

# SKILLS FOR OPEN BADGES AND DIGITALLY SIGNED CREDENTIALS IN THE NEW ERA

*Collated results from the country  
reports from Hungary, Spain,  
Greece, Latvia, Lithuania and at  
International level*

**Digitally Signed Credentials  
and Open Badges in VET and HE**

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Erasmus + KA2 Strategic Partnerships  
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## LIST OF ACRONYMS

**CPD - Continuing Professional Development**

**DSC – Digitally Signed Credentials**

**EDCI - Europass Digital Credential Infrastructure**

**ELM - Europass Learning Model**

**ESCO – European Skills, Competences, Qualifications and Occupations**

**EQF – European Qualifications Framework**

**EU – European Union**

**NQF - National Qualification Frameworks**

**HE – Higher Education**

**IMS - Instructional Management System**

**IO – Intellectual Outcome**

**IT – Information technologies**

**OB – Open Badges**

**VET – Vocational Education and Training**

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## INTRODUCTION

### 1.1 THE PROJECT AND IO1

The DISCO VET project aims to:

- build on the possibilities of the open standard of Open Badge 2.0 to work out a meaningful Vocational Education and Training (VET from Now on) and Continuing Professional Development (CPD from now on) **course** based on EU VET standards, on the OEPass - Open Education Passport project's research findings, on the newly developed EDCI (Europass Digital Credential Infrastructure) standards for interoperability, and on the partners own national standards and classifications. The result will provide **a grid of extra metadata accompanying a Badge** which would enable better mapping and manageability of badges for VET and HE providers and other stakeholders.
- develop an **open-source sample displayer platform (repository), where educational providers and learners alike could collect (issue, earn, store, view) their badges** with more meaningful and more comprehensive searching possibilities, than internal repositories (like Moodle or Canvas) or third-party products (like Badgr) are offering now. Owning the displayer repository by consortium partners would enable us bridging it to EDCI, as well as the rights to further develop the software.

The project is organised in different Intellectual Outcomes which operate in the project as building blocks. This report is part of IO1 ***Skills for open badges and digitally signed credentials in the new era.***

### 1.2 AIMS OF THIS REPORT

This study aims at providing the base for the development work. It is to scan the rapid changes and developments of the open badge ecosystem, VET system and technical solutions: technical solutions; role-based requirements of issuers, earners, validators etc.; and a VET system overview.

**The findings will feed into the O2 displayer, O3 Course and O4 Lessons Learnt Kit and users guide.**

### 1.3 METHODOLOGY AND PARTICIPANTS

The activities leading to the elaboration of this report were implemented from December 2020 until July 2021. They were implemented by teams in the partner countries in Hungary, Spain, Greece, Lithuania, Latvia and at EU level (Partner from Malta).

This report follows the instructions of the “DISCO VET O1 Overall Methodology” planning document. In this frame, a specific desk and field research was implemented in all the countries involved: Desk research involved the review of national and regional legislation and state of the art report included in chapter one: desk research. Field research involved the implementation of interviews and an online survey that are included in chapters 2, 3 and 4 of this report.

As to the **target group**, the project addresses:

- VET (Vocational Educational Training) institutions, academic and non-academic staff involved in the validation and certification processes of VET (as well as HE and CPD) organisations.
- Teacher training and further educational institutions.
- Institutes and Pedagogical Centres dealing with internal CPD for: Public Employees, Engineers, HE teachers and VET teachers.
- Teacher further educational and training of trainers' experts.
- University rectorate, deans' office staff, stunt organisations.
- Managers, HRs, entrepreneurs, chambers of commerce, company associations.
- Researchers, e-learning experts.

The **desk research** focused on the developments in Hungary, Spain, Greece, Lithuania, Latvia and at EU/International level regarding open badges and digitally signed credentials, IT and educational administration technology of the last 2 years in partner countries, EU and beyond.

The **field research** included:

- **Online Interviews:** The interviews have been the means to obtain employers, trainers and learners' input with regard to the challenges in this area, how they are addressed so far and what services, tools, training content can be useful for their stakeholders' specific roles (issuer, earner, displayer, validator), according to their views. Initial target: 3-5 in-depth expert Interviews per partner/EU level.
- **Survey:** Online questionnaires to obtain feedback from Issuers of open badges and digitally signed credentials, earners (learners) and validators to gain insight into the demand side regarding OB and DSC. Initial target: 30 on-line questionnaires per partner/EU level.

The participants in the field research activities were:

COUNTRY/EU	INTERVIEWS	SURVEY
GREECE	3 experts: 1 Certified VET trainer, 1 Professional development consultant, 1 Employee	<b>21 respondents</b> Profile #1: 10 work in the field of education as a trainer/teacher/lecturer or administrator Profile #2: 4 are employers or HR manager or agency or assess skills of employees and job candidates Profile #3: 7 are employee/job seeker/adult learner/student
HUNGARY	3 high level experts in the field of open badges and digitally signed credentials	<b>31 respondents</b> Profile #1: 25 work in the field of education as a trainer/teacher/lecturer or administrator Profile #2: 2 are employers or HR manager or agency or assess skills of employees and job candidates Profile #3: 4 are employee/job seeker/adult learner/student

COUNTRY/EU	INTERVIEWS	SURVEY
LATVIA	3 experts – specialising in information and communication technologies, and on work-based learning methodologies in the EU.	<b>30 respondents</b> Profile #1: 10 respondents are employees / students / learners / adult education participants, VET students, participants of adult education program, internship supervisors, university students. Profile #2: 10 issuers of certificates, working in the field of education - educators, teachers, administrative staff, industry representatives, practice managers, VET staff, representatives of general secondary education. Profile #3: 10 certifiers of certificates (skills), representatives of the field of education - employees of the administration, VET staff.
LITHUANIA	3 experts in the field of open badges and digitally signed credentials	<b>31 responses.</b> Profile #1: 18 work in the field of education as a trainer/teacher/lecturer or administrator Profile #2: 6 are employers or HR manager or agency or assess skills of employees and job candidates Profile #3: 10 are employee/job seeker/adult learner/student
SPAIN	3 high level experts from VET and Higher Education	<b>31 responses.</b> Profile #1: 20 work in the field of education as a trainer/teacher/lecturer or administrator Profile #2: 5 are employers or HR manager or agency or assess skills of employees and job candidates Profile #3: 6 are employee/job seeker/adult learner/student
EU	2 experts from higher education – France and Italy	N/A

Table 1: Field Research Participants. Own elaboration.

The methodology followed included the following steps:

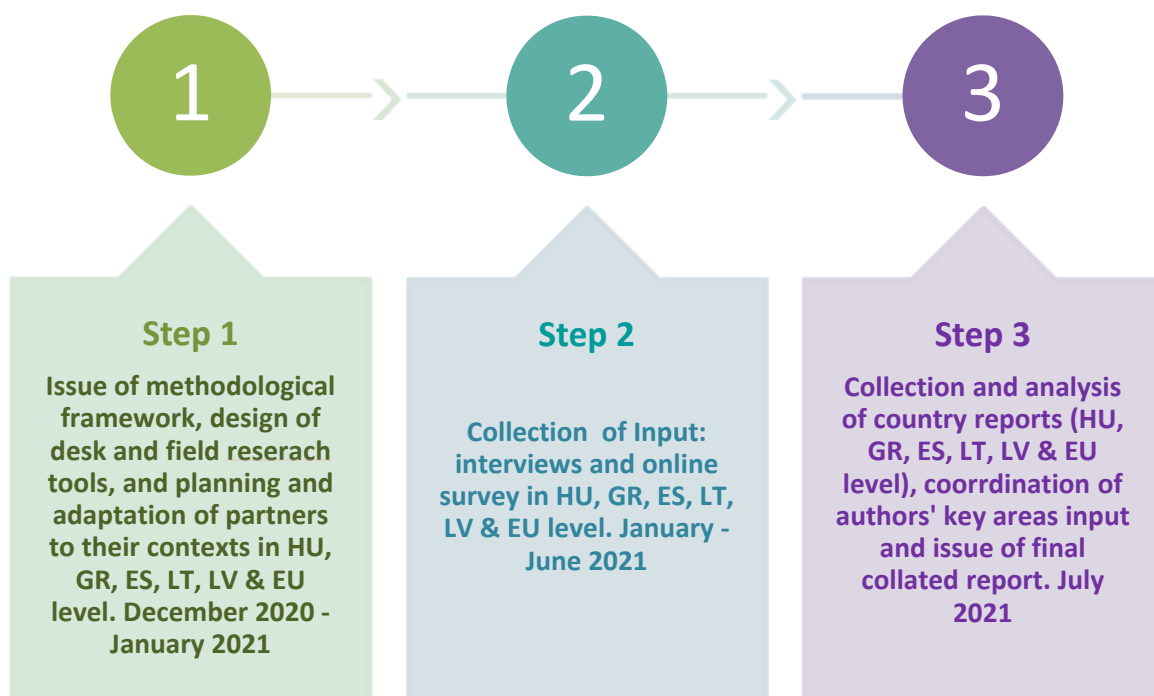


Figure 1 Methodology. Own elaboration.



## 2 KEY AREAS COVERED

The key areas to be covered in this report are Technical developments, Role based requirements and VET systems overview:

**Technical developments:** This section presents a desk research overview of the educational credential state of play from a technical perspective. This part is highly globalised, as standards and options are globally available, while research and development can be locally selected and implemented. The methods have mainly included desk research in English and the contents have been divided in 3 sections:

- General context and relevance of qualifications in the educational landscape (educational credentials and role of digital credentials: micro-credentials)
- Digital credentials: Evolution of relevant implementation initiatives and tools (EQF/ESCO, Qualifications Metadata Standard and Europass Learning Model, plus different projects, and initiatives)
- Digital badges (including IMS Open Badges and W3C Verifiable credentials)

**Role based requirements:** This section presents an overview of user needs requirements from the results obtained from both desk and field research. The freely adaptable Open Badge 2.0 standard enables to design and implement different information, services that can be developed in O2. It focuses on user needs according to the specific role one might be holding in the whole certification and validation process. Learners as earners would have different needs from issuer organisations, displayer entities and third-party validators who want to see a trusted and transparent system of high quality. This set of requirements is interesting for quality managers and experts, and national and EU level organisations (ministries, educational research organisations, Chambers). The contents have been divided in 3 sections:

- Introduction
- Role-based requirements: implications for the DISCO VET open badge displayer
- Role-based requirements: implications for the DISCO VET course on open badges

**VET systems overview:** This section presents, from the results obtained from both desk and field (survey and interviews) research, the state-of-the-art EU and national level standards and directives plus the de facto practical typology organisations used to define an agreed DISCO typology and categorisation that should be developed and implemented in the IO2 displayer. The current open standard allows using freely and typology to use as categories in the displayer system. The contents have been divided in 4 sections:

- Introduction
- Situation in Partners Countries
- Results of The Interviews
- Results of The Survey

### 3 TECHNICAL DEVELOPMENTS

Author: Carmen L. Padrón-Nápoles, KIC.

#### 3.1 GENERAL CONTEXT AND THE RELEVANCE OF QUALIFICATIONS IN THE EDUCATIONAL LANDSCAPE

The European Union (EU) definition of qualification as “a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standard” (ESCO) tends to incorporate three distinct concepts:

*Qualification standards:* these define generic characteristics of one or more qualification specifications. Thus, a qualification standard might describe characteristics of “qualifications at qualification framework level 5” or “advanced qualifications in beauty services”.

*Qualification/learning opportunities:* these provide more detailed information about where a student can enrol to receive a qualification, and detailed information about the learning and assessment process that will lead to the award of said qualification.

*Qualification awards:* credentials given to students documenting the outcome of their learning.

Transparent information on qualifications is essential to support the full process of recruitment, career management, lifelong learning strategies and recognition. This requires stakeholders (awarding bodies, country authorities, employment services, education/training institutes, social partners, jobseekers, learners, employers, etc.) to cooperate with each other, to share information and to develop a common understanding of information relating to qualifications, occupational experiences and skills acquired in other countries.

Common definitions of qualifications across European countries tend to define qualifications in terms of learning outcomes covering in most cases knowledge, skills and wider competences ranked according to a single hierarchy of levels (usually 8–12) and an inclusive set of occupational and/or knowledge fields (usually 12–15). Countries focusing on classifying qualifications against a framework tend to set this within a broader context of improving the labour market responsiveness of education, establishing pathways between Vocational Education and Training (VET), general and higher education, improving quality via quality assurance, and shifting from input- to outcome-based educational systems. To this end, the external dimension of qualifications policy in the EU focuses on using qualifications to help develop educational systems in member countries, as well as ensuring recognition of qualifications from member countries within the EU via ENIC/NARIC networks (ENIC- NARIC networks, 2021).

#### Educational Credentials

A **credential**, in its most essential form, is a documented statement awarded from one party to another describing the latter qualities. When referring to educational credentials, those are testimonials or certified documents showing that a person is entitled to credit or has a right to exercise official power (Merriam-Webster Dictionary-Credential definition) as the holder has achieved certain learning outcomes and thus qualifies for specific function/position.

As described in the following figure, there are different types of credentials according to the type of settings (formal or non-formal), the type of recognition (educational, labour market), acquired competences (knowledge, skills, or attitudes) and level of achievement (participation, completion).

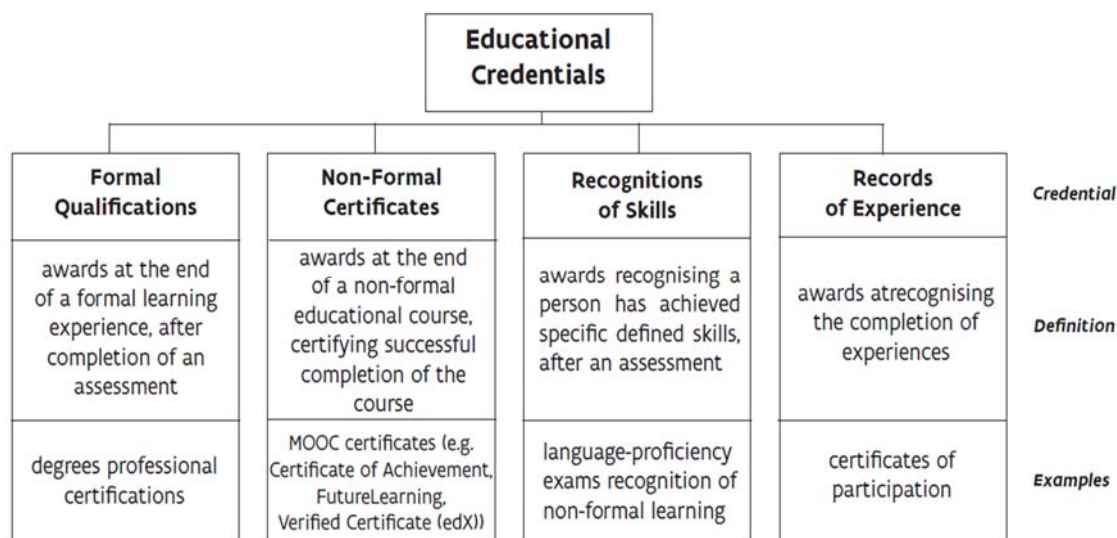


Figure 2 Types of educational credentials (Camilleri, 2018)

### The role of digital credentials: micro-credentials:

The proposal for a European Approach to micro-credentials was published in December 2020 (Higher education consultation group, 2020) and outlines nine building blocks which are necessary for an EU approach. In this proposal a holistic definition for micro-credentials is presented and recommends the inclusion of micro-credentials within national qualification frameworks, and subsequent alignment with the EQF. Micro credential is defined in (Micro-credentials Higher Education Consultation Group Final Report, 2020) as *“A proof of the learning outcomes that a learner has acquired following a short learning experience. These learning outcomes have been assessed against transparent standards. The proof is contained in a certified document that lists the name of the holder, the achieved learning outcomes, the assessment method, the awarding body and, where applicable, the qualifications framework level and the credits gained. Micro-credentials are owned by the learner, can be shared, are portable and may be combined into larger credentials or qualifications. They are under-pinned by quality assurance following agreed standard.”*

The proposal for a Council Recommendation on VET for sustainable competitiveness, social fairness and resilience was announced in January 2020 (European Sources Online, 2021). This proposal reinforces the importance of modularisation - breaking vocational qualifications into smaller parts of learning outcomes to provide more flexible, customised content to the needs of individuals. It also recognises the role of validation of non-formal and informal learning and micro-credentials, supported by European Transparency tools in upskilling and reskilling and in supporting excellence in the internationalisation of VET.

The Communication on Achieving the European Education Area by 2025 ("Achieving a European Education Area by 2025", 2021) references the importance of ensuring the "recognition and portability of short courses leading to micro-credentials," while also highlighting the instrumental role of the *Europass* in issuing authentic digital micro-credentials to students. The Digital Education Action Plan emphasises that micro-credentials which capture the learning outcomes of short-term learning can be harnessed along with digital technology to facilitate the provision of flexible, accessible learning opportunities, including for adult learners and professionals, helping them to re-skill, upskill or change careers.

