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The blockchain technology in the education sector

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International context



Paris Communiqué (EHEA):

«We also urge the adoption of transparent procedures for the recognition of qualifications, prior learning and study periods, supported by interoperable digital solutions».

Council recommendation on the Automatic Mutual Recognition of Diplomas and learning periods abroad (European Council):

«Hereby welcomes the Commission's intention to:

[...]

Explore , in cooperation with Member States, the potential of new technologies, such as blockchain technology, to facilitate automatic mutual recognition».

(Draft) Global Convention on the Recognition of Qualifications concerning Higher Education (UNESCO):

«SECTION III. BASIC PRINCIPLES FOR THE RECOGNITION OF QUALIFICATIONS CONCERNING HIGHER EDUCATION

Article III [...]







8. Parties commit to adopt measures to eradicate all forms of fraudulent practices regarding higher education qualifications by encouraging the use of contemporary technologies and networking activities among Parties».

Where we started...



 CIMEA

Credential evaluation needs

-  Be sure that a **qualification is authentic** and awarded to a single person by an authorised **competent authority**
-  Ensure the possibility to **share our evaluation report** to other institutions in safe, open and transparent way
-  **Simplify the access** to courses of study and job opportunities to people
-  **Simplify the comprehension of a qualification** by the receiving institution/employer
-  Increase a **system of trust** among awarding institutions
-  Be in line with **international processes** and **technological advances**



Blockchain-based qualification service



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Thanks to the «**diplome**» service, we made available a "Wallet" for people, where it is possible to store certified qualifications using blockchain technology, creating a **decentralized, transparent, certified, and unchangeable** qualification management system.

The **qualifications are uploaded directly into the «Wallet» by the certification bodies** (universities, ENIC-NARIC centres, national administrations, etc.) using **blockchain** technology to allow **secure sharing of data**, respecting **privacy**: the **holder of the qualification is the only owner of the information** and of the cryptographic key that allows access to the saved data, though a mechanism fully compliant with the principles expressed by the *General Data Protection Regulation (GDPR)*.

The *diplome* service



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01

Students

Students of any degree can store their qualifications within their portable, secure, personal space enabling easy movement

02

Professionals

Any professional of any type as physicians, nurses, lawyers can keep their continuous professional history

03

Experts

Experts can keep track of their expertise with a undeniable catalogue of certified capabilities

04

Qualified workers

Qualified workers can keep alternating work and studies facilitating their recovery of working places

