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Blockchain and digital credentials: Legal aspects of reliability, governance and protection of rights

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Why are micro-credentials important in the EU?

- To boost quality and accessible lifelong learning
- To facilitate the way in which skills are signaled and understood

Which are the basis of the European approach to micro-credentials?

European Commission Definition (2022):
"A micro-credential certifies the learning outcomes that a person has acquired following a short learning experience, which has been assessed and is organised according to transparent standards."

Eleven European standard elements to describe a micro-credential (Annex I)

Ten European principles to design and issue a micro-credential (Annex II)

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Micro-credentials Ц Standard elements and principles

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✓ **Annex I – Eleven European standard elements to describe a micro-credential:**
Title of the micro-credential
Identity of the holder (learner/beneficiary)
Learning outcomes demonstrated by the holder
Estimated workload (in hours and/or ECTS)
Level according to a national qualifications framework and/or the **EQF**
Type of learning (formal, non-formal)
Assessment methods
Delivery mode (in-person, online, blended)
Quality assurance applied
Issuer – the institution/organisation awarding the micro-credential
Date of issue and, if applicable, **expiry/validity period**

✓ **Annex II – Ten European principles to design and issue a micro-credential**
Learner-centred – designed to meet learners' needs
Relevance – meaningful learning and useful competences
Transparency regarding content, learning outcomes, workload, level
Quality – supported by reliable and recognised quality assurance
Flexibility – modular, personalised, and stackable
Inclusiveness and equity in access
Portability – recognised and usable in different contexts
Comparability across countries and educational systems
Verifiability – clear and verifiable information about issuance
Recognition – can be recognised by institutions and employers

The EU work on micro-credentials

- European Skills Agenda 2020-2025
  - 2022 Council Recommendation on a European approach to micro-credentials for lifelong learning and employability
- European Year of Skills 2023-2024
- **Union of Skills 2025**
  - Strategy to expand the use of micro credentials as flexible learning solutions, in line with the European approach, to ensure that they are
    - Trusted, understandable, issued digitally and comparable across sectors and countries.
  - Construct a legal framework for **individual/subjective professionalism**
    - the introduction of **numerous technical and operational instruments** :
      - the Europass framework;
      - Youthpass;
      - the European Qualifications Framework (EQF);
      - the European Credit Transfer and Accumulation System (ECTS);
      - the European Credit System for Vocational Education and Training (ECVET);
      - the European Digital Credential for Learning (EDC);

Microcredentials as crucial part of subjective professionalism

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The **portability and transferability of competences**.

- the right to the **portability of professional capital**, closely linked to
  - the principle of free movement and mobility of persons,
  - the principle of the usability of competences within the European Credit System for Vocational Education and Training (ECVET).
- The aim is to **transform learning into a portable right**.

Among the many objectives of transparency, the most relevant include:

- increasing the visibility of competences
- fostering responsibility and awareness among individuals with regard to the training undertaken and their own professional pathway (**engagement**);
- **promoting the usability of competences** by:
  i. recomposing fragmented professional identities;
  ii. facilitating the portability of the competences acquired;
  iii. **supporting** mobility in the labour market and **free movement** at national and UE level;
  iv. **facilitating transitions** between learning systems and levels;
- **improving the investment** of public and private resources allocated to training and active labour market policies, by facilitating their planning;
- **facilitating the matching** of the supply and demand for competences and labour.

Microcredentials - documentation and transparency

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Systems for documentation and transparency answer to the needs for recognizability and usability of learning outcomes.

- Certification of competences is used in different contexts and with multiple meanings and, at the same time, the landscape of competence "certification" is constantly evolving:
  - **the public system** of competence certification has as main objective the usability of informal and non-formal competences in the labour market
    - Highly bureaucratic approach
  - **private systems** that are developing along parallel lines,.

In both cases, the reliability of transparency mechanisms depends on the same several factors:

- consistency with existing regulatory frameworks;
- the form of representation, more efficient if usable in different contexts of use;
- the contents attested;
- the requirements and referencing standards adopted;
- the quality of the process of assessment and identification of competences; and
- last but not least, the **credibility of the body responsible** for delivering and attesting learning outcomes.

The prerequisite of any reference framework is the **legitimation system**, which may be:

- based on legal authority, or
- based on the consent expressed by the social partners.