Other strategic policy documents at the EU level emphasise the importance of flexible learning: Principle 1 of the 2017 European Pillar of Social Rights 'education, training and lifelong learning' endorses that 'flexible opportunities for learning and re-training (...) should be available at all times throughout a person's life and working career.' (European Commission, 2021). And the accompanying action plan published in March 2021 further stresses that "innovative instruments like micro-credentials can facilitate flexible learning pathways and support workers on their job or during professional transitions." (The European Pillar of Social Rights in 20 principles Action plan, 2021)

### 3.2 DIGITAL CREDENTIALS: EVOLUTION OF RELEVANT IMPLEMENTATION INITIATIVES AND TOOLS

#### EQF and ESCO

Europe's education and training systems are diverse in structure, tradition, and outputs. Member States, social partners and other stakeholders felt the need to have a common reference to increase the transparency and comparability of qualifications. This resulted in the development of the European Qualifications Framework for lifelong learning -EQF (European Commission, 2018). The Recommendation of the EQF was adopted in 2008. One of the aims of the EQF is to contribute to the interrelationship of education, training, and employment.

One of the main aims of the European Skills/Competences, qualifications, and Occupations -ESCO (European Commission, 2019) is to help bridge the (semantic) gap between the world of education and training and the labour market. Thereto ESCO describes and interlinks vocabularies related to i) occupations, ii) skills and competences, and iii) qualifications in three pillars. ESCO in its current version v1.0.8, is available in all official EU languages and it represents an important building block of the new *Europass*.

The nature of the information on these three dimensions differs. The occupations pillar and skills and competences pillar are developed on a shared understanding of concepts by the ESCO contributors; they describe the concepts and find the appropriate terms. Aiming at labour market relevance, they identify knowledge, skills, and competence terminology, starting from a functional analysis of occupations. Furthermore, they analyse learning outcomes descriptions to ensure that the knowledge, skills and competence terminology of ESCO provide a bridge for communication of the labour market with the education and training sector. These tasks are fundamental for the development of the ESCO classification.

In contrast to the development of the other two pillars, in the qualifications pillar ESCO aims to interlink the existing qualifications within *Europass* with the Skills and Occupation data. The aim is to provide enrichment of structured data to strengthen the machine-readable data that are relevant for the European labour market.

Currently ESCO includes 2 942 Occupations and 13 485 Skill. Each of them is available in 27 languages. A new major version of ESCO (v1.1.0) is scheduled to be released at the end of 2021.

### **Digitally signed credentials: The Qualifications Metadata Standard and Europass Learning Model**

Acting on the evident need to shift from paper-based certificates to digitally signed credentials: Europass will enable people to receive Europass Digital Credentials, which are trust-worthy, digital records of learning achievements such as qualifications and diplomas. Europass Digital Credentials are signed by an issuing education and training institution and so have the same legal value as paper-based credentials.

The Commission has implemented the first version of the Europass Digital Credentials Infrastructure (EDCI) which organisations can implement for free to issue digital credentials. The implementation allows organisations to issue qualifications (like a degree or vocational training), apprenticeships or participation certificates efficiently through a secure, trustworthy, and fraud-resistant digital infrastructure.

The Europass Digital Credential Infrastructure is based on a set of standards, services and software which allows institutions to issue digital, tamper-proof qualifications and other learning credentials within the European Education Area. Using it learners, employers, education and training providers and other authorised bodies have a simple and trustworthy way of verifying the validity and authenticity of digital credentials. (Europass, 2019)

The Europass Learning Model (ELM) (EC, 2020) is the data model used for all learning concepts in Europass, including qualifications and learning opportunities. The ELM data model is based on the qualification metadata schema (QMS) (Qualification Metadata Schema specifications v1.1.2, 2018), while enriching it with further classes required for publication of accreditations and credentials. The data model ensures a common understanding and consistent use of quality data by all stakeholders involved in the publication and use of data in Europass:

- A subset of the model, the Qualifications Metadata Schemata (QMS2), is used to support publication of information on qualifications on the Europass platform (Europass platform, 2020).
- Another subset of the model, namely the Learning Opportunities Metadata Schemata (LOMS), is used to support publication of information on learning opportunities on Europass.

European Member States are strongly recommended that all national authorities use the up to date QMS2 or LOMS to publish their data on Europass through the Qualification Data Repository (QDR) platform (QDR, 2020). The newer schemata are flexible models and can adapt to the existing situation in different Member States as well as to an international context. The use of the up to date QMS2 and LOMS will also allow national authorities or authorised providers to use the infrastructure to issue Europass Digital Credentials.

In technical terms, the QMS1 and QMS2 are RDF vocabulary with an RDF schema. Additionally, there are XML schemata available to support the encoding of information in XML. The schemata also define controlled vocabularies as fixed value lists for specific properties in the schema. QMS2 is applicable in many contexts. They can be applied to encode, publish, and exchange qualification metadata in many technologies, including:

- RDF accessible via SPARQL endpoints.
- RDF embedded in HTML pages.
- RDF serialised as RDF/XML or Turtle.
- XML.



The work carried out in the definition of the Europass Learning Model and the EDCI as European framework for digitally signed credentials is also based on the results obtained in the projects and initiatives listed in the following section.

## Projects and initiatives

### 1. OEPass project: Open Education Passport – OEPass (Project Ref: 2017-1-DE01-KA203-003546)

The recognition and transfer of individual credits through ECTS are powerful instruments to support open education and virtual mobility. The OEPass project developed a Learning Passport as digital standard format for documenting open education credentials based on ECTS. Such passport has a comprehensive documentation of learning experiences in terms of awarding body, credential awarded, credential holder, evidence of achievements. Thus, it contributes to describe open education and virtual mobility experiences in terms of ECTS and solves common criticisms to open education related to the lack of trusts and with respect to students' assessment and identity. Moreover, it is scalable to hundreds or thousands of students through automatic issuing and verification of certificates. And it is flexible enough to capture a wide range of non-formal and formal open education experiences (OEPass project).

### 2. MicroHE project: MicroHE: Support Future Learning Experience through Micro-Credentialling in Higher Education (Project Ref 590161-EPP-1-2017-DE-EPPKA3-PI-FORWARD)

MicroHE was built on the conviction that micro-credentialing in Higher Education can be a key to the successful transformation of universities' service offering, to attract more learners and provide them with high quality micro-credentials that are portable, modular, and stackable, and provide micro-credential holders with advantages and benefits which traditional degrees are often too rigid and inflexible to supply. The project produced a series of highly influential outputs, including the MicroHE meta-data standard, that has become an important building block of the new Europass data model, Credentify, the first European issuer of blockchain-secured stackable ECTS credentials, as well as a Delphi survey to forecast the potential impacts of continued curriculum modularisation on HE Institutions (MicroHE Digital Credentials MasterClass Magazine, 2020).

### 3. ECCOE project: ECCOE: European Credit Clearinghouse for Opening up Education (Project Ref 2019-1-FR01-KA203-062951)

ECCOE main goal is to facilitate the endorsement and appropriation of open, online, and flexible higher education. In support of this overarching objective, the project aims to increase trust in technology-enabled credentials among students, higher education institutions (HEIs) and employers. (ECCOE project site)

Its activities are aimed at:

- Developing quality descriptors for digital credentials relating to courses, modules, MOOCs and groups of competences.
- Creating and validating a Model Credit Recognition Agreement which will be available in 6 languages (DE, EN, FR, IT, LT, NL).
- Setting up an online catalogue of over 60 disciplinary and transversal modules which have passed the selection criteria for cross-institution recognition.

- Designing a system for technology-enabled credentials.
- Laying the ground for wider take-up via the ECCOE-System network and piloting, by producing and disseminating the supporting documentation that institutional stakeholders need.

### 3.3 DIGITAL BADGES

Digital badges are an implementation of another type of credentials which includes an indicator of accomplishment, skill, quality, or interest that can be displayed, accessed and verified online.

The technologies to consider are:

#### 1. IMS Open Badges (OBv2)

The IMS Open Badges specification describes a method *for packaging information* about accomplishments and recognition embedding it into *portable image files* as digital badges and establishing *resources for its validation and verification*. The current stable and latest version is 2.0, which was released in October, 2018 (IMS Global, 2018).

The specification indicates a set of use cases which represent the badges full-life cycle as it is presented in the next figure:

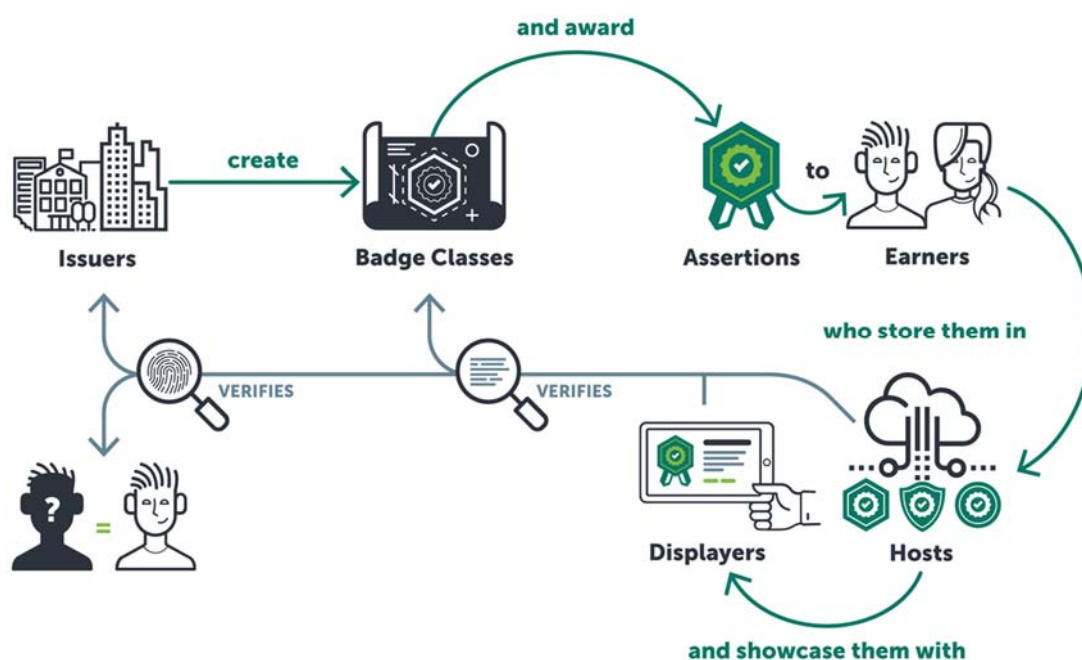


Figure 3 Open Badge full life cycle according to the Open Badge spec (IMS Global, 2018).

1. Creating a BadgeClass: Organization acting as Issuers can create BadgeClass objects to build a catalogue of badges that may be available to earn from the issuer. Those Badge classes may include information about the achievement including how to earn it or learn more about the issuer and achievement itself.
2. Organizations can Issue badge Assertions to recipients: With a catalogue of badges (BadgeClasses) prepared, organizations can issue those badges to recipients by creating Assertion objects. The Assertion is the representation of an awarded badge and may include evidence and supporting information on how the recipient became eligible for it.
3. Earners will be able to store their awarded badges in Badge hosts, which will implement main features for importing (see 5 below) and displaying Open badges.
4. Displaying Open Badges: Typically, when an Open Badge is displayed, the Assertion and related objects are displayed on a screen in human-readable format. Supporting this enables the recipient to showcase their earned achievements and choose to allow others to view those.
5. Importing Open Badges: Badge Hosts must support the function of importing Open Badges. This involves a process by which an Assertion and related objects are validated for format and integrity. Import of Open Badge data normally results in the subsequent display of that data.

IMS Open Badges supports the process of sharing or exchanging using the following technologies:

- Download baked badge image file: Badge Baking is the process of taking an Assertion and embedding it into the badge image, so that when a user displays a badge on a page, software that is Open Badges-aware can automatically extract that Assertion data and perform the checks necessary to see if a person legitimately earned the badge. The BadgeClass (IMS Global) image must be in either PNG or SVG format to support baking.
- Social media integrations.
- Copy URL to JSON assertion.
- Retrieve HTML to display the badge.

## 2.W3C Verifiable credentials

The W3C Verifiable credentials is a W3C Recommendation, which was released in November 2019. It describes the core data model and roles of the core actors and the relationships between them in an ecosystem where verifiable credentials are expected to be useful. It must be noted the relevance of this type of specifications to ensure not only to ensure the credentials interoperability but also to guarantee they will be cryptographically secure, privacy respecting, and machine verifiable.

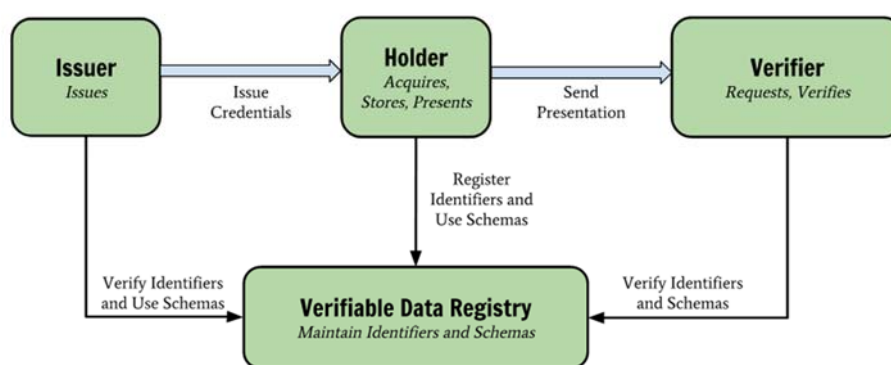
A **verifiable credential** is a *tamper-evident credential* which has authorship that can be cryptographically verified. Holders of verifiable credentials can generate verifiable presentations and then share these verifiable presentations with verifiers to prove they possess verifiable credentials with certain characteristics. Such presentations can be also cryptographically verified (W3C Verifiable Credentials Data Model 1.0, 2019).

The lifecycle of credentials and presentations in the Verifiable Credentials Ecosystem, as presented in the next Figure, often take a common path:

1. Issuance of one or more verifiable credentials.



2. Storage of verifiable credentials in a credential repository (e.g., a digital wallet).
3. Composition of verifiable credentials into a verifiable presentation for verifiers.
4. Verification of the verifiable presentation by the verifier.



*Figure 4 The roles and information flows in a verifiable credentials' ecosystem as basis for the W3C Verifiable Credentials specification (W3C, 2019).*

To ensure feasible implementations of this specification, its Working Group members had implemented verifiable credentials using at least three proof mechanisms:

- JSON Web Tokens (Jones, Bradley, & Sakimura, 2015) secured using JSON Web Signatures (Jones, Bradley, & Sakimura., 2015)
- Linked Data Signatures (Linked Data Signatures CG-DRAFT. Digital Verification Community Group.)
- Camenisch-Lysyanskaya Zero-Knowledge Proofs (Camenisch & Lysyanskaya)

## 4 ROLE-BASED REQUIREMENTS

Author: Dénes Zarka, BME.

### 4.1 INTRODUCTION

The freely adaptable Open Badge 2.0 standard enables to design and implement different information, services that can be developed in O2, design and implementation of the DISCO VET open badge displayer. This chapter focused on the analysis of user needs in the different countries participating in the DISCO VET project according to the specific roles involved in the whole certification and validation process. Learners as earners have different needs from issuer organisations, displayer entities and third-party validators who want to see a trusted and transparent system of high quality.

The methods used for analysing role-based requirements included both desk research and online interviews:

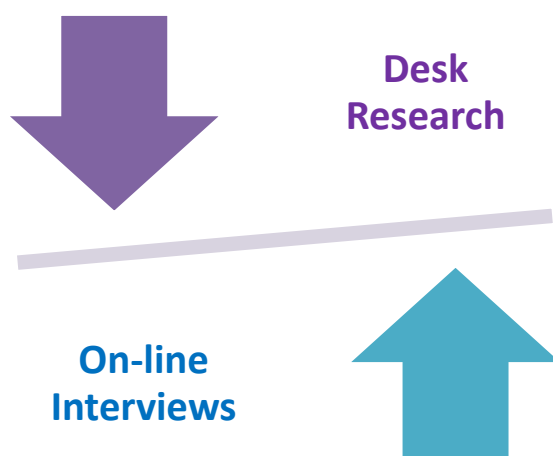


Figure 5 Methods involved for analysing role-based requirements. Own elaboration.

**Desk research:** Literature research in English and national resources, project final and intermediate reports.

**Interviews on-line:** The interviews served in acquiring employers, trainers, and learners' input regarding the challenges in this area, how they are addressed so far and what services, tools, training content would be useful for their stakeholder specific roles (issuer, earner, displayer, validator), according to their views.

The conclusions included in this section, extracted from the research implemented in the partner countries, have a direct impact on both the design and implementation of the DISCO VET open badge displayer (IO2) and the course on open badges (IO3).