05

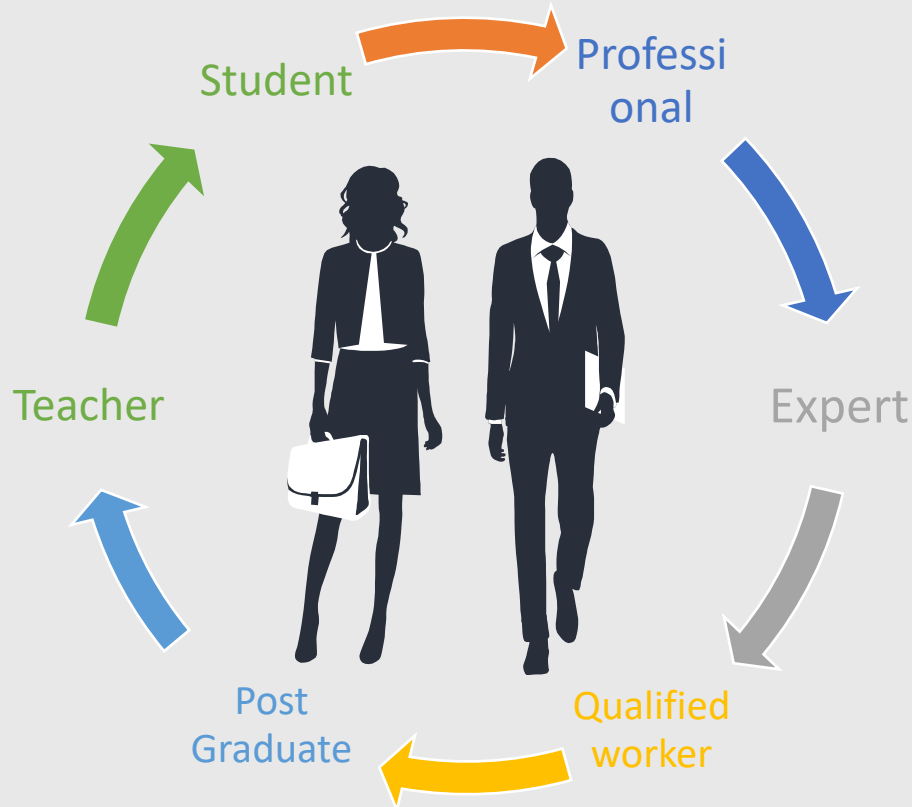
Post Graduate

All researches, papers and publications can also be stored within the wallet guaranteeing notarization and proof of ownership

03

Teachers

Teachers can keep track of their courses and extra qualifications



- ✓ *Diplome* is a service oriented to users: the wallet is portable as any user will own only a **SINGLE** wallet where to store his titles whatever number of accounts he may have in different qualification institutions.
- ✓ Universities or other institutions will join *Diplome* **without any change in their existing technologies**
- ✓ Any institution will join *Diplome* through an official and certified process: only after they will receive an 'institution wallet' and will be able to add qualifications to user wallets
- ✓ “*Diplome*” is the network of wallets plus the governance model that makes the service reliable and effective

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The system implements a **global network open to:**



International organisations and processes: use a transparent and free of charge system to develop policy goals in the field of digitalisation and automatic recognition



higher education institutions: use the ecosystem in all the phases of the academic career (enrolment, study programme, to register the exams taken and the corresponding marks, awarding phase, when the final qualification is registered in blockchain);



stakeholders awarding non academic qualifications: certificates attesting a new training programme can be uploaded in the student's wallet;



cross certification authorities: stakeholders assessing qualifications, such as an ENIC-NARIC, can provide information about transparency, authenticity, understanding and comparability of qualifications at international level directly in blockchain.



professional certification authorities: issuing professional credentials designed to help professionals enhance their job performance and marketability in their respective fields.

The *diplome* eco-system



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- *Diplome* is **citizen-oriented**
- *Diplome* is **free of charge**
- *Diplome* is based on **open technologies**
- *Diplome* **does not force organizations to a specific technology** but adapts to the existing
- *Diplome* **does not control user identity** but is open to any external identity system
- *Diplome* is **fully compliant with all metadata included in already existing Bologna and EU instruments** (Europass documents, Diploma Supplement, etc.)

The *diplome* concept



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Data privacy and Data protection



Data minimization

The only data saved within the blockchain structure are the **key metadata required to provide trusted information** about the education subject.

Accuracy & Quality

All data come from entitled Certification Authorities or the user itself. **The signature of the source of the data is saved within the data structure itself.**

Disclosure limitation

All data related to any user is in his full control and only the user itself can give access rights to such data.

Openness and Portability

Full Right to Data Portability to Diplome users: open-standard and language-independent JSON format, **compatibility is guaranteed** to any modern IT system.

Information security

Once data is saved within the chain, it becomes **temper resistant (immutable)** and any modification becomes impossible also for system administrators.

Different data protection profiles



Diplome aims to be a worldwide solution the data protection approach is flexible in order to accommodate different legislations and every single organization part of *diplome* is free to choose any of the profiles below. At the moment 3 data protection profiles are envisages:

Profile 1

The data structure representing the issued qualification is completely anonymized and no personal data (or data related to personal data) is stored within *diplome* wallet. An external qualification digital document would be needed to complete the qualification certification process.

Profile 2

The data structure representing the issued qualification is completely anonymized and protected with double encryption using the qualification organization key and user key. No identity data is stored within the qualification dataset while full details of the qualification is.

Profile 3

The data structure representing the issued qualification is completely anonymized and protected with double encryption using the qualification organization key and user key. Identity data is stored into the wallet (e.g. SSI reference) together with the qualification dataset including full details of the qualification.

