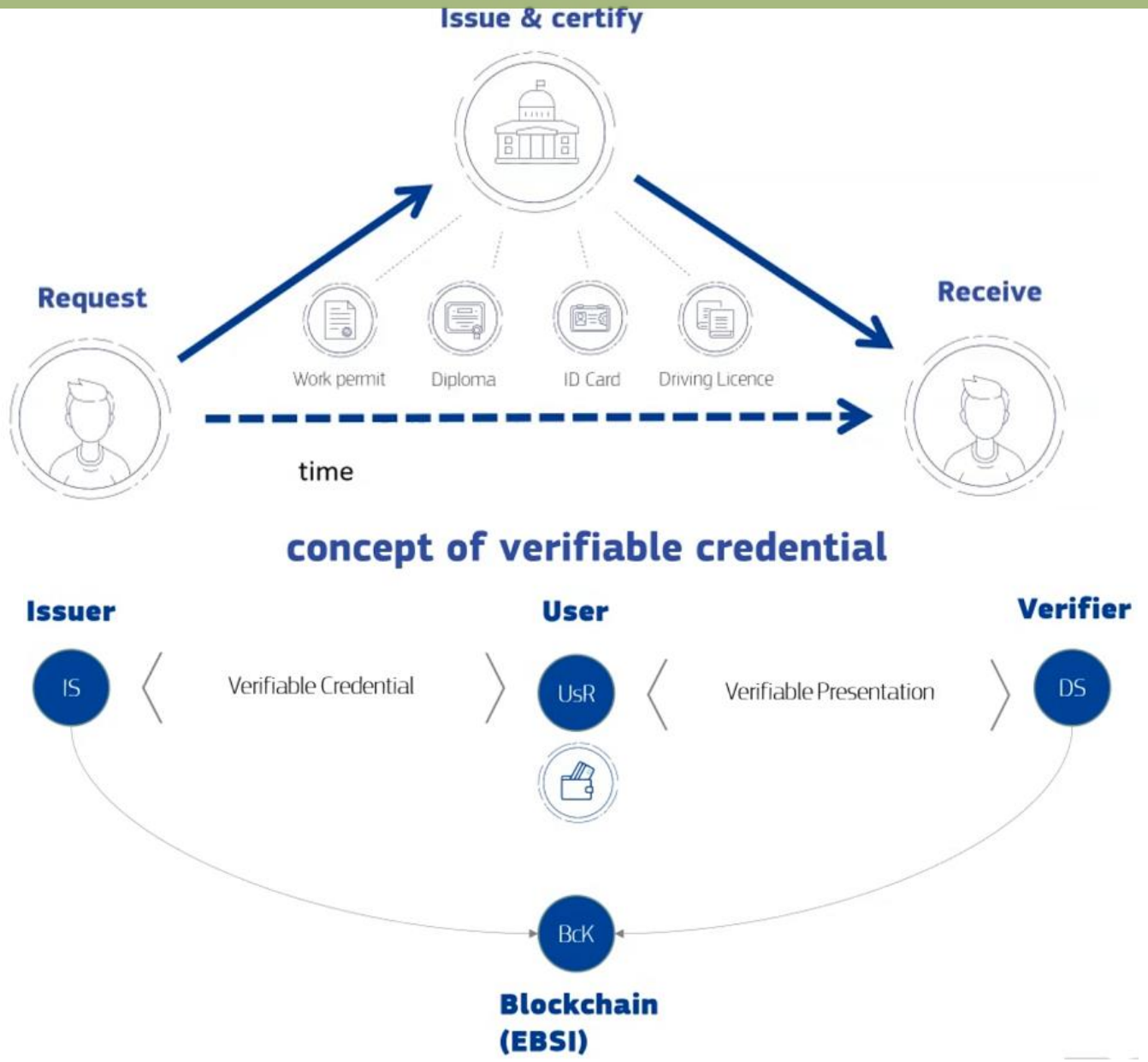
DLT for debt & equity financing