The following table includes a selection of terminology that might serve to clarify the contents included in the following sub-sections:

TERMINOLOGY	DEFINITION
<i>Assertion</i>	A representation of an awarded badge, used to share information about a badge belonging to one recipient.
<i>Backpack</i>	A term originally used to describe Open Badges services that provide importing, aggregation, and hosting features for recipients. These services match most closely with the role we now define as an Open Badge "Host" application. May also refer to the Mozilla Backpack.
<i>BadgeClass</i>	A collection of information about the accomplishment recognized by the Open Badge. Many assertions may be created corresponding to one BadgeClass.
<i>Badge Earner</i>	An individual who has met the necessary requirements to earn a badge or micro-credential
<i>Badge Issuer</i>	A service that allows for the creation of BadgeClasses and the subsequent issuing of Assertions to recipients that conform to the Open Badges specification. Beginning with Open Badges 2.0, the candidate platform must issue a valid baked badge and demonstrate how the badge is retrieved by the recipient.
<i>Badge Viewer</i>	Anybody who can read, analyse the credential, badge. Educational institutions and Employers (HR managers) are specific and important target group of viewers, with special requirements.
<i>Badge Displayer</i>	An application that displays verified badges to viewers. Beginning with Open Badges 2.0, the candidate platform must display a minimum set of badge metadata and support viewer-initiated verification of a badge.
<i>Badge Infrastructure supplier</i>	Owner of a verified Displayer.
<i>European Qualifications Framework</i>	Gives an indication as to the level of various qualifications.
<i>European Diploma Supplement</i>	A standardised template to give additional information about the degree
<i>European Credit Transfer System (ECTS)</i>	Allows for individual learning units to be described in terms of knowledge, skills, responsibility, and autonomy.
<i>Microcredential</i>	Sub-unit of a credential or credentials that could accumulate into a larger credential or be part of a portfolio. Examples are: Verified Certificates, Digital Badges, MicroMasters, Nanodegrees. The project identifies the following 4 main key features of micro-credentials: modular, stackable, portable, digital, and universal. (MicroHE)

Table 2: Terminology to better understand role-based requirements. Own elaboration.

## 4.2 ROLE-BASED REQUIREMENTS: IMPLICATIONS FOR THE DISCO VET OPEN BADGE DISPLAYER

The initiatives at European and international levels previously presented, have a common understanding of the different roles involved in the process of creating, issuing, awarding, owning, and recognising digital credentials. Issuers will need clear instructions and easy to use tools for creating and issuing digital credentials to allow them to keep and distribute learners' records in a simple, safe and inexpensive way, remove risks related to the identity fraud and issue multiple credentials to a single learner using a common streamlined process. Owners of digital credentials will need to maintain a compelling and verifiable record of their learning achievements to share with employers, receive credentials in a safe way, keep their credentials ownership without having to ask or pay to issuer institutions for credentials transcripts; compile and curate digital credentials issued by multiple educational institutions. On the other hand, employers or any other educational institution willing to recognize digital credentials will need instructions and tools which support the analysis and verification of the information included in the credentials.

### Greece:

Requirements coming from interviews: Issuers:

- *The connection with an institutional actor is a prerequisite*
- *There must be a clear connection with the economy or labor-market sector where the acquired knowledge is leading to*
- *The trend follows the labor-market trends and needs, and not that of the formal education*
- *In certain fields (e.g., coaching) which lie beyond the traditional curricula of HEIs, digital credentialization enjoys high levels of validity*
- *I would insist that it is more an issue of content and trainer. Only after securing quality in these aspects, we could talk about relating to EQF.*

Earners:

- *Integration in HEIs, acceptance at formal, State level is required*
- *HEIs should investigate connecting graduate and post-graduate studies with the constant changes in the respective subjects, according to labor market changes, which in turn means constant updating, which could be addressed by online training, following up the formal graduation at all levels*

### Hungary:

We have found already defined data sets when issuing digital certificates centrally. Digital credentials in VET and Adult education:

- *Coordinated by National Vocational and Adult Educational Office*
- *Issuer: Examination organiser institute*
- *Digital signature: Given by the Leader of the Examination organiser institution or appointed clerk who takes responsibility over the credibility of the credential.*
- *Institution: Registered Issuer institution in the system.*
- *Credential Data Set: owner, issuer, place of issuer, serial number, Credential Subject Credential Name*
- *Issuer Data: Name, Address, OKM ID number, telephone, fax, cellular, e-mail, web, contact person*

Requirements coming from interviews: Issuers:

- *professional board behind the system is a must*

- *The smaller, the better: It is a justified tendency to have micro-sections of education and learning are much more manageable. The chance of failure in these sections (from a couple of weeks to even a couple of hours courses) is much less*
- *I need some personal data, like name and mother's name [mother's name is an established identification in Hungary – translator's note]. Educational ID is necessary to be present as personal identification*
- *Integration of research in the training and using digital credentialization as an important follow-up practice for post-graduate knowledge acquisition and updating*
- *Block chain might be too complex*
- *Authorities started to issue learner identification number This gives the possibility to follow the learning paths and makes transfer of credits or accepting previous training easier*
- *Natural progression if such technologies (Blockchain) and practices take fruition in education as well*
- *My requirement would be the link to the syllabus, how long is the course, reference to the curriculum.*

#### Earners:

- *Assessment and evaluation should also be open access.*
- *A valid storage system is key to a trusted system*
- *EQF and displayer should be able to interoperable, same way as in VET, the National Qualification Register and EUROPASS are interoperable*
- *If we succeed to define the blocks of the basic skills than we can easily assign the credits and an assessment system can also be built on it*

#### Latvia:

##### Requirements coming from interviews: Issuers:

- *Requirements may relate to the documentation and validation of the assessment*
- *The certificate must be electronically signed with legal force*
- *One of the ways is to organize the final testing upon completion of the course with the learner taking the test face-to-face thus authenticating the learner's identity*
- *Latvia, like most EU countries, has aligned its qualifications framework with the EQF, it is clearly worthwhile to provide evidence of the skills that form part of the qualification to be linked to these frameworks*
- *All the certificates issued by the technical schools, including the diploma itself, could be registered in a single system (nationally or internationally), so that the potential student does not have any problems with entering the higher education institution and submitting paper proofs or copies thereof*
- *All educational establishments entitled to issue certificates are registered in the common system. This would facilitate the verification and recognition of certificates*
- *Higher education institutions should work towards accepting digital certificates as part of a higher qualification. And probably also up-skill staff on working with digital badges system*

#### Earners:

- *The possibilities of digital recognition allow a person to accumulate certificates, recognition documents, feedback and create a richer portfolio of skills more flexibly and fully*
- *It must also be possible to issue certificates of knowledge and skills, work experience or social activities that are not related to a specific qualification and are not related to NQF or EQF and are not related to the geographical framework of Latvia or Europe. For example, when it comes to studying, working in Africa or China*
- *There is a requirement for modular education. Confirmation is received for individual modules (parts). Each part can be acquired in more than one educational institution at the same time, however, as a result,*

*by collecting all the certificates of acquisition for each of the necessary modules, one can also obtain a qualification certificate for the attained profession*

- *Digital certificates can improve everyone's lifelong learning. It can lead to finding a better job, getting valuable diplomas or improve one's existing knowledge*

## Lithuania:

Requirements coming from interviews. Views from the Issuers:

- *The process can be tricky and somewhat iterative*
- *Biggest criticisms are that we do not know how and who takes exam or test or another assignment*
- *Learner identification, learner authentication and then the process should be described in the way that it leaves no room for hesitation for the teacher and for the organization behind the teacher*
- *Audio and video collections, or let's say keystrokes identification, so if I use the same keyword, the computer may recognize that it is the same person as well, then we can recognize people from camera, face recognition, algorithm, and other things*
- *The conditions in the remote location, that maybe someone should be accompanying the learners in the exams or how else we should be confident that this is the right person in the right place and doing the right thing*
- *Universities are trying to investigate the offerings of micro-credentials, and they are setting some internal oriented projects where they try to investigate what would it take to recognize micro-credentials*
- *The first thing for universities is to introduce digital badges and digital credentials, so divide the curriculum of this course into smaller parts which are described in terms of skills and competencies, and then digital badges or other types of credentials are issued to the learners, whenever this is completed, and the next step for university I think is to prepare to demonstrate these digital badges in public spaces, so that they are openly visible for anyone who would be interested in employing or starting collaboration with people having such skills*
- *For universities to establish the system itself which would be synchronized with the existing, or planned to be designed in the future digital credentialization platforms, so that university is prepared to issue diploma, also in digital formats which can be divided into smaller units on the basis maybe of academic certificates, or even certificates for certain competencies and skills to be issued to learners*
- *I am not sure whether blockchain is now the kind of the best possible solution*



#### Earners:

- *I think micro credentials activities are quite good because they try to investigate what you can do with the more open and flexible ways of learning and how you could integrate some of the traditional means of verification so that they could be easily recognized*
- *In making a kind of small leap of digitalization in terms of how you've recognized learning and how you can store and verify things that this person has got this degree and has taken this course and has gained five credit points from this*
- *It is critical that like whatever that type of educational data is that it somehow matches international and well appreciated standard in a way to share the paper is what the data I have it's comparable to what the other universities have and what other open online university like universities or program or MOOC providers have*
- *Professional development of those who are still in education, but also of professionals, who are already working in the field allows all people to update their skills quickly, get digital credentials for that, and enable that these new skills are visible in the digital labor market*
- *The digital credentialization goes towards the benefits of personal development and professional development, at the same time, it brings career development opportunities to direct contact between the people and the employers*
- *This is the big role that Blockchain idea in education is implementing*
- *More and more young people want to customize their academic study according to career path they decide, so they have a clear understanding of where they want to go, in which industry they want to work, and this, no institution can fulfil*
- *If you continue to tuck micro credentials in the core of my education, in the core of what I am doing, the student, then the employee will need a kind of secure place, what we call wallet, where you can show, okay, now I have done this course in this place and this place, it says it has clear quality criteria and I think the only secure technology for that is Blockchain*
- *There will be a tremendous and huge market opening up because the student is willing to pay for that, so he is not waiting for the institutions that they can provide him with 5 ECTS points, they are not interested earning any more ECTS points, they are interested in knowledge, value, expertise, skills, and if they can prove that they achieved that, even at several ECTS, if it's acknowledged by the employer, they will do it*
- *From the company side, they need to see assessment or quality, criteria, and It is a must for the institutions, so they should have some requirements*
- *There would be a faster change in education to allow a more personalized professional development path, for example in a particular industry, in a particular company, so that you could take the kind of and more, let's say, personalized path and within that path that you like embed different types of competencies like that you aren't necessarily offered by your home university and that you'd be more flexible than in like gaining different types of badges*
- *There are signs of more modularization or unbundling of higher education what is a very good sign*
- *In the industry, the most successful companies nowadays, what they do is called, 'mass customization. It is, you have a core academic education, very limited, and then the student is knowing what he wants to do, he chooses from different providers. You can get it from institutions, you can get it from the private market, you can get it abroad, these are exactly his profile, that then in combination with his profile, he has a CV where he gets his job, with exactly the combination of training, and that's something almost no institution can provide anymore*

## Spain:

Today, learning occurs anywhere, not just in formal learning settings. Informal learning is gaining more and more importance. This has been boosted by the pandemic but the need in Spain was already identified in 2015 by INTEF, the Spanish National Institute of Educational Technologies and Teacher Training. INTEF is a unit depending of the Ministry of Education, Culture and Sports responsible for the integration of ICT in non-university educational stages. In its report issued in 2017 about “Open Digital Credentials for the Recognition of Competencies” it confirms that:

*Since 2015, the (Spanish) Ministry of Education and Vocational Training, through the Institute National Educational and Training Technologies of the Teaching Staff, develops «INTEF Insignias» (<https://insignias.intef.es>), a “backpack” of open digital credentials to help 1. the educational community to show their professional skills and abilities; 2. to support future professionals to access educational jobs and anyone, and 3. interested in being recognized for their acquisition of skills, achievements and show evidence, and manage recognitions obtained from a lifelong learning perspective.*

According to INTEF (2017), the basic roles are identified as:

- Entity: it is the higher-ranking user on whom as many institutions as desired can depend. A practical example of an Entity is the MECD (The Spanish Ministry of Education), on which institutions such as INTEF depend.
- Institution: is the user who has the encrypted token, that is, the key for issuing open digital credentials, which guarantees the security, validity, etc., of their credentials
- Manager: is the user who manages the backpack on behalf of the institution.
- Issuer: is the user with permissions to create issue and revoke credentials, and must depend on an institution. The institution itself (the manager on its behalf) can upload user permissions to issuers dependent on it to issue the relevant credentials

An infographic that reflects all the key features for the design of a digital certification displayer:

[https://padlet-uploads.storage.googleapis.com/120499426/1c6f6dc7daf22913b81822e7e712c6b6/infograf\\_insignias.png](https://padlet-uploads.storage.googleapis.com/120499426/1c6f6dc7daf22913b81822e7e712c6b6/infograf_insignias.png)



### 4.3 ROLE-BASED REQUIREMENTS: IMPLICATIONS FOR THE DISCO VET COURSE ON OPEN BADGES

#### Greece:

- Blended (on-line synchronous, on-line asynchronous)
- Demos, videos, self-paced
- Innovative, interactive, fully digital
- (Employee) Demos, online links, games
- 2-4 weeks (30-40 hours)

#### Hungary:

- Use blended mode
- First and last session should be face to face (2X3 hours)
- Visuals, strong, with multimedia
- Short videos
- Tests
- Collaboration, interactivity needed
- Practice oriented
- Mixed methodology, to avoid boring parts
- Individual and group learning parts as well.
- Not more than 30 hours.
- Follow-up should be worked out

#### Latvia:

- Various resources are needed.
- Open educational resources with explanations, such as a textbook. Ideal if in an interactive format, not just a pdf file.
- Explanatory videos with interactive support materials.
- As diverse as possible methods, but without excluding individual work with information sources.
- Maybe there could be a course 1x-2x a week for 4 hours for 2-3 months.

#### Lithuania:

- Perhaps an online course is appropriate for this option.
- Presentations and OER combined.
- Online collaboration and individual work.
- 2 hrs a week, 2-4 weeks max.

## Spain:

The interviews and survey seem to agree upon the modular organisation of the course using independent pills that can be followed by the different profiles involved (Issuers, earners, validators).

In both survey and the interviews, it was mentioned the possibility to make the course flexible to be adapted to the knowledge of the learner. The survey reflected that it was important that the course was: flexible, adapted to the needs of the learners by profile, practical and attractive.

According to the results of field research, we would suggest:

- Use videos and podcasts
- Indicate clearly the time needed for model, unit, and sub-unit
- Make emphasis on real life examples and a clear applicability and adaptability to the contexts
- Make the learning as flexible as possible to be as adaptable as possible to the learner
- Try to reflect the benefit of the learning and the potential of increased employability

## 5 VET SYSTEMS OVERVIEW

Author: Elena Trepulè, VMU

The activities leading to the elaboration of this report were implemented from January until May 2021. The activities were implemented by all partners whereas this report was collated by a team of 3 staff from VMU.

The current open standard allows using freely and typology to use as categories in the display system. Based on earlier projects (e.g., OEPass) and literature interviews with stakeholders at VET and HE organisations, employers.

This section summarises the state-of-the-art EU and national level standards and directives plus the de facto practical typology organisations used to define an agreed DISCO typology and categorisation that should be developed and implemented in the new display.

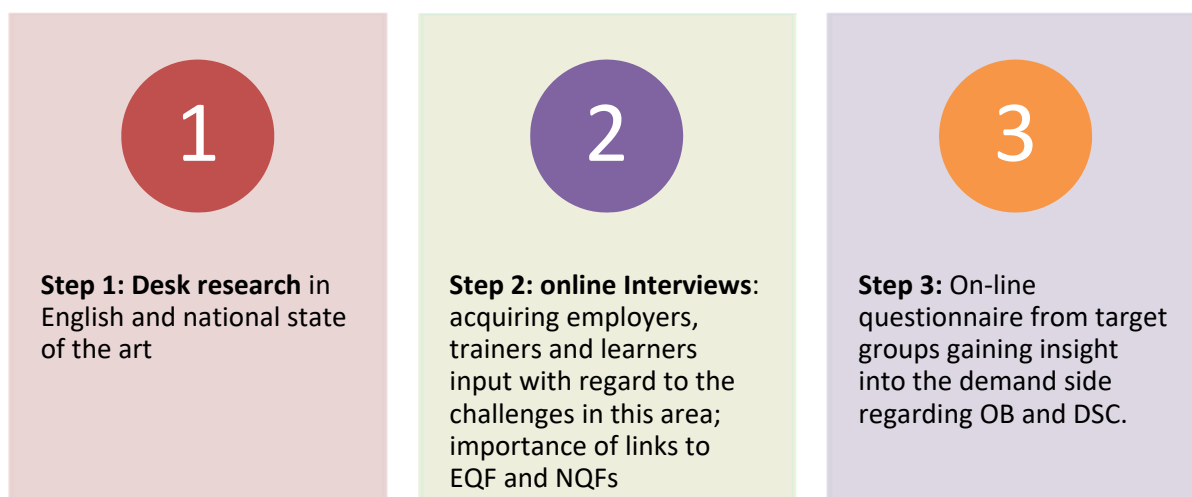


Figure 6: Steps for the elaboration of the VET systems Overview section. Own elaboration.