Four scenarios for microcredentials

Scenario 1:

Supply driven microcredentials (as part of formal education) for further learning

Scenario 2:

Supply driven microcredentials for LM entry and job setting (professional credentials)

Scenario 3:

Demand driven microcredentials (examples of enterprises/sectors)

Scenario 4:

Microcredentials for vulnerable groups /groups at risk (upskilling/reskilling)

Formal Laerning
- Takes place in recognised education and training systems
- Structured, intentional, assessed
- Leads to official qualifications

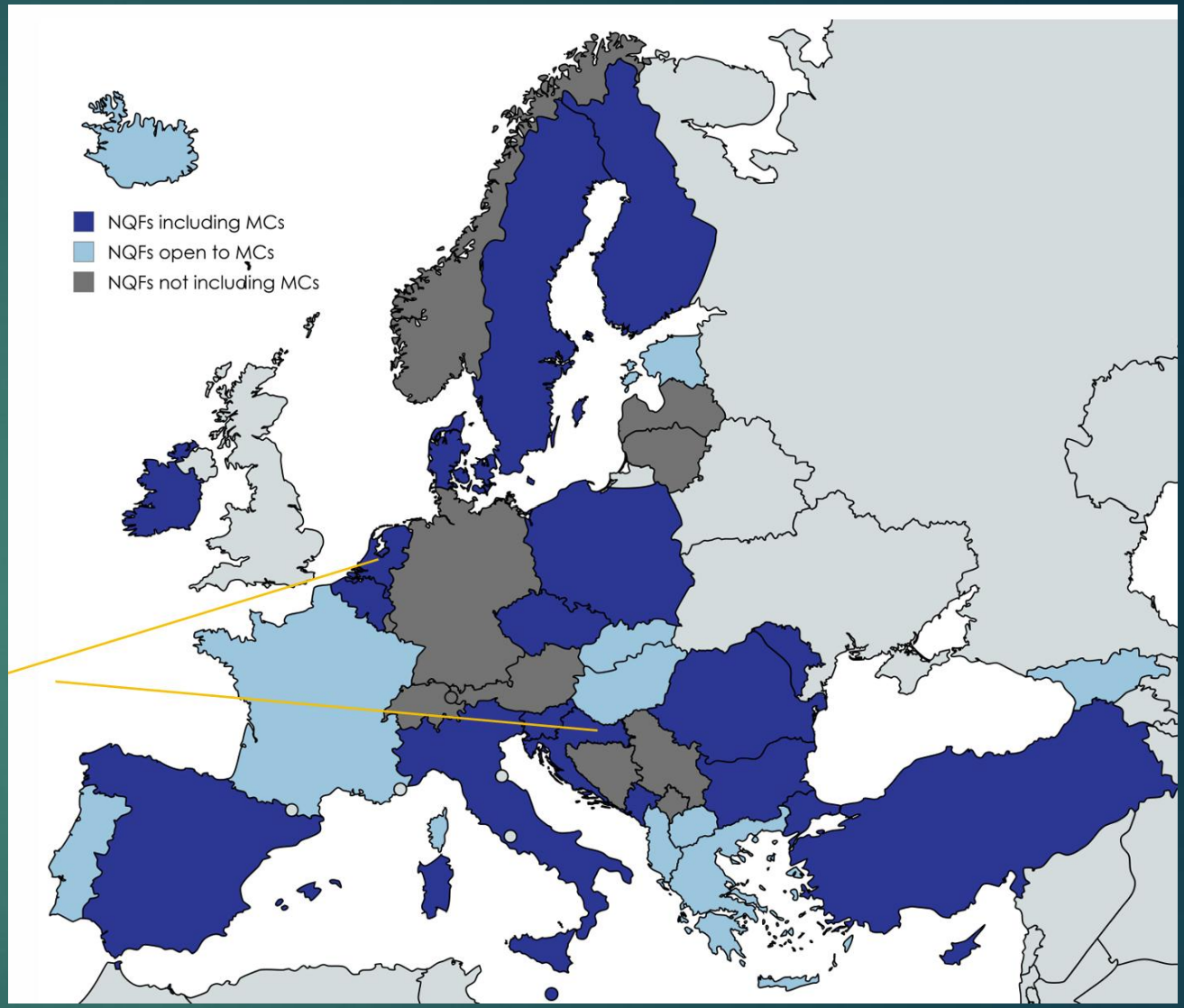
Non-Formal Learning
- Occurs outside formal systems
- Organised and intentional
- Usually does not lead to formal qualifications

Informal Learning
- Results from everyday life and work experience
- Unstructured and often unintentional
- No automatic certification

Microcredential in NFQs

CROATIA: Micro-qualifications are part of adult education (levels 2 to 5). They can be stacked leading to a full qualification. Higher education institutions can offer lifelong learning programmes; only programmes aligned to the CROQF can be considered as microcredentials and be financed through vouchers.