DLT in procurement

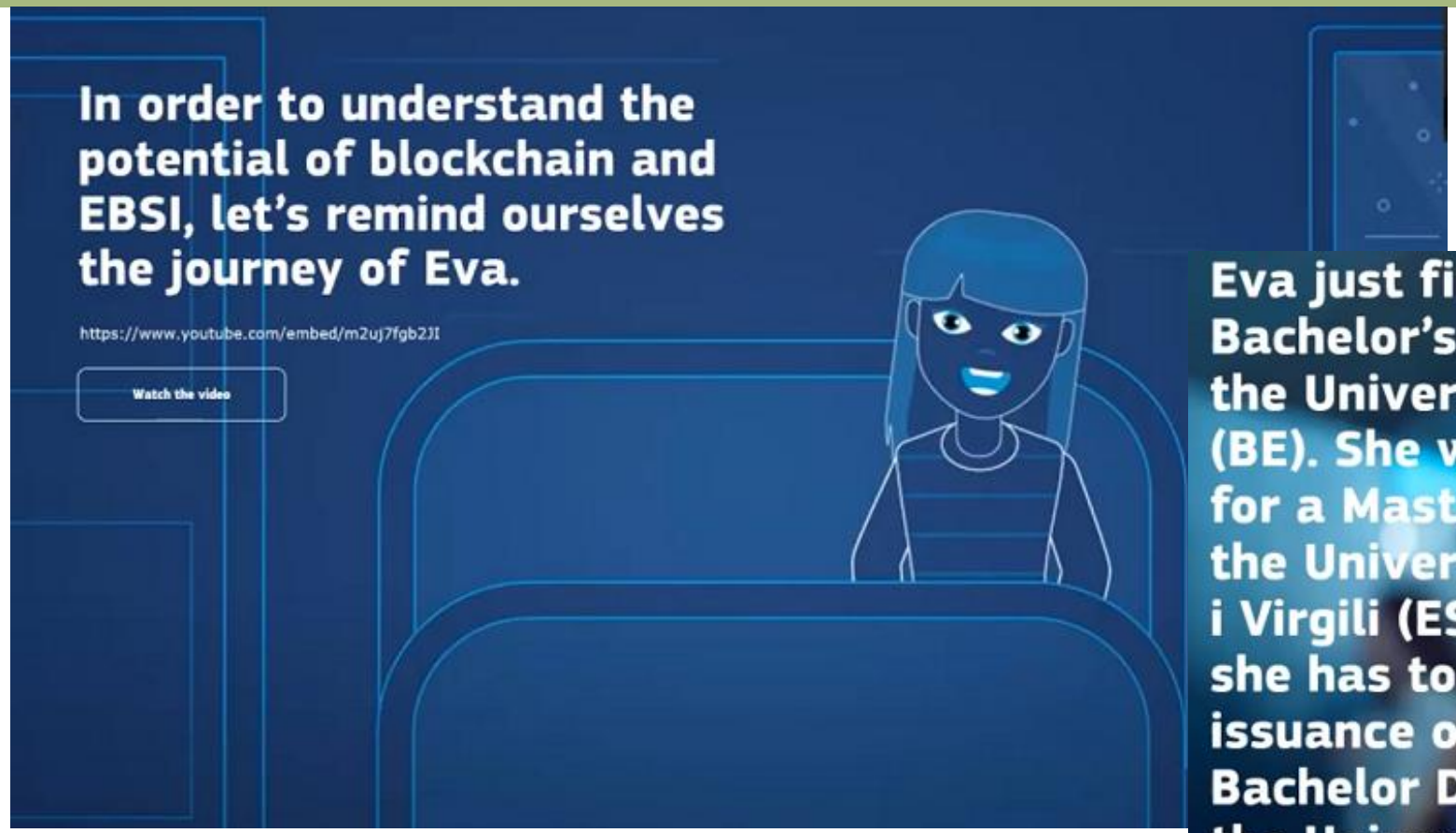
EBSI (3)