## 5.1 INTRODUCTION

Correlation between the existing frameworks is essential to open up possibilities for qualification acquisition and improvement as well as national and international mobility of studies and work. It also promotes lifelong learning and facilitates the recognition of qualifications, individual, non-formal and informal learning in all learning forms – face to face, open online or blended as well as in full programs or for micro credentials.

A recently published *EU Skills Agenda*<sup>1</sup> in Action 10 identifies micro-credentials as an *EU tools supporting lifelong learning*. The European Commission seeks to develop European approach to micro-credentials and has appointed a Micro credentials' Consultation Group that has produced a final report in 2020 "A European Approach to Micro-credentials"<sup>2</sup> in 2020.

Short-term open learning opportunities leading to micro-credentials such as digital badges may help to widen the scope of learning and skills development opportunities and form the lifelong learning dimension in higher education reaching more social groups of different age.

Micro-credentials are a novel but fast developing type of credentials in Europe and other parts of the world as a response to the fast-changing skills needs of the labour market as well as a possibility to recognize non-formal as well as open learning of different age and social groups. The definition of micro-credentials is still emerging, especially in national contexts, however, different EU innovation research projects and international organizations already offer a variety of definitions.

As EQF is a reference framework for qualifications based on level descriptors for learning outcomes applicable to all levels of qualifications, according to the Consultation Group, EQF already provides a potential basis for the inclusion of micro-credentials if Member States wish to include these in their national qualification framework. Even though internationally inclusion of micro-credentials into the national qualification frameworks is in the early stages, there is a trend among the Member States to start opening national qualification frameworks (NQF) to other forms of provision than the full qualifications offered by formal education institutions, e.g., Austria, Denmark, France, Ireland, Netherlands, Poland, Finland, and Sweden.

According to EC Council Recommendation<sup>3</sup>, 'Digitally signed credentials are electronic documents which are awarded by qualified bodies to individuals to confirm and provide proof of their learning outcomes achieved in formal, informal, and non-formal settings. They may often be referred to as 'digital certificates' as well'. Digital badges are a popular type of digital micro-credentials.

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<sup>1</sup> <https://ec.europa.eu/social/main.jsp?catId=1223>

<sup>2</sup> <https://ec.europa.eu/education/sites/default/files/document-library-docs/european-approach-micro-credentials-higher-education-consultation-group-output-final-report.pdf>

<sup>3</sup> European Commission, 2018b. Council Recommendation of 26 November 2018 on promoting automatic mutual recognition of higher education and upper secondary education and training qualifications and the outcomes of learning periods abroad. [Online] Available at: [https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1568891859235&uri=CELEX:32018H1210\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1568891859235&uri=CELEX:32018H1210(01))

## 5.2 SITUATION IN PARTNERS COUNTRIES

### GREEK CASE

#### Market Analysis

E-learning, distance learning, blended learning as alternatives to traditional ways and modes of training and learning across all educational levels (including formal, informal, and non-formal education, VET and tertiary level of education) are not widely embedded in the Greek society, nor are they institutionalised at State level through the relevant bodies (e.g. Ministry of Education, Ministry of Labour, Ministry of Development and Investments), or the community of teachers and trainers at all levels. The COVID-19 pandemic was maybe the first instance that brought e-learning at all levels higher in the agenda of stakeholders, policy makers, educational institutions and organisations ranging from the primary, the secondary to the tertiary level of education, also including VET.

Consequently, although e-learning is being applied in the fields of adult education, VET and Higher Education, besides of the fact that the pandemic brought e-learning to the attention of the public, the State, but also the private sector in professional and adult education, the ecosystem of open badges, digitally signed credentials and micro-credentials is by and large almost completely unexplored, especially as a market opportunity for organisations in the educational sector and companies alike.

#### Role Based Requirements

Open badges and digital credentials are deployed in a rather scattered way by actors providing education and training. There was no evidence or well-documented approach that could offer information about the role-based requirements that would be in place in the case of Greece.

#### Policies

In Greece, the digital transformation process at the socioeconomic or even cultural level has been spearheaded by developments in the way citizens interact with the State at the institutional level. This was and still is the first step to redefine the relationship between individuals and institutions. The educational system, a social institution by nature, is being affected in this process, and it consequently draws principles and practices from the interaction field of State vis-a-vis Citizen.

The Greek e-Government Interoperability Framework (Greek e-GIF) enables a wide range of e-services to Greek citizens, businesses, the educational system, the health system, as well as everyday transactions at local level. Features like e-signature, online-distance transactions facilitate the digital transformation process, and gradually create a digital economy and society to encompass social and economic life (EU – Digital Government Factsheet 2019). The percentage of individuals who interact through digital media mostly with public authorities is on a steady rise, having caught up with the EU performance in this level in 2015 (approx. 45 %) ([http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc\\_bde15ei&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=isoc_bde15ei&lang=en))

We highlight the aforementioned aspects due to their core role in building a new platform of trust between citizens and the institutions that serve social and economic development. The levels of trust between citizens and the institutional framework – being it in the fields of government, health, education, business etc. – has been traditionally low, due to lack of transparency, meritocracy as well as the existence of highly bureaucratic processes, that also allowed red tape, disrupting trust both ways. It is therefore almost teleological in nature, that the validation of educational assets would fall into the same spiral, promoting heavily only those validation processes that have a highly formal character and are acquired by the formal education system. Non-formal and informal education are not being successfully mainstreamed across society and the educational system, and thus, the validation processes thereof are not easily accepted or appreciated. Digital credentials are part and parcel in this process, still to enjoy higher levels of acceptance by individuals, professionals, educators, and trainers, as well as the labour market.

### Teacher Training

No concrete teacher training initiatives regarding digital credentials have been identified in terms of sufficient and well documented information. However, we stress the following initiative, which provides information on digital assessment of knowledge at the level of school education mainly, implying an infrastructure for the issuing and validation of open badges:

#### OER Resources of “Photodentro”

The OER Repositories of the “Photodentro” family are a central e-service of Greece’s Ministry of Education for the organization and distribution of digital educational content in the school community. These OER Repositories host learning objects (i.e., autonomous, and reusable digital material that can be used for teaching and learning) such as experiments, interactive simulations, investigations, images, educational games, 3D maps, exercises and more. The “Photodentro” Repository includes a collection of about 17,470 enriched interactive schoolbooks as well as collections of selected objects developed within the framework of multiple educational projects of Greece’s Ministry of Education or other bodies.

All of the learning objects of the Photodentro OER Repository are open and can be accessed under the Creative Commons CC BY-NC-SA license. The Photodentro OER Repository implements the national strategy for digital educational content and promotes the use of OER for schools. OER provide opportunities in using open knowledge to improve the quality and access of education (Papadimitriou, Megalou & Tzovla, 2015).

Various processes of evaluating learning objects have been applied at Photodentro’s seven OER Repositories. Learning objects from the Repository “Photodentro/Open Educational Practices” are awarded with “Quality Labels” based on a specific evaluation process. Objects from all other Repositories are awarded with “Quality Stamps” which are provided according to the brand name of their producer. Labels, stamps, and badges have been used as terms to evaluate and accredit resources and processes in different learning environments. A commonly accepted term has not yet been adopted within the learning community.

Photodentro OER repositories have been co-financed by the European Union (ESF) and the Greek State in the context of the “Digital Educational Platform, Interactive Books, and Learning Object Repository” program (#296441) of the Greek National Strategic Reference Framework (NSRF) 2007-2013 (Operational program Education and Lifelong Learning); they are currently being expanded and improved in the context of the “Digital School II: Expanding and Exploiting the Digital Educational Platform, the OER Repositories and the Interactive Textbooks” program (#5001312) of the NSRF 2014-2020 (Operational Programme «Human Resources Development, Education and Lifelong Learning 2014-2020). Program Beneficiary (program coordinator & implementer): Computer Technology Institute and Press – “DIOPHANTUS” (CTI) ([www.cti.gr](http://www.cti.gr)).

## HUNGARIAN CASE

### Market Analysis

At present digital badges and digitally signed credentials do not have an operational presence in Hungary's educational scene. There are initiatives that are related to micro-credentials and can progress towards piloting processes, but there are no standards, but rather fragmented practices, for example in is the Open Content Creation initiative of the Hungarian Academy of Sciences and BME. These practices are present on the level of activities within open and online learning and not on the level of standards.

The terminology itself is new, the survey and the interviews have shown that to find the proper terms when translating the course will pose a challenge. The government joined the EU initiative of micro-credentials that might bring in a unified terminology, but the DISCO VET project will be among the first to try to come up with a coherent description of open badges and digitally signed credentials in Hungarian.

### Role Based Requirements

Regarding specific Hungarian role-based requirements; these are the significant elements need to be addressed:

- The validity of the badge and the digitally signed credentials is the most important factor for the validators (employers, HR, educational institutions accepting badges as proof of previous learning etc.).
- For data protection purposes (access to data), top-down approaches are better trusted
- National educational ID is the main source of identification for all 3 roles.

### Policies

Hungary established the Digitális Jólét Program (DJP, Digital Success Programme) in 2015, which focused on the development of a digital infrastructure and know-how for citizens and businesses. Based on four strategies (Digital Child Protection, Digital Export Development, Digital Education, Digital Start-up), it produced a general positive outcome (e.g., there has been a steady increase in the percentage of services available on public authority websites), which led the government to launch a new version of the Programme in 2017. The so-called DJP 2.0 was built around five pillars, articulated in 89 actions along 26 thematic areas. Its objective related to digital transformation of the whole Hungarian society, with the goal of reaching a competitive advantage in digital.

The Digital Education Strategy of Hungary (DES) was adopted in Government Decree 1536/2016 (IX. 13). Its focus is access and methodology, the goal is to reach a high percentage of digital literacy. They hope that it will exert demand pressure on e-administration developments, which will improve the available range and quality of services. In line with the strategic mandate, the DES covers the entire Hungarian system of education and it includes education management (administration and quality management, primary information system, student measurement-assessment, management information system).

In DES the only mention of badges and digital certification was in relation to adult education: when describing the creation of an environment supporting adult-age digital learning, it includes the introduction of validated digital badges which verify competences acquired via non-formal and informal learning. The establishment of a national system which supports competences acquired through non-formal and informal learning makes sure adults can flexibly enter the appropriate courses after assessing and taking account of their previously acquired knowledge. The acquired competences will be verified and presented by authentic digital certifications.

DES also reflects on data validation, management of data authenticity problems; development of data-based pedagogy and management methodology; and data integration and the monitoring of processes.

### Teacher training



In DESH the education administration and the further training of teachers is planned to take place on a digital basis. It is stressed that digital education should not be a mere version of traditional teaching that is supported with digital tools. The plan is to create an open educational environment which is based on new approaches, methodologies, and requirements and which reacts to the challenges of the digital age and train teachers to work in this environment.

Regarding the mandatory continuous professional development of teachers, digital credentials and badge system is not in operation right now. However, as DESH puts a great emphasis on adult learning in terms of developments towards digital credentials, one can hope the introduction of open badges and digital credentials in this field in the foreseeable future.

## LATVIAN CASE

### Market Analysis

The National Development Plan of Latvia for 2021 – 2027 (NAP 2027) identifies further development of digitization as a pervasive element in all sectors, especially in areas such as innovation and science, healthcare, inclusive society and the labour market, infrastructure, regional development, security, and the environment and energetics.

Based on the analysis of the current situation and considering future challenges and possible development scenarios, five lines of action have been identified for the implementation of the guidelines:

1. Digital skills and education
2. Digital security and reliability
3. Availability of telecommunications and computing
4. Digital transformation of the national economy (incl. Public administration)
5. Innovation, ICT industry and ICT science.

Today's society is e-ready, i.e., prepared to use electronic services. Although, in comparison with the average of European Union countries, our society is lagging in the use of digital tools. Where is the problem and how can it be solved?

The first step to work digitally, is to create the right services and processes. Here, each situation offers their own tools: websites, customer portals, resources, process and document, personnel, customer relations and other management systems. Although, most transactions do not require a hand signed approval, there are still several situations where the proof of a supreme legal force is a hand signed document. Such cases exist in every organization - concluding agreements with employees, partners, signing management documents, etc., as well as in various service sectors, like finance, logistics, public services, telecommunications, outsourcing (such as, accounting, or legal services) etc.

Regardless of the size of the industry and organization, it is necessary to hand sign the documents.

### Role Based Requirements

To provide an efficient and secure way of recognizing qualifications across Europe and other documents certifying learning achievements, The European Commission is developing the Europass Digital Credentials Infrastructure (EDCI), and the work on the Europass digital credentials infrastructure is still ongoing. Authentication services for all digital documents or the acknowledgements of skills and qualifications will be supported. A certificate is a documented statement issued by an educational organization containing testimonies about a person's learning experience. Europass digital credentials describe a specific learning achievement. Such digital certificates may be issued to confirm the professional skills of the learner / worker / student / trainee, the acquired qualifications, skills obtained outside formal education, and the achievements gained in professional development activities.



Digital credentials are documents in the form of a digital file, which may include extensive information to help employers / certifiers / approvers and other authorities understand and recognize the certificate. Digital certificates, if compared to paper documents, have a number of advantages - reduced administrative burden, that is particularly important for digital certificate issuers, educational institutions and companies, as it eliminates the use of paper and provides an opportunity to optimize employee resources, no staff required because everything is carried out by a computer, as well as the issuance and granting of such digitally signed credentials is secure for both the recipient and the issuer, because it eliminates the possibility of fraud. Receiving such documents is quick and easy, as it is possible for the beneficiaries to verify the certificates automatically, including accurate and high-quality information in them, which verifies the qualifications or skills acquired by the beneficiary. It is undoubtedly very important for recipients of digitally signed credentials to receive certificates for all activities, classes attended, participation in projects, assessment of skills and knowledge, achievements, evidence of formal qualifications.

Digital technologies offer new opportunities for issuers, recipients and approvers in order to increase the reliability and transparency of qualifications, as well as to intensify document protection against fraud. Digital qualifications are more portable than paper certificates and they can be located on more than one server or institution. They may include extensive metadata, they are easily presentable on CVs, social media and personal websites and can be viewed by stakeholders.

Establishment of European education area means that even the qualifications of small service providers are recognized and can be trusted, especially in a cross-border context. The framework for digitally signed credentials will make it possible to achieve greater coherence and support quality assurance; it will improve portability and comparability and support mobility, cooperation, and exchanges.

A variety of digital tools are available for use in the learning process, including webinars, virtual classes, chat tools, blogs, games, simulations, videos, social networks, augmented reality as well as open educational resources, such as MOOCs, open libraries, and repositories.

## Policies

Analysing public ICT policies and legislation, The Electronic Documents Law has been in force in Latvia since 31 December 2019. This law determines the legal status of an electronic document and an electronic signature and relates to the provision of certification services in accordance with the European Union Regulation Nr. 910/2014/ES requirements.

The Electronic Documents Act stipulates that state administrations and local governments accept e-documents from natural and legal persons, consequently, any information or request submitted in writing may be submitted to national and local authorities at a distance, using an e-document. An e-document may contain the information and inquiry requests from authorities, the applications to issue permits, certificates, and licenses, as well as the submissions of reports, statements, and statistical data.

For an electronic document to have legal effect:

- It must be signed by a secure electronic signature (or electronic signature, if the parties have agreed in writing on signing the e-document with the electronic signature);
- It must be time-stamped (in cases specified in the EDL);
- It must be drawn up in accordance with the requirements of document composition specified in regulatory enactments.

Security required for the use of e-documents:

- Computer and internet connection.
- A smart card reader connected to a computer, e-signature smart card or eID identity card, e-signing software (available free of charge on the portal [www.eparaksts.lv](http://www.eparaksts.lv));

- Virtual e-signature.

The second most important legal act is the regulations of the Cabinet of Ministers of the Republic of Latvia Procedures for the Preparation, Drawing Up, Storage and Circulation of Electronic Documents in State and Local Government Institutions, and the Procedures by which Electronic Documents are Circulated between State and Local Government Institutions, or Between These Institutions and Legal and Natural Persons. These Regulations prescribe the procedures for the circulation of electronic documents between state and local government institutions or between the authorities and natural and legal persons.

Since January 1, 2008, the Law on Submissions has also been in force in Latvia. This law shall also apply to the examination of an application received in an electronic form, if it has been signed by an electronic signature in accordance with the procedures specified in regulatory enactments, as well as if the application is submitted and the identity of the person is verified, using online forms available on the Unified website of State and Local Government Services ([www.latvija.lv](http://www.latvija.lv)).

The aim of the **Latvian state website Latvija.lv** is to provide fast and convenient access to services provided by state and local government institutions. The information on the website is compiled in the form of a catalogue, which allows interested parties to find the information they need on public services provided by state and local government institutions, the ways of requesting and receiving them, the payments related to the services and the descriptions of the services. These electronic services include a link to the service resource. The website is maintained by the State Regional Development Agency.

**The Law on the Security of Information Technologies** in Latvia is in force since February 1, 2011. The purpose of the law is to improve the security of information technologies by setting the most important requirements that guarantee the provision of essential services for which these technologies are used.