NETHERLAND: Microcredentials awarded **outside formal education** are included in the NQF. The procedure includes a validity check on the training provider as a conditional step. Then providers apply for a level classification. MCs should be concluded with a summative assessment and be labour market relevant



Analysis based on data from 42 NQFs (EU MSs, EFTA and candidate countries)

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Typology of Non-formal MCs

(1) **Non-formal MC by providers of formal programmes**: Benefit from the institutional quality assurance systems already in place within their issuing organisations

(2) **Professional competence certificates**: Certificates showcase the practical skills and knowledge required for specific occupations. Professional competence certificates are subject to some level of public oversight

(3) **International standard based credentials:** Not linked to broader qualification systems, developed or endorsed by professional associations, industry bodies or specialist training providers. QA is varied, depending on international standard

(4) **Sector-recognised credentials:** Certify workers for the requirements set out by professional groups. Learning content, certification and quality assurance are developed by the sector itself

(5) **Employer-issued credentials:** Awarded for programmes offered by (providers contracted by) companies directly, with demands on QA typically governed by the employer itself

(6) **Badges:** Most flexible form which allows to validate acquired skill or knowledge, with non-standard and decentralised approach to QA

Providers

- offering programmes in the formal domain (e.g Universities and VET institutions)
- Private training providers
- Sectorial organisations
- Employers:companies designing and issuing training certificates
- NGOs and community initiatives

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Blockchain and Certified Recording of Information

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Certification can stem from the technology used for information recording (transparency):

- ✓ **Blockchain**
- ✓ Electronic time-stamping,
- ✓ **cryptography**,
- ✓ **digital signatures**.

They all contributes in a different way to guarantee

- Immutability
- Stratification

Blockchain is based on five fundamental concepts:

- **Decentralization** – Blockchain is a peer-to-peer (P2P) network in which control is evenly distributed among users, preventing any single participant from hacking, manipulating, or shutting down the chain.
- **Integrity** – All participants have decision-making rights.
- **Security** – Since blockchain is distributed, there is no central point of control. Advanced cryptography (PKI – Public Key Infrastructure) protects transactions and guarantees user authenticity.
- **Inclusion** – All users are independent and can participate without discrimination.
- **Privacy Protection** – Strong hash cryptography allows secure data exchange without revealing identity.

Blockchain Ц Key Points

How a Blockchain Transaction Works

Request – A person requests a transaction.

Transaction – The transaction is broadcast to a P2P network.

Validation – The network validates the transaction through algorithms.

Block Creation – Validated transactions are grouped into a block.

Block Insertion – The block is added to the existing blockchain and becomes immutable.

Completion – The transaction is completed and stored in a public ledger.

Public Blockchain

Open access to anyone; anonymous participation; consensus via Proof of Work or Proof of Stake; slow transaction speed.

Federated / Consortium Blockchain

Controlled by multiple entities; access limited to consortium members; shared governance.

Private Blockchain

Controlled by a single entity; only authorized participants; faster and more efficient.

Blockchain and Microcredential protection

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Technological platforms based on blockchain technologies and specialised in the storage and management of intangible asset documentation brings indubitable benefits

- **once a document has been stored** on this platform, a legally valid certificate is generated attesting to its registration, showing the date and time of upload

Blockchain has proven to be an extremely useful tool for **copyright protection** to

i. assign a specific time and
ii. attribute authorship to creative or innovative works,
iii. contribute to the certainty of the information recorded in a blockchain ecosystem.

Micro-credentials, in the large majority of the cases, are NOT creative works of the mind, but in the event of **disputes over the ownership of MCS**, as well as one over the authorship of one o more works, **it is crucial to have reliable evidence** that can attest the creation of the MCS/work at a specific moment in time.

Blockchain-based applications offer **numerous advantages**, including

- tamper-proofing,
- reliability,
- low and affordable costs,
- privacy protection
- legal validity of certification,
- prevention of illegal behaviour by third parties.

Blockchain and Microcredential protection - NFT

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Non-fungible tokens are unique, irreplaceable, non-repeatable and indivisible.

- Anyone who owns one has a certificate relating to a specific asset (for example, an NFT can represent a certificate of ownership of a real or digital document).

The NFT **does not include the associated document or digital content**.

- It consists of a set of metadata, with a unique identification code for the linked digital asset.

The Court of Rome was the first European judicial authority to issue **an injunction prohibiting the creation and marketing of Non-Fungible Tokens** and, in a recent order, ruled that:

- "The creation of NFTs depicting a footballer wearing a football team's jersey is unlawful if the team has not authorised the use of its trademark for this purpose".
    - Compare with a MCS issued without the authorization of the provider to the use of his trademark

NFT creation is clearly linked to **subsequent exchange** through smart contracts, but is also true that such exchange activity is not necessary for its existence.

Interoperability between Blockchain and Micro-credential Systems

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The expansion of micro-credentials across formal, non-formal and informal contexts requires **robust governance and reliability mechanisms**.

- A promising development lies in the **interoperability between Micro-credential Systems (MCSs) and blockchain technology**.

Blockchain enhances MCS governance through

- **transparency**,
- **immutability**,
- **security**
- **decentralisation**.

The integration must be grounded in **existing legal frameworks** and a clear understanding of the **law–technology interaction**.

- Blockchain-based models can support a **"compliant by default" approach**, ensuring automatic legal compliance, trust and long-term reliability of micro-credentials.

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