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.**

EBSI (4)


Issue & certify
Request
Work permit
Diploma
ID Card
Driving Licence
Receive
time
concept of verifiable credential
Issuer
User
Verifier
IS
Verifiable Credential
UsR
Verifiable Presentation
DS
BcK
Blockchain
(EBSI)

EBSI (5)



https://www.youtube.com/watch?v=m2uj7fgb2JI

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 – http://del4all.eu
https://www.del4all.eu/news/2020/12/02/flagship-technology-projects-in-the-eu/

Micro-credentials

Dec 14, 2020 - https://ec.europa.eu/education/education-in-the-eu/european-education-area/a-european-approach-to-micro-credentials_en

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: anonymous marks/student performance comparison leading to personalised learning, reputation, proof of learning

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

Romanian Educational Blockchain Ecosystem

- Romania has a dynamic Blockchain ecosystem: numerous educational programs, initiatives and policy proposals.
- During the last months: projects and policies for diplomas and micro-credentials on the European Blockchain Services Infrastructure (EBSI).

Romanian Blockchain Ecosystem

Report by Carmen, Victor & Tudor Holotescu Jan 7 · 20 min read

Photo by Lidia on Unsplash

https://carmenholotescu.medium.com/romanian-blockchain-ecosystem-cf29ae26050d

Academic courses and projects

Courses:

- Blockchain programming - Carmen Holotescu, Ioan Slavici University, 2017-18
- Blockchain: Foundations and Applications - Emanuel Onica & Andrei Arusoaie, Alexandru Ioan Cuza University of Iaşi, 2020-21
- Blockchain: Smart Contracts- Florin Craciun, Babes-Bolyai University Cluj-Napoca, 2020-21

Modules:

- Modules in Master courses - Modex and Politehnica University of Bucharest, 2020-21
- Laboratory of Blockchain - by Modex at Bucharest Academy of Economic Studies, 2020
- Many universities have course modules, and Bachelor, Master and PhD theses have Blockchain as topic

1st postgraduate program "Entrepreneurship in Blockchain" at West University of Timisoara, Dec 2020-March 2021 #AntreprenoriatBlockchainUPT

Ciprian Pungilă	(M1) Fundamente tehnice blockchain în sistemele descentralizate și bazate pe permisiuni	UVT/Info
Alexandru Roja	(M2) Oportunități antreprenoriale în blockchain	UVT/FEEA
Cristian Cira	(M3) Modele descentralizate în economie și societate	UVT/Info
Mihai Alisie	(M3) Modele descentralizate în economie și societate	Akasha Elveția

Armand Doru Domuţa	(M2) Oportunități antreprenoriale în blockchain (O2) Aplicații în energie	Restart Energy Timișoara
Carmen Holotescu	(O4) Aplicații în educație (O5) Programarea aplicațiilor pe diferite platforme blockchain	Universitatea „Ioan Slavici" Timișoara
Leonardo Badea	(O1) Aplicații blockchain în domeniul financiar	BNR
Răzvan Bogdan	(O3) Aplicații pentru lanțuri de distribuție	Universitatea Politehnica Timișoara

For Curriculum design:
INATBA. 2021. Blockchain Education: A Prerequisite for Socio-Economic and Technological Advancement. https://inatba.org/news/blockchain-education-report/

Research

Research groups:

- Distributed Systems Research Laboratory at Technical University of Cluj-Napoca
- at eLearning and Multimedia Centres of Politehnica University of Timisoara
- at Faculty of Mathematics and Informatics of the West University of Timisoara,
- Center for Open Education at Ioan Slavici University of Timisoara

Researchers in Romania wrote 93 articles (0.97%), the country on the 31st place out of 72 countries with at least one ISI indexed article.
With 145 ISI citations and 282 on Google Scholars, the most cited article is written by members of the Distributed Systems Research Laboratory, from the Technical University of Cluj-Napoca, coordinated by Prof. Ioan Salomie:
Claudia Pop, Tudor Cioara, Marcel Antal, Ionut Anghel, Ioan Salomie, Massimo Bertoncini. 2018. Blockchain based decentralized management of demand response programs in smart energy grids. Sensors.