The mission of the Information Technology Security Incident Response Institution CERT.LV is to promote information technology security in Latvia. CERT.LV is a structural unit of the Institute of Mathematics and Computer Science of the University of Latvia, operating under the Ministry of Defense of the Republic of Latvia within the framework of the IT Security Law. The main tasks of CERT.LV are to maintain and update information on IT security threats, to provide support to public authorities in the field of IT security and to any natural or legal person in the prevention of IT security incidents if a Latvian IP address or a Latvian domain is involved in the incident, to organize informative and educational events for both employees of state institutions and IT security professionals, as well as other people interested.

There is no specific regulation in Latvia that determines Open Badge and digitally signed credential use.

### Teacher Training

In the European education system, digital competence is included in the standard of professional competence of teachers along with the competences that are considered essential for all teachers. In Latvia, the standard of professional competence of teachers is included in the procedure for organizing the quality assessment of teachers' professional activity, but the reference document is the Professional Standard "Teacher".

The professional standard defines the digital competencies required in the teaching profession as the ability to:

- purposefully and critically choose and integrate various teaching methods, techniques and technologies in the learning process;
- assess the risks associated with the use of digital technologies;
- purposefully, rationally, and effectively use the information and communication technologies in the learning process and professional development.

The use of virtual reality technologies in education is also expected to increase in the future, both by creating virtual classes, virtual labs, virtual meetings, and discussions. This will also change the need for certain types of resources and infrastructure.

The goal of digital skills in the education sector: The development and use of digital skills takes place comprehensively throughout the educational process, giving learners the opportunity to put their skills into practice in the learning process. Upon completion of the prescribed stage of formal education, graduates have acquired comprehensive technological proficiency. The training of ICT specialists takes place in close cooperation with industry associations and employers, at the same time developing flexible approaches to qualifications. Both knowledge acquired in a continuous learning process and in a self-directed and individualized way are formally recognized, thus promoting the individual's interest in continuous professional development, and preparing him/her for the current needs of society, the economy and future trends. Digitally enabled teaching methods are provided, thus ensuring high quality and accessibility of education.

Digital Transformation Guidelines for 2021-2027, action line "Digital Skills and Education". In this direction, digital skills and competences are considered accordingly (Digital Competences Framework for Citizens (DigiComp 2.1, 2017)), its level of knowledge approach is used to define policy objectives, frameworks and learning objectives for specific target audiences:

- Level 1. "Participation" - a basic set of digital skills and digital tools for every citizen;
- Level 2. "Practical use" - digital skills for each resident's independent use of digital services, applications, digital technology solutions;
- Level 3. "Provision of services" - digital skills for those providing services and coordinating the provision of services in the digital environment in public administration, local governments and the private sector;
- Level 4. "Development of services and systems" - digital skills for those who design, develop and maintain ICT platforms, systems and digital services for public administration, local governments, private sector;
- Level 5. "Impact and benefits" - digital skills for the ICT sector, universities, science - those who need deep and extensive ICT knowledge for the implementation of large-scale and high-impact projects, in order to make an impact and profit from the digital skills acquired.

Recognition and open educational resources - Thematic report on the latest information in the 2016 European Recognition Report. The thematic report addresses specific aspects relevant to the development of recognition measures in Europe.

These aspects have facilitated the updating of the national reports, which are available on Cedefop's website. The reports cover the following topics:

- Recognition in the care and youth work sectors: how recognition measures relate to specific care and youth work sectors;
- Recognition monitoring provides an overview of how the recognition of non-formal and informal learning is recorded in Europe;
- Recognition of funding: an overview of funding sources for the recognition of non-formal and informal learning is provided, related issues such as the sustainability and availability of recognition measures are discussed;
- Recognition and open educational resources: the focus is on the recognition of learning outcomes achieved through open educational resources, for example by participating in mass open online courses.

## LITHUANIAN CASE

### Market Analysis

The situation in Lithuania regarding digital badges and other digitally signed credentials is rather limited to project and research group initiatives<sup>4</sup>. The separate research groups based mostly in universities are working on solutions to introduce and digitally signed credentials into their organizational routines and institutional systems. Groups of researchers are working on theoretical solutions to scientifically ground the introduction of digitally signed credentials and their metadata descriptions.

A state agency “Centre for Quality Assessment in Higher Education”(SKVC) has introduced in 2020 term in Lithuanian language “mikro-kredencialai” to denote “micro-credentials”. This is a positive move, however, the further developments in national legislation towards digitally signed credentials are not developed yet. The mentioned agency SKVC is following the European developments towards micro-credentials, but no any further formal initiatives are being offered yet.

### Role Based Requirements

University based research groups are investigating the improvement of Digital Badge metadata to increase their value to learners. A Vytautas Magnus university case analysis of Digital Badge metadata and international expert interview analysis about requirements for Digital Badge metadata has allowed to formulate the standards for Digital Badge metadata to increase their value to learners and employers<sup>5</sup>. The findings based on university DB metadata analysis reveal two predominant reasons why badges are issued to students:

- a) To contribute to overall assessment strategy.
- b) To assess soft skills by acknowledging certain personal professional skills or competences achieved or demonstrated.

At the university, badges are neither used to substitute conventional grading mechanisms, nor recognize students’ prior achievements earned outside formal learning settings. The results also reveal the fact that metadata descriptions of badges are rather limited and short of significant information. Therefore, there is lack of information on students’ achievements and parameters required for acquisition of the badge.

The results from expert interview in the paper confirm that DBs become of greater value if the information provided in the DB description metadata supplies data about the learning process and gives the evidence or answers that one needs, either as a university representative, a lecturer, or as an employer. It is important for the person recognizing the achievement to assure learner identification security, i.e., that this is the person who has participated in the learning process and has reached the indicated learning results.

Although DB practices are improving, the problem still exists that DBs are very often misused: the metadata in their description does not provide necessary information, making it difficult for students to use badges for the recognition of their learning results, exporting and publishing them in other environments, and vice versa. Research findings of this study allows formulation of new knowledge about the use of DBs for assessment and recognition, and provides the quality criteria for DB metadata descriptions, so that they would carry more value for assessment and recognition in HE. Therefore, the study will contribute to enhance the use of DBs in the studied institution as well as in other similar contexts. The impact of the study is inclusion of the proposed list of quality criteria for DB metadata descriptions in institutional practices. That directly concerns the improvement of the value of DBs for students’ assessment and recognition as DBs with rich and quality criteria-based metadata descriptions will have a higher value in higher education.

<sup>4</sup> <http://studyonline.lt/en/study-of-innovation/micro-credentials/>

<sup>5</sup> <https://infedu.vu.lt/journal/INFEDU/article/677/info>

## Policies

Even though the policy developments in education sector regarding micro-credentials are only yet to come, the digital infrastructure to operate digital signatures is in place.

Paragraph 10 of Article 3 of [Regulation \(EU\) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC](#) (hereinafter referred to as the Regulation) provides that ‘electronic signature’ means data in electronic form which is attached to or logically associated with other data in electronic form and which is used by the signatory to sign. Paragraph 2 of Article 25 of the Regulation also stipulates that a qualified electronic signature has the equivalent legal effect of a handwritten signature. The [Law of the Republic of Lithuania on Electronic Identification and Trust Services for Electronic Transactions](#) provides the legal regulation of electronic identification and signature in Lithuania.

A public service [www.elektroninis.lt](http://www.elektroninis.lt) consists of two qualified digital certificates, one of which is intended for personal identification and the other one – for signing. It is possible to use mobile signature, USB cryptographic token or a smart card.

## Teacher training

Future teachers in Vytautas Magnus university Education academy are being introduced into the system of digital credentials and are trained to create a digital badge. The teaching staff at Vytautas Magnus university is on the regular basis offered optional training courses on the creation and use of digital badges in their courses<sup>6</sup>

## SPANISH CASE

### Market Analysis

According to Borrás (2017) open badges and digitally signed credentials in Spain seem to represent a opportunity:

- for issuers, either from companies, training centres or educational institutions.
- for earners, that is those who receive some kind of training and intend to accredit their competences in a more precise way.
- and for anyone interested in hiring experts in certain subjects.

There seems to be lack of awareness and dissemination of its potential among the key stakeholders particularly from earners and consumers in general. It seems necessary to:

- Ensure validity processes for both the earner and the issuing entity, including transparency in the process of creating and issuing the badge
- Provide the badge with as much information as possible
- Follow the Open Badges standard.

Offer training to all the roles involved in the process and carry out dissemination of actions related to open badges and digitally signed credentials in Spain.

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<sup>6</sup> <http://studyonline.lt/studiju-inovacijos/skaitmeniniai-zenkliukai/>



## Role Based Requirements

Today, learning occurs anywhere, not just in formal learning settings. Informal learning is gaining more and more importance. This has been boosted by the pandemic but the need in Spain was already identified in 2015 by INTEF, the Spanish National Institute of Educational Technologies and Teacher Training. INTEF is a unit depending of the Ministry of Education, Culture and Sports responsible for the integration of ICT in non-university educational stages. In its report issued in 2017 about “Open Digital Credentials for the Recognition of Competencies” it confirms that:

*Since 2015, the (Spanish) Ministry of Education and Vocational Training, through the Institute National Educational and Training Technologies of the Teaching Staff, develops «INTEF Insignias» (<https://insignias.intef.es>), a “backpack” of open digital credentials to help 1. the educational community to show their professional skills and abilities; 2. to support future professionals to access educational jobs and anyone, and 3. interested in being recognized for their acquisition of skills, achievements and show evidence, and manage recognitions obtained from a lifelong learning perspective.*

According to INTEF (2017), the basic roles are identified as:

- Entity: it is the higher-ranking user on whom as many institutions as desired can depend. A practical example of an Entity is the MECD (The Spanish Ministry of Education), on which institutions such as INTEF depend.
- Institution: is the user who has the encrypted token, that is, the key for issuing open digital credentials, which guarantees the security, validity, etc., of their credentials
- Manager: is the user who manages the backpack on behalf of the institution.

Issuer: is the user with permissions to create, issue and revoke credentials, and must depend on an institution. The institution itself (the manager on its behalf) can upload user permissions to issuers dependent on it to issue the relevant credentials

## Policies

Interoperability is well regulated in Spain for the Public Administrations according to a set of rules that are part of the national framework:

[https://administracionelectronica.gob.es/pae\\_Home/pae\\_Estrategias/pae\\_Interoperabilidad\\_Inicio/pae\\_Normas\\_tecnicas\\_de\\_interoperabilidad.html#.YGIL4rBxfFg](https://administracionelectronica.gob.es/pae_Home/pae_Estrategias/pae_Interoperabilidad_Inicio/pae_Normas_tecnicas_de_interoperabilidad.html#.YGIL4rBxfFg)

Moreover, electronic signatures are commonly used, especially in technology-driven companies or digital environments. Additionally, use of a certificate-based digital signature, specifically a Qualified Electronic Signature (QES) may be mandatory to conduct certain administrative procedures or formalities conducted with the Spanish Administration (Adobe Sign, 2021). Next to the eIDAS (*EU electronic IDentification, Authentication and trust Services*) regulation, key laws regulating electronic signatures in Spain include:

- Spanish Law 39/2015 on Administrative Proceedings (Administrative Proceedings Act)
- Spanish Law 59/2003 on Electronic Signature (E-Signature Act) which establishes the general regulatory scheme for electronic signatures in Spain and distinguishes between Qualified electronic signatures (QES) and non-qualified Basic or Advanced electronic signatures
- Spanish Civil Code, Article 1278 which establishes the general principle of the freedom of forms for contracts meaning that no specific form is generally required for a contract to be valid.

Spanish law aligns with the eIDAS Regulation on the definitions of the different types of electronic signatures and in terms of the evidentiary weight given to qualified and non-qualified electronic signatures.

As to innovation in education, In Spain, 34,975 students and 1,329 primary and secondary teachers did take part in the [CRISS](#) project (Horizon 2020 research and innovation programme under grant agreement No 732489) piloting aimed at assessing students’ acquisition and certification of digital competences. The initial pilot tests

lasted from six to eight months, ending together with the school year in June 2019. A total of 264 schools joined in: 183 from Andalusia, 34 from Catalonia, 24 from Navarra, 6 from the Basque Country, 5 from Extremadura, 2 from Valencia, 2 from the Balearic Islands, 2 from Murcia, 2 from Galicia, 2 from Asturias, 1 from Castile and Leon and 1 from Madrid.

### Teacher Training

Some teacher training initiatives have been identified, such as:

- Non-University level in SPAIN: INTEF (As mentioned, INTEF is the Spanish National Institute of Educational Technologies and Teacher Training. Unit of the Ministry of Education, Culture and Sports responsible for the integration of ICT in non-university educational stages): Course on digital credentials for teachers and educators. [https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+INTEF1717+2017\\_ED2/7981deb080c840b2b3f294484bd9704c/](https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+INTEF1717+2017_ED2/7981deb080c840b2b3f294484bd9704c/)
- University level – EU level: The Ilona Buchem Open Badges for Open Science MOOC. It is a learning path for persons working or interested in the field of Research Data Management (RDM). It is one of three MOOCs provided by the OBERRED project, co-funded by the Erasmus+ Programme of the European Union. [https://platform.europeanmoocs.eu/course\\_open\\_badges\\_for\\_open\\_science](https://platform.europeanmoocs.eu/course_open_badges_for_open_science)

An interactive padlet that reflects very well the available resources in Spain regarding digital credential (divided onto theory, kinds of digital credentials, how to design and visualize them and more resources): [https://padlet.com/oriol\\_borras\\_gene/insigniasUPM](https://padlet.com/oriol_borras_gene/insigniasUPM)

Moreover, we have been able to spot some courses about electronic signatures and digital certifications that represent a baseline to our DISCO VET topic, in Spanish, as example:

- MiriadaX: Course in ES about “Firma electrónica y certificado electrónico”: <https://formacion.miriadax.net/curso/firma-electronica-y-certificado-electronico/>
- Ministry of employment funded projects for unemployed: Course in ES “Electronic signature and electronic certificates”: <https://cursosinem2021.com/c-curso-inem-2021-firma-electronica-y-certificados-electronicos>
- Training provider: free course certified by the ministry of employment Course in ES “Free course of digital signatures and electronic invoices”: <https://aula10formacion.com/curso/curso-gratis-online-de-firma-digital-y-factura-electronica/>
- Training provider: free course in ES “Free Course on digital signatures” <https://www.adams.es/cursos-gratuitos/informatica-profesional/la-firma-digital-/27005#.YHRsQ-gzaUk>

## EU AND INTERNATIONAL SPHERE

### Market Analysis

The overall situation in Europe regarding digital badges and other digitally signed credentials can be analysed from a two-fold perspective: the efforts at European level and the implementations at national levels. At European level there are a set of policies, initiatives based on such policies providing technological and financial support for the generation of a common understanding on the importance of digitally signed credentials and the development of infrastructures to support the implementation of their whole life cycle (creation, issuing, awarding, owning and verification). In section 3 those policies, actions and initiatives were described.

Meanwhile, at national level the state of art of art of digitally signed credentials varies as there are countries like The Netherlands where a national approach to digital credentialing is being set through the implementation of a unified infrastructure in which educational institutions can issue digital credentials at scale using Badgr. Surfnet, the Dutch National Research and Education Network, leads an open badges pilot with Badgr allows 16 institutions to create and issue badges (Badgr, 2021). In other countries efforts are rather limited to participation on EC funded projects and research group initiatives. Those research groups based are mostly based in universities or small companies and they are working on solutions to introduce and digitally signed credentials into their organizational procedure and institutional systems.

There are international initiatives like the Digital Credentials Consortium (Digital Credentials Consortium, 2021), which was founded in 2018 by leading universities from Europe and North America (US, Canada and Mexico) with expertise in the design of verifiable digital credentials. The MIT along with Delft University of Technology and University of Milano Bicocca amongst other relevant universities are designing an infrastructure for digital credentials of academic achievement.

Moreover, we can find are private actors like Accredible, which provides a comprehensive digital badge and certificate platform with a full-service digital credentialing solution for creating and managing credentials and their integration with the organizations' legacy systems. Accredible currently serves to more than thousand renown organizations like Google, IEEE, Slack, Harvard and Berkeley Universities. (Accredible, 2021)

### Role Based Requirements

The initiatives at European and international levels previously presented, have a common understanding of the different roles involved in the process of creating, issuing, awarding, owning and recognising digital credentials. Issuers will need clear instructions and easy to use tools for creating and issuing and digital credentials to allow them to keep and distribute learners' records in a simple, safe and inexpensive way, remove risks related to the identity fraud and issue multiple credentials to a single learner using a common streamlined process.



Owners of digital credentials will need to maintain a compelling and verifiable record of their learning achievements to share with employers, receive credentials in a safe way, keep their credentials ownership without having to ask or pay to issuer institutions for credentials transcripts; compile and curate digital credentials issued by multiple educational institutions. On the other hand, employers or any other educational institution willing to recognize digital credentials will need instructions and tools which support the analysis and verification of the information included in the credentials.

### **Policies**

At European level there is a set of policies aiming at fostering the development and deployment of digital infrastructures to support the flexible learning, the use of digitally signed credentials as means to certify the achievement of competences and its recognition. Such policies are already presented in section 3.1.