Underlying technology



Diplome's actually utilize a standard Ethereum blockchain and can run on any ethereum-based variants. The launch of *diplome* will happen on a Quorum implementation (Alastria).

Diplome's building blocks are:

User's Wallet

Diplome's user wallet is composed by a standard user blockchain address/account and one or more smart contracts each handling one or more qualifications. There can be more smart contracts as each of them can handle qualifications based on a pre-defined Profile: there are therefore up to 3 smart contract types even though the structure can be extended in future following further models.

Organization's Wallet

An organization issuing a qualification must hold a blockchain address/account connected to an Org-SmartContract with specific characteristics required to identify the organization and its permission types. Only an Org-SmartContract can add a qualification in a user's wallet.

Diplome's Oracle

One of the key governance processes of *diplome* is the one that allows external and independent verification if an entity is a certified authority in *diplome*'s ecosystem. Anyone can query *diplome*'s oracle to verify if a specific organization is part of *diplome*'s network

Qualification process

A



Qualification

User request entity to load qualification in his *diplo*me wallet.

B



Organization

Organization loads metadata in org wallet, signed with its priv-key and user pub key.

C



*diplo*me

Organization transfers metadata to user's wallet. Users wallet checks *diplo*me oracle to verify organization status

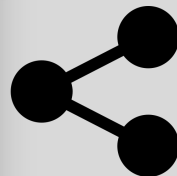
D



User

User can with ANY open tool check qualifications saved within *diplo*me

E



User

User can share his qualification data with any external entity, in or outside *diplo*me; entity can independently verify veridicity of qualification

diplo
me

Sneak peek



diplome CIMEA THE ART OF CONNECTING ACADEMIA

Welcome Andrea Sanchi

Services / My Diplome

My Diplome

CIMEA, through the "diplome" service, has developed a «Wallet» for each holder of academic qualifications, where it is possible to upload one's own qualifications using **blockchain** technology, creating a **decentralized, transparent, certified, and unchangeable** academic qualification management system with the aim of making it easier for a student, a graduate or a certified professional to enrol in a foreign university and to enter the labour market of another country. The **digital-Wallet-of qualifications** is a private space owned by each user, who can upload all the qualifications of his/her academic and professional career free of charge.

The qualifications and documents uploaded directly into the «Wallet» by the certification bodies (universities, ENIC-NARIC centers, national administrations, etc.) use **blockchain** technology to allow **secure sharing of data**, respecting **security and privacy**: the holder of the qualification is the only owner of the information and of the cryptographic key that allows access to the saved data, in full compliance with the principles expressed by the *General Data Protection Regulation (GDPR)*. Access to information recorded on *blockchain* from a certified source allows **direct verification of the authenticity** of the qualification and documentation, as well as **portability of the qualification** in digitally. Moreover, frauds in the academic field can be minimized: the data saved by *blockchain* technology is unchangeable and cannot be altered.

Download Keystore file Print paper wallet

HOME PAGE My Diplome PROFILE Account My Requests Documents Qualifications Competences SERVICES Information request Comparability Verification INFO Contacts FAQ

Qualifications

In this section the personal documents useful for identifying the applicant of the CIMEA service can be uploaded, such as: identity card, passport, residence permit, etc.
In this section, the Consent Form, of help in the processing of personal data, must necessarily be uploaded.

DOWNLOAD CONSENT FORM

All the documentation uploaded will be used for the evaluation of the qualifications carried out by the experts of CIMEA: PLEASE REMEMBER TO UPLOAD DOCUMENTATION IN SUCH A WAY THAT EVERY ELEMENT OF THE DOCUMENT IS READABLE IN ORDER TO AVOID FURTHER REQUESTS FOR SENI DOCUMENTATION AND A CORRESPONDING INCREASE IN THE AMOUNT OF TIME NEEDED TO PERFORM THE REQUESTED SERVICES.

HIGHER EDUCATION QUALIFICATION ADD NEW DOCUMENT

SECONDARY SCHOOL QUALIFICATION



Thank you

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<http://www.cimea.it/it/progetti-in-evidenza/diplome-blockchain4people/blockchain.aspx>