Three Romanian universities - members of the Bloxberg.org Trusted Research Infrastructure,

running validator nodes:

- West University of Timisoara,
- Carol I National Defense University
- Ioan Slavici University of Timisoara

Initiatives for the pre-university system(1)

https://inaco.ro/project/gmv3/

In 2020, the Initiative for Competitiveness (INACO) published the 3rd edition of the “Guidance of the jobs of the future”, coordinator Andreea Paul; a chapter is related to Blockchain.
Between 2018–2020, INACO organized f2f and online trainings about the future jobs and emerging technologies, in which over 15,000 pupils took part, becoming familiar with Blockchain too.

Initiatives for the pre-university system(2)

RO-Certs Validator

DIPLOMA

Issued to: ZAHARIA ANTONIA MARIA
Event: Diploma Tinerii INACO

Issuer: INACO
Date: 10.8.2020

Using RO-Certs, in the autumn of 2020, there were issued 300 digital certificates for all the students in the schools of Bucharest who obtained the maximum grade at the National Evaluation and Baccalaureate Exams, in a project of INACO — Initiative for Competitiveness.

Diplomas and Micro-credentials on EBSI (1)

#ebsi4ro
UEFISCDI and UPT – 2021-2023

Call for proposals	CEF-TC-2020-1 – Blockchain		
Objectives	• 1. EBSI infrastructure development and operations • 2. Support to the acquisition of services and applications for the participation of the Member State in one or more EBSI cross-borded use-cases • 3. EBSI capacity building and training activities		
Title of the proposed Action	Connecting Romania through Blockchain		
Start date of the proposed Action	01/04/2021	End date of the proposed Action	31/03/2023
Scope and objectives of the proposed Action			
The central scope of the project "Connecting Romania through Blockchain" is to create an extendable and sustainable ecosystem to facilitate and accelerate the awareness, knowledge and adoption of the European Blockchain Services Infrastructure (EBSI) by the Romanian citizens, businesses, institutions and administration. The main objectives of the projects are: •to set up the first EBSI node in Romania, functional and integrated with the EBSI network and operations; •to deploy the Diplomas' use-case, by developing applications and services for digital credentials and micro-credentials, integrated with the (Single) National Student Enrolment Registry of students; •to support capacity building and training activities for universities, institutions and companies, targeting a broader uptake of the EBSI by public and private services.			

https://ec.europa.eu/inea/en/news-events/newsroom/%E2%82%AC31-million-to-improve-cross-border-digital-services

Diplomas and Micro-credentials on EBSI

#ebsi4ro
UEFISCDI and UPT – 2021-2023

- 1st EBSI node in Q4
- MOOCs modules on Unicampus.ro, workshops and trainings with micro-credentials
- System for university diplomas and micro-credentials on EBSI
- Piloting cross-borders mobility
- Support for implementing EBSI use-case in administration and institutions

Collaboration with the National CRED project:
- MOOC about Blockchain in Education and Research
- Certificates on EBSI

55,000 teachers in schools

https://ec.europa.eu/inea/en/news-events/newsroom/%E2%82%AC31-million-to-improve-cross-border-digital-services

Proposal in Education Strategy - SmartEDU

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/

Thank you!

Invitations:

- MOOCs and training of the “Connecting Romania through Blockchain” project #ebsi4ro
- 8th International WORKSHOP “Open Education and the Emerging Technologies of the 4th Industrial Revolution” - eLSE Conference
  https://www.elseconference.eu/pages/view?page=workshop_11

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