### **Teacher Training**

The European Framework for the Digital Competence of Educators (DigCompEdu) is a scientifically sound framework describing what it means for educators to be digitally competent. It provides a general reference frame to support the development of educator-specific digital competences in Europe (Hub, 2021). The DigCompEdu study builds on previous work carried out to define citizens' Digital Competence in general, and Digitally Competent Education Organisations (DigCompOrg). It contributes to the Commission's recently endorsed Skills Agenda for Europe and to the Europe 2020 flagship initiative Agenda for New Skills for New Jobs. The EdDiCo project enhances the DigCompEdu by adding a whole dimension dedicated to creditalisation and recognition, which a full description of the different competences (knowledge, skills and attitudes) and levels an educator/teacher should develop/improve in order to successfully get involved in the digital credential life cycle. (Competence Metamodel for Digital Educators, 2021)

Furthermore, the DigCompEdu has been used as starting point for the development of a self reflection tool named DigCompEdu CheckIn and it allows educators to self-assess their level of any of the competences listed in the DigCompEdu framework (DigCompEdu Check in site, 2021) In contrast the EdDiCo project is currently working on not only providing a selfassessment tool to determine the educators' actual levels of competences but it will give a set of recommendations in form of open educational resources like courses and tools which will guide and help training educators in their roles as part of the creditalisation and recognition process. (EdDiCo Self-Assessment and Recommendation tools for Digital Education, 2020)

### 5.3 RESULTS OF THE INTERVIEWS

The interviews in partner countries with experts in digital assessment and recognition were implemented using email and video conference facilities as well as a written follow up in the period February-April 2021.

The challenges of assessment and recognition in Open and Online Learning are:

#### GREECE

- *Correspondence with skills and competences not covered by formal education. Evaluation and assessment methods (e.g., exams, testing that complement sole following of learning material) is also a challenge that should be tackled towards high recognition. A validation by formal, institutional actor is a prerequisite.*
- *Validity, high quality and accepted trainers, well-documented learning material, trustworthy accreditors and issuers.*
- *(Employee) Validity, acceptance form labour-market.*

#### HUNGARY

- *There are multiple solutions and platforms. The processes of defining and gaining a badge greatly differ, thus the badge system is far from being stable. This also causes confusion for the users and discourage them to try the badge system. The issuer should carry weight. Carpet badging is a wrong tendency. We started with diplomas, then reference letters had a growing significance, eventually the system will birth a badging process that will be easy to follow. So far there is a lot of wiggle room, that might put of less adventurous potential users.*
- *From the adult educator point of view, the challenge is to find a rational levelling system: when should you issue the certificate? If it is within an online system, there are supporting mechanisms, but the rationale behind the certification is still an issue to solve.*
- *Would I recognize it as valid as an HR director? Depending on the vocation, I would. If the vocation is very practice oriented, then I would have my doubts. However, if the potential employee would present badges or online certificates issued by a practice place, then that would be ok for me too.*
- *I don't have forgery concerns: if someone want to forge a certificate, they can do the same with the paper certificates as well. Digital certificates might even be harder to forge.*
- *In general, having digital certificates and badges would even make the HR personnel's job easier: easier to file, easier to attach or reference when applying for funding etc.*

## LATVIA

- *Teachers need skills to do this. Recognition probably requires a management infrastructure agreement at the level of educational institutions - state - EU, conditions, skills for use.*
- *There should be no problems with online assessment. Recognition has not been introduced and is not implemented, if we are talking about documents recognized by the Latvian state or formal educational institutions. It is difficult to rely on learners' integrity in performing tests, as well as finding the most appropriate ways and means to assess practical skills online.*
- *Assessment of online learning is in general a complicated task for teachers as they are not able to directly observe the learning process and progress of each student. And the students may use additional informative resources and assistance while completing the tasks. The problem lies in finding out what has really been acquired and memorized and what has been looked up for and therefore the recognition of knowledge and certification becomes problematic as it's not possible to determine the identity of the test taker.*

## LITHUANIA

- *In the cases, where there isn't someone sitting behind and monitoring that learning and verifying that you have learned something, then of course the recognition also gets a bit more tricky because you have to somehow prove what you have learned, and if you can't anyhow prove, if you have done it, I know you've taken some online learning unit and you even received some badge as an outcome but if there's no one who has monitored or checked what you have been learning.*
- *One type of challenge is the link of non-formal learning with formal learning and employer. So the agreement between the stakeholders that this open and online learning is recognized is one challenge. The second challenge is procedure, for example in Lithuania, it is still not completely clear, how people can collect recognitions and assessments of non-formal learning and recognize them, and to what extent in formal study programs, what percentage of credit transfer could be implemented.*
- *If we look from the perspective of the institutions, and national institutions, regional institutions, European-wide institutions, there are so many different standards, regulations, and policies. Until they have defined the assessment and recognition of open learning, the private learning providers, like Udacity are moving faster and faster ahead of what the institutions can provide, so it's a problem of speed. Students will not wait for that. The student will go to university for the basics and will use different online courses, no matter if they are assessed by the institution, if they know this is something the company needs. We are representing HE institutions; we are far much too slow with the change which is needed out there.*

## SPAIN

- *On the one side raising the awareness of all the roles and positions involved in the assessment and recognition process and on the other side also the issue of alternative credentials and digital credentials. EDCI can be an opportunity to homogenize but many institutions in Spain are already investing in digitally signed credentials. Soon we will see how this is progressing.*
- *From the moment this model began to become popular, to the present pandemic, I think it has always been difficult to verify the identity of person taking the online course. Proctoring seems like a good solution and in private university institutions such as CUNEF or Francisco de Vitoria University have already successfully established it, but in public ones, I am aware that they have encountered problems, for example at the University of Granada. I have tried to create badges to recognize the mentoring work of some participants in MOOC courses, but I think there is still a lot to do in this area.*
- *If open learning systems are to be validated and their recognition made official at a formal education level, it is necessary to advance in the guarantees of the evaluation process. Once this point is solved, the main challenge will lay in the full or partial certification of competencies through micro-credentials.*

## EU LEVEL (Italy and France)

- *We need to count on collaborative ecosystems which involve educational institutions and employers based on national level strategies created with cooperation between ministries, educational organizations and companies to jointly define skills requirements and the means for recognizing learners' achievement.*
- *The implementation of effective mechanisms to properly assess the attainment of specific learning outcomes.*
- *The availability of hands-on/practical trainings for the different roles involved in the assessment of learning competences and their recognition will contribute to better understanding and implementation of both processes.*

The **relation of assessment and recognition of open online learning to EQF** (European qualification framework) or **NQF** (national qualification framework) are:

## GREECE

- *NQF actors in Greece should exploit projects and programs that have been implemented at EU level, with Greek actors involved. They do not as far as I know. These actors should be the gatekeepers at the official level in accreditation aspects.*
- *I would insist that it is more an issue of content and trainer. Only after securing quality in these aspects, we could talk about relating to EQF.*
- *Yes, but with a set of very strict criteria.*

## HUNGARY

- *It is a hierarchical system. EQF provides a model of levels and credit transferability that the NQF recreates. Vocations need also to be systematised; however, a vocation consists of very complex qualification systems. In dual VET systems and in project works open and online learning can play an important role, where we take learning outside of the formal education. If we succeed to define the blocks of the basic skills than we can*

*easily assign the credits and an assessment system can also be built on it. We have the skills defined however they are not assigned to the concrete requirements of a vocation.*

- *They should be able to interoperable, same way as in VET, the National Qualification Register and Europass are interoperable.*
- *As they are working with market-oriented courses, not confined with registered qualification, for them to introduce an interoperable system, they need to rework all their courses to come up with interoperable qualifiers, to decide the EQF equivalent. It is doable.*
- *As a HR director of a completely Hungarian company, she has not yet meet with recognizing international certificates, as almost all their employees are Hungarian nationalities. Her first thought on the subject was, how Hungarian certificates are recognized at a foreign company.*

## LATVIA

- *Latvia, like most of the EU countries, has aligned its qualifications framework with the EQF, it is clearly worthwhile to provide evidence of the skills that form part of the qualification to be linked to these frameworks. However, it must also be possible to issue certificates of knowledge and skills, work experience or social activities that are not related to a specific qualification and are not related to NQF or EQF and are not related to the geographical framework of Latvia or Europe. For example, when it comes to studying, working in Africa or China.*
- *There must be close links, at least to the extent that all educational establishments entitled to issue certificates are registered in the common system. This would facilitate the verification and recognition of certificates.*

## LITHUANIA

- *Any kind of recognition of learning or how you store for example some educational data in any database they need to be aligned with some international standards so that they aren't something that exists only in their universities internally. If learning results do not fit any of the qualification frameworks or similar standards, they are then the sharing of those across institutions.*
- *Some professions have their standards that are described through competencies and skills in detail. But new professions that appear now might not be described in competencies and skills in such detail. Actually, EQF and NQF should be prepared to the openness and flexibility that is brought by open and online learning in terms of new competencies, new skills and also digitalization of new credentials. First of all, EQF should be digital.*

## SPAIN

- *It is a policy issue. IT also depends on the NQF adoption and implementation in member states. In Spain for example, it should be promoted at national level that can (or should) be adopted by the autonomous communities in Spain. This might provide an unequal result in Spain as having the regional the educational communities it might provide a very different situation depending on the region in Spain you are located....*
- *It must be a direct relationship and also take into account DigComp and DigCompEdu which has adapted in Spanish by our ministry (<https://sede.educacion.gob.es/publiventa/marco-europeo-para-la-competencia-digital-de-los-educadores-digcompedu/competencia-digital/24685>). It would also be interesting to link it to the commitment of reference framework of digital teaching competence that has been carried out from the Ministry on Education in Spain: [https://www.boe.es/diario\\_boe/txt.php?id=BOE-A-2020-7775](https://www.boe.es/diario_boe/txt.php?id=BOE-A-2020-7775)*
- *The competences must be associated with levels of the MECES (Higher education qualification system in Spain) and therefore facilitate the recognition of the specific volume of training of a certain level of the MECES / NQF.*

## EU LEVEL (Italy and France)

- *At European level there is a need for a common recognition framework: it will be required to define mappings of digital credential levels in according to NQFs and EQF levels and the use of open-source technical platforms based upon European standards will be mandatory, that will also ensure digital credentials will be portable and easily processed for their recognition.*
- *The definition of assessment and recognition of open online learning outcomes using mappings between EQF, NQF and the reference framework of ESCO to describe competences and skills for the different professions will contribute to adapt better scale up the recognition process to a broader number of professions.*

## 5.4 RESULTS OF THE SURVEY

The survey was circulated in partner countries during the months of February to May 2021. In this report we focus on the demand side regarding skills related to OB and DSC in partner countries.

### GREECE

For those who work in **education sector** the skills considered equally most important are *Be able to encourage learning for obtaining open badges and digitally signed credentials* and *Be able to use badging systems as part of a gamified learning process*, followed by *Be able to draft the framework that will describe how badges will be used/earned, displayed/shared and designed*.

**Employees and job seekers as well as adult learners** rated with the highest rating skills *Be able to participate in gamified learning experiences to obtain a badge or digitally signed credential* followed by *Be able to analyse the contents of different open badges and digitally signed credentials and choose the most appropriate for my learning path*.

**Employers and those in HR sector** considered most important the skill *Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee*.



## HUNGARY

For those who work in **education sector**, the skill considered important is *Be able to use badging systems as part of a gamified learning process* and *Be able to integrate issuing badges in other administrative, managerial tasks and processes*

For **employers and those in HR sector** the skill considered somewhat important is *Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee.*

For **employees and job seekers as well as adult learners** the skills rated the least uninteresting is *Be able to analyse the contents of different open badges and digitally signed credentials and choose the most appropriate for my learning path.*

## LATVIA

For those who work in **education sector** two skills are considered as very important: ability to integrate digital certificate issuance into other administrative, management tasks and processes and ability to develop a digital certificate.

**Employees and job seekers as well as adult learners** consider the ability to use the system to operate with / obtain and display / share the Open Badges and digitally signed credentials to be most important.

**Employers and those in HR sector** consider skills to analyse and differentiate the Open Badges and digitally signed credentials to be the most important, as well as be able to identify their benefits for the employer.

## LITHUANIA

For those who work in education sector two skills are considered as very important are *Be able to analyse learning data* and *Be able to encourage learning for obtaining open badges and digitally signed credentials*. The other skills are also rated as important.

For employers and those in HR sector the skill considered most important is *Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee* and *Be able to assess the validity of open badges and digitally signed credentials*, closely followed by the rest of skills.

For employees and job seekers as well as adult learners the skills rated with the highest rating is *Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials*, know how to use, store, and share my open badges and digitally signed credentials and *Be able to use a framework to use/earn and display/share open badges and digitally signed credentials*.

## SPAIN

For those who work in **education sector** the skill considered important is *Be able to draft the framework that will describe how badges will be used/earned, displayed/shared and designed*, followed by *Be able to encourage learning for obtaining open badges and digitally signed credentials* and by *be able to use badging systems as part of a gamified learning process*.

For **employers and those in HR sector** the skill considered most important is *Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee*, closely followed by the rest of skills.

For **employees and job seekers as well as adult learners** the skills rated with the highest rating is *Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials*.

## 6 COLLATED RESULTS OF THE FIELD RESEARCH

### 6.1 INTERVIEWS

The interviews in partner countries with experts in digital assessment and recognition were implemented using email and video conference facilities as well as a written follow up in the period February-April 2021.

We have included here below the **summary of responses divided in 3 sections:**

- Assessment and recognition: Challenges in open and online learning
- EUROPASS learning model EDCI integration and metadata: Potential integration of the EUROPASS Digital Credentials Infrastructure (EDCI) into the digital strategy for the assessment
- General questions: recommended learning resources and most important course features

#### I. ASSESSMENT AND RECOGNITION:

##### Challenges of assessment and recognition in open and online learning

##### GREECE

- *The main challenge would be the correspondence with skills and competences not covered by formal education. Evaluation and assessment methods (e.g., exams, testing that complement sole following of learning material) is also a challenge that should be tackled towards high recognition. A validation by formal, institutional actor is a prerequisite.*
- *Validity, high quality and accepted trainers, well-documented learning material, trustworthy accreditors, and issuers.*
- *(Employee) Validity, acceptance form labour-market.*

##### HUNGARY

- *There are multiple solutions and platforms. The processes of defining and gaining a badge greatly differ, thus the badge system is far from being stable. This also causes confusion for the users and discourage them to try the badge system. The issuer should carry weight. Carpet badging is a wrong tendency. We started with diplomas, then reference letters had a growing significance, eventually the system will birth a badging process that will be easy to follow. So far there is a lot of wiggle room, that might put of less adventurous potential users.*
- *From the adult educator point of view, the challenge is to find a rational levelling system: when should you issue the certificate? If it is within an online system, there are supporting mechanisms, but the rationale behind the certification is still an issue to solve.*
- *Would I recognize it as valid as an HR director? Depending on the vocation, I would. If the vocation is very practice oriented, then I would have my doubts. However, if the potential employee would present badges or online certificates issued by a practice place, then that would be ok for me too.*
- *I don't have forgery concerns: if someone want to forge a certificate, they can do the same with the paper certificates as well. Digital certificates might even be harder to forge.*
- *In general, having digital certificates and badges would even make the HR personnel's job easier: easier to file, easier to attach or reference when applying for funding etc.*

## LATVIA

- *Assessment is not difficult, because it is the teacher's job. The teacher needs skills to do this. Recognition probably requires a management infrastructure agreement at the level of educational institutions - state - EU, conditions, skills for use.*
- *There should be no problems with online assessment. Recognition has not been introduced and is not implemented, if we are talking about documents recognized by the Latvian state or formal educational institutions. It is difficult to rely on learners' integrity in performing tests, as well as finding the most appropriate ways and means to assess practical skills online.*
- *Assessment of online learning is in general a complicated task for teachers as they are not able to directly observe the learning process and progress of each student. And the students may use additional informative resources and assistance while completing the tasks. The problem lies in finding out what has really been acquired and memorized and what has been looked up for and therefore the recognition of knowledge and certification becomes problematic as it's not possible to determine the identity of the test taker.*

## LITHUANIA

- *In the cases, where there isn't someone sitting behind and monitoring that learning and verifying that you have learned something, then of course the recognition also gets a bit more tricky because you have to somehow prove what you have learned, and if you can't anyhow prove, if you have done it, I know you've taken some online learning unit and you even received some badge as an outcome but if there's no one who has monitored or checked what you have been learning.*
- *One type of challenge is the link of non-formal learning with formal learning and employer. So, the agreement between the stakeholders that this open and online learning is recognize is one challenge. The second challenge is procedure, for example in Lithuania, it is still not completely clear how people can collect recognitions and assessments of non-formal learning and recognize them, and to what extent in formal study programs, what percentage of credit transfer could be implemented.*
- *If we look from the perspective of the institutions, and national institutions, regional institutions, European-wide institutions, there are so many different standards, regulations, and policies. Until they have defined the assessment and recognition of open learning, the private learning providers, like Udacity are moving faster and faster ahead of what the institutions can provide, so it's a problem of speed. Students will not wait for that. The student will go to university for the basics and will use different online courses, no matter if they are assessed by the institution, if they know this is something the company needs. We represent HE institutions, we are far much too slow with the change which is needed out there.*

## SPAIN

- *On the one side raising the awareness of all the roles and positions involved in the assessment and recognition process and on the other side also the issue of alternative credentials and digital credentials. EDCI can be an opportunity to homogenize but many institutions in Spain are already investing in digitally signed credentials. Soon we will see how this is progressing.*
- *From the moment this model began to become popular, to the present pandemic, I think it has always been difficult to verify the identity of person taking the online course. Proctoring seems like a good solution and in private university institutions such as CUNEF or Francisco de Vitoria University have already successfully established it, but in public ones, I am aware that they have encountered problems, for example at the University of Granada. I have tried to create badges to recognize the mentoring work of some participants in MOOC courses, but I think there is still a lot to do in this area.*
- *If open learning systems are to be validated and their recognition made official at a formal education level, it is necessary to advance in the guarantees of the evaluation process. Once this point is solved, the main challenge will lay in the full or partial certification of competencies through micro-credentials.*

## EU LEVEL (Italy and France)

- *We need to count on collaborative ecosystems which involve educational institutions and employers based on national level strategies created with cooperation between ministries, educational organizations, and companies to jointly define skills requirements and the means for recognizing learners' achievement.*
- *The implementation of effective mechanisms to properly assess the attainment of specific learning outcomes.*
- *The availability of hands-on/practical trainings for the different roles involved in the assessment of learning competences and their recognition will contribute to better understanding and implementation of both processes.*

## II. EUROPASS LEARNING MODEL EDCI INTEGRATION AND METADATA

### Potential integration of the Europass Digital Credentials Infrastructure (EDCI) into the digital strategy for the assessment

#### GREECE

- *Yes, definitely. As I have only followed the process, I think it will be a needed tool, following the trends in education and especially lifelong learning*
- *It can but let us see first how it looks.*
- *Yes, it could.*

## HUNGARY

- *They have not yet heard about it or only on a superficial level.*
- *It only makes sense if it can be integrated. HEIs might use different systems, but they have to be interoperable.*

## LATVIA

- *It would be good to support it, to try to implement it at national level. Because our institution (training centre) will focus on the system implemented in the country (strategy).*
- *No answer to this question.*
- *Limited Knowledge on the practical application of EDCI. However, EDCI has the potential to be adopted in all levels of education and support building a common understanding and consistent references to qualifications, skills, and occupations on a European level.*

## LITHUANIA

- *All participants were aware of the EUROPASS Digital Credentials Infrastructure (EDCI).*
- *It will have to be integrated, it is a question of time and adequate procedures.*
- *The universities are starting to include the preparation of metadata for digital credentials into the institutional strategies.*

## SPAIN

- *Of course. I just don't know if we have capacity as Universidad Rey Juan Carlos. As already mentioned in the previous question, it should be a national initiative implemented by the CCAAs.*
- *It's not that it can be integrated, it's that it must come true. Other Vice-Chancellors, mainly Technology and Sustainability, are working on it.*
- *Microcredencialization is useful if it is recognized, and global infrastructures can support that recognition if they provide added value over a mere "credential container". We are not working on this aspect in our university now though.*

## EU LEVEL (Italy and France)

- *One of the interviewers knew about the availability but didn't have time for researching how it can be integrated in his university strategy.*
- *The other commented that intensive work will be required to integrate in our current digital strategy for assessment into the EDCI and mentioned these as the initial steps to take: Firstly obtain a Qualified electronic seal (digital equivalent to seals of legal entities on paper); prepare information required for creating digital credentials according to the requirements of the EDCI credential builder to ensure specific data from the student's information systems will be selected for issuing the credentials.*



### III. GENERAL QUESTIONS

Learning resources, books, and courses recommended regarding open badges and digitally signed credentials

#### GREECE

- *The most relevant in the Greek case is the following. Further than that, almost all information that I know, is drawn from sites of badges issuers available online (2 trainers mentioned the same one):*
  - ✓ Papadimitriou, & Niari (2017). *Open Badges – Ανοικτές Ετικέτες Ποιότητας: Αποτίμηση Ποιοτικών Στοιχείων σε Συστήματα Ανοικτής Εκπαίδευσης*. Διεθνές Συνέδριο για την Ανοικτή & εξ Αποστάσεως Εκπαίδευση, 9, 62-72. [https://www.researchgate.net/publication/322811687\\_Open\\_Badges\\_-\\_Anoiktes\\_Etiketes\\_Poiotetas\\_Apotimese\\_Poiotikon\\_Stoicheion\\_se\\_Systemata\\_Anoiktes\\_Ekpaideuses](https://www.researchgate.net/publication/322811687_Open_Badges_-_Anoiktes_Etiketes_Poiotetas_Apotimese_Poiotikon_Stoicheion_se_Systemata_Anoiktes_Ekpaideuses)
- (Employee) I cannot recall any.

#### HUNGARY

- *The BME does not have any courses or resources, other HEI do hint on having these skills thought. If we would have a thorough research, we might be able to come up with something, but established practices are definitely missing.*
- *Recent educational and IT conferences focused on digital transformation; however, it got stuck on the level of methodologies and platforms.*
- *There are some online resources, but not a systematized resource, definitely no publication. Some YouTube resources. She is now attending HR training and no such topic is planned to be tackled. She sent around the DISCO VET survey and the informal feedback was that it was very new to them and they have not received any training regarding online certification nor any other info (e.g. at HR conferences).*
- *There is nothing she is familiar with in this subject in HR related professional publications.*

#### LATVIA

- *Get acquainted with your country's e-document system, Latvija.lv, and use of e-signature (if you haven't already done so). Get acquainted, look for information about digital assessment and recognition tools in non-formal education (token systems, open badges, Microsoft badges, certificates in Internet courses, in the world of computer games); Sanna Brauer "Digital Open Badge Driven Learning – Competence-Based Professional Development for Vocational Teachers (doctoral dissertation).*
- *I believe that I should study in this area myself.*
- *There are plenty:*
  - *Sanna Brauer. Digital Open Badge-Driven Learning: Practical Applications to Support Emerging Ecosystems (2019)*<sup>7</sup>
  - *Jaana Kullaslahti, Sanna Ruhalahti, Sanna Brauer Professional Development of Digital Competences: Standardised Frameworks Supporting Evolving Digital Badging Practices (2019)*
  - *Brauer, Sanna; Siklander, Pirkko (2017) Competence-based assessment and digital badging as guidance in vocational teacher education*<sup>8</sup>

<sup>7</sup> <https://www.theseus.fi/handle/10024/338737>

<sup>8</sup> <https://www.theseus.fi/handle/10024/143105>

- REID, A. J., PASTER, D. and ABRAMOVICH, S., (2015). *Digital badges in undergraduate composition courses: effects on intrinsic motivation*. *Journal of Computers in Education*, 2, (4), pp.377–398.
- ABRAMOVICH, S., SCHUNN, C., and HIGASHI, R. M., (2013). *Are badges useful in education? It depends upon the type of badge and expertise of learner*. *Educational Technology Research and Development*, 61 (2), pp.217–232.

## LITHUANIA

- The research team Participating in DISCO VET has published a paper: <https://infedu.vu.lt/journal/INFEDU/article/677/info>
- ✓ Trepule, E., Volungeviciene, A. Tereseviciene, M., Greenspon, R., Costa, N. *How to Increase the Value of Digital Badges for Assessment and Recognition in Higher Education. A University Case*, *Informatics in Education* 20(2021), no. 1, 131-152, DOI 10.15388/infedu.2021.07

## SPAIN

- There are plenty, as examples:
    - The guide about “Insignias digitales como acreditación de competencias en la Universidad”: (IN ES): <http://oa.upm.es/47460/>
    - Open Badges v2.0. IMS Final Release: INTEF “credenciales digitales abiertas para el reconocimiento de competencias” [https://insignias.educacion.es/sites/default/files/uploads/2018\\_0731%20Gu%C3%ADa%20Credenciales%20Digitales%20Abiertas.pdf](https://insignias.educacion.es/sites/default/files/uploads/2018_0731%20Gu%C3%ADa%20Credenciales%20Digitales%20Abiertas.pdf)  
<https://www.imsglobal.org/sites/default/files/Badges/OBv2p0Final/index.html>
    - The Ilona Buchem Open Badges for Open Science MOOC. It is a learning path for persons working or interested in the field of Research Data Management (RDM), OBERRED project, co-funded by the Erasmus+ Programme of the European Union. [https://platform.europeanmoocs.eu/course\\_open\\_badges\\_for\\_open\\_science](https://platform.europeanmoocs.eu/course_open_badges_for_open_science)
    - INTEF: Course on digital credentials for teachers and educators. [https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+INTEF1717+2017\\_ED2/7981deb080c840b2b3f294484bd9704c/](https://enlinea.intef.es/courses/course-v1:MOOC-INTEF+INTEF1717+2017_ED2/7981deb080c840b2b3f294484bd9704c/)
  - The main learning resource is the Padlet of Oriol Borrás dedicated to badges: [https://padlet.com/oriol\\_borras\\_gene/insigniasUPM](https://padlet.com/oriol_borras_gene/insigniasUPM)
- Books I know:
- Fanfarelli, J. R., & McDaniel, R. (2019). *Effective digital badge design: Apps for learning*. Routledge.
  - Ifenthaler, D., Bellin-Mularski, N., & Mah, D. K. (2016). *Foundation of digital badges and micro-credentials*. Switzerland: Springer International Publishing.
  - O'Brien, K., & Jacobson, T. E. (Eds.). (2018). *Teaching with digital badges: best practices for libraries*. Rowman & Littlefield.
  - Masura, S. (2013). *Digital badges*. Cherry Lake.
  - McGovern, T.M. (2020). *Academic Digital Badges: Industry, Employment and Perspectives*.
  - Muilenburg, L. Y., & Berge, Z. L. (Eds.). (2016). *Digital badges in education: Trends, problems and cases*. Routledge.
  - Rimland, E., & Raish, V. (Eds.). (2019). *Micro-credentials and digital badges*. ALA TechSource.

## EU LEVEL (Italy and France)

- *Higher Education 4.0: Certifying Your Future* <https://www.futurelearn.com/courses/higher-education-certifying-your-future>
- *EDCI issuer: How to prepare your data for the Europass Digital credentials.* <https://europa.eu/europass/en/preparing-credentials-europass-digital-credentials>
- *EDCI issuer.* <https://webgate.acceptance.ec.europa.eu/europass/edci-issuer/#/home>
- Stefaniak, J., Carey, K. *Instilling purpose and value in the implementation of digital badges in higher education.* *Int J Educ Technol High Educ* 16, 44 (2019). <https://doi.org/10.1186/s41239-019-0175-9> Full article access <https://educationaltechnologyjournal.springeropen.com/articles/10.1186/s41239-019-0175-9#citeas>
- Training initiatives in open badges and digitally signed credentials that could serve DISCO VET as an example:
  - *Higher Education 4.0: Certifying Your Future* <https://www.futurelearn.com/courses/higher-education-certifying-your-future>
  - *How to create a digital badging program in your classroom*
  - <https://www.classcraft.com/blog/how-to-create-a-digital-badging-program-in-your-classroom/>

## Most important course features

### GREECE

#### Blended or online:

- *Online and synchronous.*
- *Blended*
- *Online asynchronous*

#### For online learning what kind of computer and connection they have:

- *PC, laptop, tablet, smartphone. All should be covered, especially for the younger at age.*
- *All is available*

#### Online teaching media they prefer (presentations, OER...):

- *Demos, videos, self-paced*
- *Innovative, interactive, fully digital*
- *(Employee) Demos, online links, games*

### HUNGARY

#### Blended or online:

- *Blended, definitely. Distance learning made a big stride in Hungary as well and regarding organisation and time management, it has great advantages, as people realised so. The first and the last session however should stay contact.*
- *Blended, even if most of the learning takes place online, f-2-f presence is still important.*

#### Online teaching media they prefer (presentations, OER...):

- *A platform with many short videos (no longer than a minute), after 3-4 videos, a short test for assessment. As much colourful as possible. Interactive elements could be included as well. Within an institution, they can be collaboration included as well, but for learners independent from each other, collaboration in a course that is less than 30 hours is futile, it cannot be established properly.*

- *It has to be visually strong. Multimedia elements, videos with detailed instructions, practiced oriented.*
- *Should be group learning. In online it should be self-learning and group learning mix.*
- *Every method is good if it is mixed, so the learner does not get bored.*

## LATVIA

### Blended or online:

- *A mixed type would be best.*
- *Mixed lessons.*
- *There could be a differentiation between the knowledge levels that each participant could choose from, in accordance with their role in the institution (teacher, IT expert, management staff) and further need to work with digital badges. Blended workshops combining face-to-face training with online classes.*

### Computers and internet connection would be used for online learning:

- *Any available.*
- *I do not think that it is very important if we talk in the Latvian context. It is important to have a stable and sufficient Internet connection, but the computer should have a camera, microphone, and speakers.*
- *Depends. In case the training would be taken from participant's home in a distant learning mode, most likely the participant would use personal computer/laptop and available internet connection. If there would be possibility to take the course during working hours in office environment, the participants would use the IT equipment and connection provided by the institution.*

### Online teaching media they prefer (presentations, OER...):

- *Various resources are needed.*
- *Open educational resources with explanations, such as a textbook. Ideal if in an interactive format, not just a pdf file.*
- *Explanatory videos with interactive support materials.*

## LITHUANIA

### Blended or online:

- *Perhaps an online course is appropriate for this option.*

### Computers and internet connection would be used for online learning:

- *Everyone in education is now used to telework.*

### Online teaching media do they prefer (presentations, OER...)

- *Presentations and OER combined.*
- *Online collaboration and individual work.*

## SPAIN

### Blended or online:

- *BLENDED. 100%online is complicated and face to face is still important (ADVICE: weekly short 30 minutes webinars that can become videos to use in the future) but leaving the chance to access to 100% online.*
- *100%online*
- *Working at UNIR I can't give you another answer: I think the course should be 100%, without preventing it from being shaped with virtual (synchronic) face-to-face classes.*

**For online learning what kind of computer and connection they have**

- *Portable computer, tablet or even smartphones. Facilitate access as much as possible.*
- *Widen access: It would not include prerequisites for the course and should be available to everyone*

**Online teaching media they prefer (presentations, OER...)**

- *Weekly short 30 minutes webinars (that become videos). Collaborative work: Facebook groups... etc. Telegram groups. Podcasts: more useful than videos and with experts by topic. Teaching methods (group work, storytelling, role playing, online collaboration...etc.)?*
- *Mainly videos, if they can be interactive, much better and slides you can download. As a supplementary material I would use infographics, made for example with Genially or Sway, as OER, I do not know if there is much about badges (apart from what Oriol Borrás has developed) and I find podcasts very good idea, although I would go for Reels on Instagram.*

**EU LEVEL (Italy and France)**

**Blended or online:**

- *selection of Blended learning as effective mode to ensure proper interaction between participants and allowing them to learn at their own pace*

**Online teaching media they prefer (presentations, OER...)?**

- *OER and presentations in that priority order.*

**Teaching methods (group work, storytelling, role playing, online collaboration...etc)**

- *They proposed to use group work, online collaborations, and peer assessment.*

## 6.2 ONLINE SURVEY

As already mentioned, the online survey consisted on the issue of an online questionnaire in English that was translated to the partner languages (HU, ES, GR, LT and LV, see Annex 1 *Links to surveys in the partner languages*).

The aim was to obtain feedback from Issuers of open badges and digitally signed credentials, earners (learners) and validators to gain insight into the demand side regarding OB and DSC. Initial target was 30 on-line questionnaires per partner/EU level. The final number of participants was 165 (please see distribution by country in table 1).

In table 2, we can see the distribution of survey inputs by country:

COUNTRY	SURVEY INPUTS
Spain	34
Greece	24
Hungary	38
Lithuania	37
Latvia	30
Other	2
<b>TOTAL</b>	<b>165</b>

Table 3: Number survey inputs by country. Own Elaboration.

As we can see below, most inputs came from Hungary (23%), Lithuania (22%) and Spain (21%):

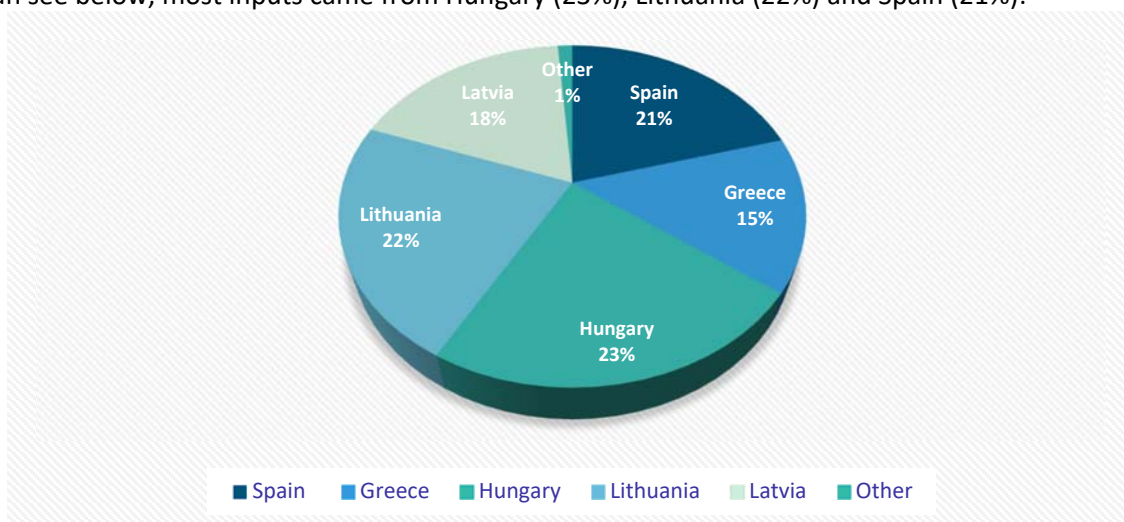


Figure 6: Survey Participants – percentage. Own Elaboration.



Regarding gender, as illustrated in figure 7 59% (a total of 109) were females and 30% were males (43)

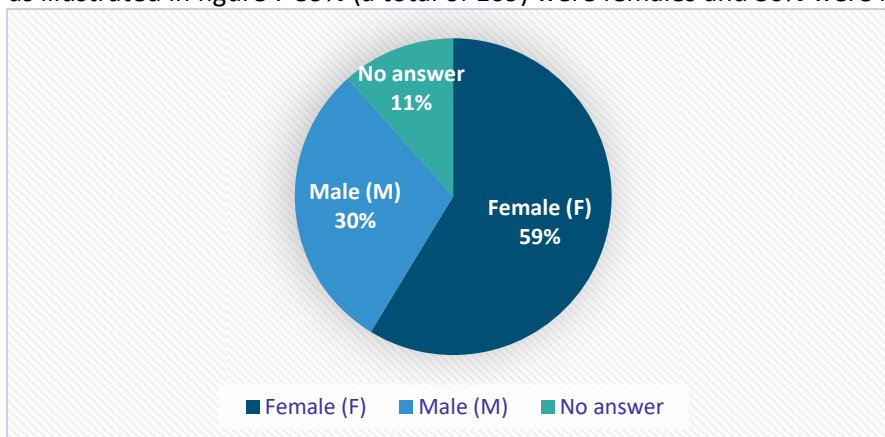


Figure 7: Gender of survey Participants – percentage. Own Elaboration.

As to the distribution of roles, table 3 shows the total distribution of roles:

ROLES	#
Issuers: I work in the field of education as a trainer/teacher/lecturer or administrator	93
Earners: I am an employee/job seeker/adult learner/student	40
Validators: I am an employer or HR manager, or agency / I assess skills of employees and job candidates	32
No answer	3

Table 4: Number of roles of respondents by country. Own Elaboration.

We can see in figure 7 that 38% of respondents were issuers, that is staff working in the field of education as a trainer, teacher, lecturer, or administrator, followed by earners, that is employees, job seekers, adult learners, or students.

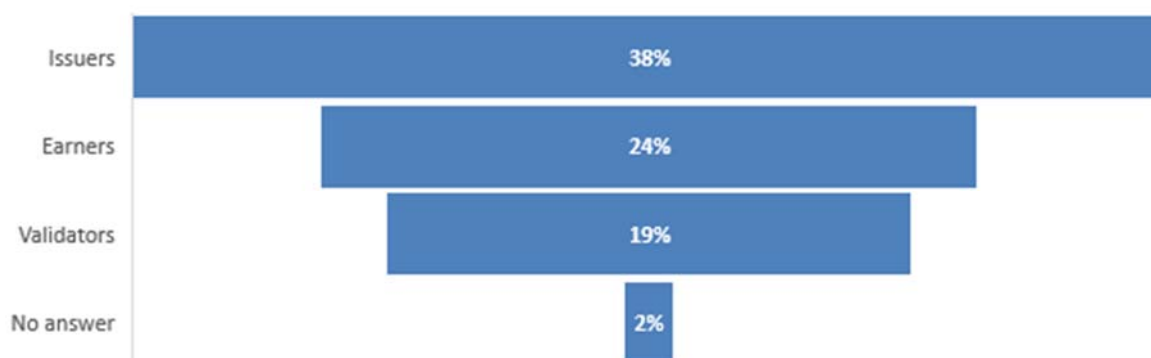


Figure 7: Survey Participants – percentage. Own Elaboration.

As to the SKILLS per role, in a scale 1 to 5 where 1 corresponds to *definitely agree* and 5 *definitely disagree or I do not know*; issuers, earners and validators of open badges and digitally signed credentials were asked to report about their preferences. These were the results regarding the 3 roles:

### Profile #1 Issuers

The following table presents the average collated rating from the 93 respondents regarding the skills from the role Issuers, that is those working in the field of education as a trainer, teacher, lecturer, or administrator:

Skills for Issuers of OB and DSC	Rating
Be able to encourage learning for obtaining open badges and digitally signed credentials	2,4
Be able to analyse learning data	2,5
Be able to draft the framework that will describe how badges will be used/earned, displayed/shared and designed	2,5
Be able to use the most popular platforms to identify the key features for OB + DSC	2,5
Be able to integrate issuing badges in other administrative, managerial tasks and processes	2,6
Be able to design evaluation criteria to meet the necessary standards to obtain open badges and/or digitally signed credentials	2,6
Be able to use badging systems as part of a gamified learning process	2,6
Be able to design a badge	2,8
Average rating, all skills: 2,6	

Table 5: Rating of Skills - Issuers. Own elaboration

The average rating of all skills is 2,6 which corresponds to “Agree”. The preferred skills were “be able to encourage learning for obtaining open badges and digitally signed credentials” (2,4) closely followed by “Be able to analyse learning data”, “Be able to draft the framework that will describe how badges will be used/earned, displayed/shared and designed” and “Be able to use the most popular platforms to identify the key features for OB + DSC” (2,5).



Figure 8: Rating of Skills - Issuers. Own elaboration.

## Profile #2 Earners

Table 6 presents the average collated rating from the 40 respondents from the role earners, that is, employees, job seekers, adult learners, students.

Skills for Earners of OB and DSC	Rating
Be able to use a framework to use/earn and display/share open badges and digitally signed credentials	2,1
Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials	2,4
Know how to use, store and share my open badges and digitally signed credentials	2,4
Be able to analyse the contents of different open badges and digitally signed credentials and choose the most appropriate for my learning path	2,5
Be able to use properly open badges and digitally signed credentials	2,5
Be able to participate in gamified learning experiences to obtain a badge or digitally signed credential	2,6
Average rating, all skills: 2,4	

Table 6: Rating of Skills - earners. Own elaboration.

As illustrated in Figure 9, the average rating of all skills is 2,4 which corresponds to “Agree”. The preferred skill was *Be able to use a framework to use/earn and display/share open badges and digitally signed credentials* followed by *Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials* and *Know how to use, store, and share my open badges and digitally signed credentials*.

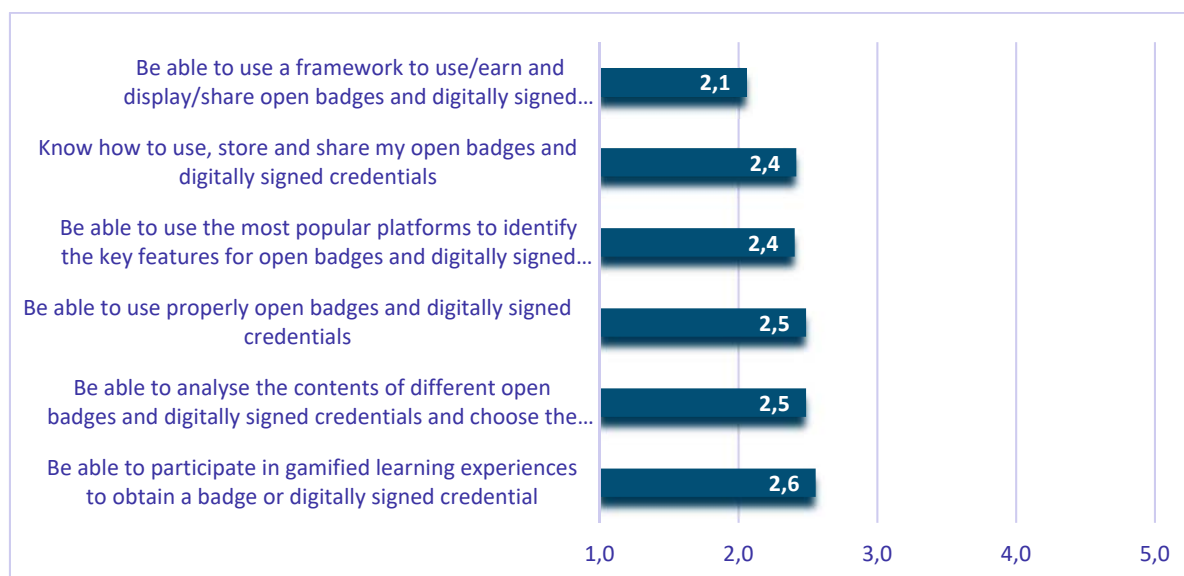


Figure 9: Rating of Skills - Earners. Own elaboration

### Profile #3 Validators

And finally, table 7 presents the average collated rating from the 32 respondents from the role validators, that is, employers or Human Resource managers of companies or agencies, that is profiles assessing skills of employees and job candidates.

Skills for Validators of OB and DSC	Rating
Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee	2,0
Be able to analyse and differentiate the open badges and digitally signed credentials and to be able to identify their advantages for the employer's needs	2,1
Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials	2,2
Be able to assess the validity of open badges and digitally signed credentials	2,3
Be able to validate a framework to use/earn and display/share open badges and digitally signed credentials	2,3
Average rating, all skills: 2,2	

Table 7: Rating of Skills - validators. Own elaboration.

The average rating of all skills is 2,2. Figure 10 illustrates that the preferred skill is *Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee* closely followed by *Be able to analyse and differentiate the open badges and digitally signed credentials and to be able to identify their advantages for the employer's needs* and *Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials*.



Figure 10: Rating of Skills - Validators. Own elaboration.

## Choice of Media – all the profiles

When asked about the choice of media all the profiles believed most fit to be used as resources in a course or learning activity addressing issues of open badges and digitally signed credentials in a scale representing 1 Definitely agree to 5 Definitely disagree or I do not know, these were the results:

Choice of MEDIA	Rating
Printable worksheets	2,9
Infographics	2,5
Animated presentations	2,4
Slides for overhead projector	2,8
Open educational resources (OER)	2,3
Internet link lists	2,4
Audio and video files	2,2
Learning platforms	2,0
Average rating, all media: 2,4	

Table 8: Rating of Media – all profiles. Own elaboration.

The average rating of all media is 2,4. As figure 11 shows, the preferred media are learning platforms, followed by Audio and video files, OER and internet Link lists.

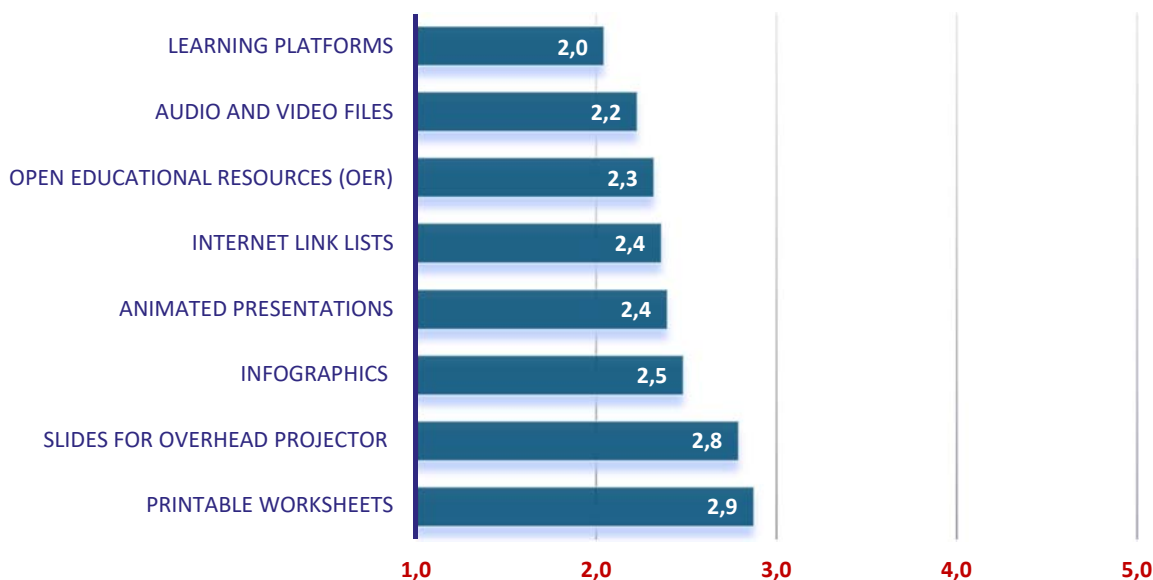


Figure 11: Rating of Media – all profiles. Own elaboration.

## Choice of Methods– all the profiles

Table 9 shows the results regarding the choice of methods all the profiles believed the methods that most fit to be used in a course or learning activity addressing issues of open badges and digitally signed credentials in a scale representing 1 *Definitely agree* to 5 *Definitely disagree or I do not know*, these were the results:

Choice of METHODS	Rating
Frontal instruction	2,7
Group work	2,4
Self-learning	2,5
Role playing	2,5
Storytelling	2,8
Stories and case studies	2,3
Everyday life problems	2,2
Information included in news media (newspaper, TV, radio)	2,6
Average rating, all media: 2,5	

Table 9: Rating of Methods – all profiles. Own elaboration.

The average rating of all methods is 2,5. As figure 11 shows, the preferred methods are Everyday life problems closely followed by Stories and case studies and Group work:

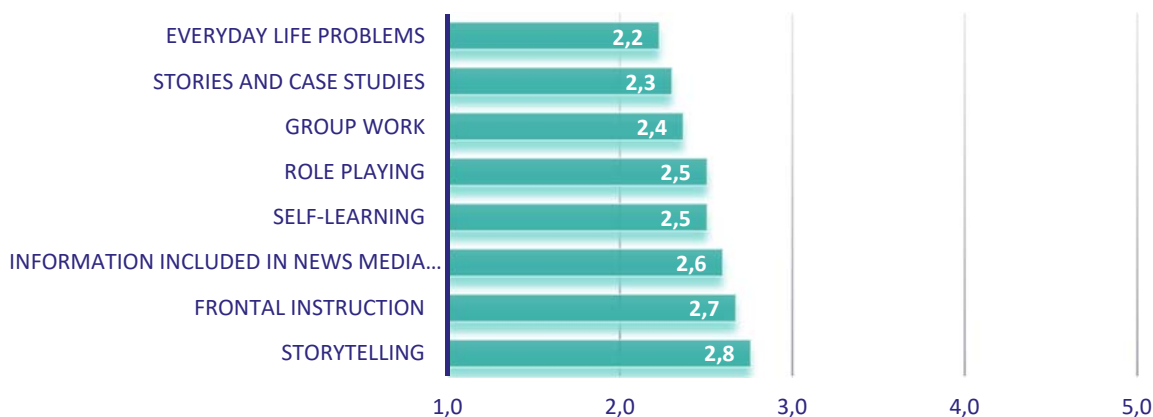


Figure 11: Rating of Methods – all profiles. Own elaboration.



## 7 CONCLUSIONS AND RECOMMENDATIONS FOR THE IO2 DISPLAYER AND IO3 COURSE

### Summary of desk research:

Short-term open learning opportunities leading to micro-credentials such as digital badges may help to widen the scope of learning and skills development opportunities and form the lifelong learning dimension in higher education reaching more social groups of different age. Micro-credentials is a novel but fast developing type of credentials in Europe and other parts of the world as a response to the fast changing skills needs of the labour market as well as a possibility to recognize non-formal as well as open learning of different age and social groups.

The EU has launched the European Europass digital credentials infrastructure to register micro-credentials as well as digital badges. Besides, intense discussions and endeavours to create a unified system to recognize micro-credentials is being created and targeted working groups are created in Europe. EC appointed consultation group “European Approach to Micro-credentials” has produced its final report in the end of 2020 and different forefront innovation projects continue to work in creating the applicable and harmonized system to issue and uptake the micro-credentials, including digital badges across the EU. This project is seeking to define an agreed DISCO typology and categorisation that should be developed and implemented in the new displayer.

Open learning in all sectors is not widely embedded in the **Greek** society, nor are they institutionalised at State level through the relevant bodies. Besides of the fact that the pandemic brought e-learning to the attention of the public, the State, but also the private sector in professional and adult education, the ecosystem of open badges, digitally signed credentials and micro-credentials is by and large almost completely unexplored, especially as a market opportunity. In Greece, the digital transformation process at the socioeconomic or even cultural level has been spearheaded by developments in the way citizens interact with the State at the institutional level. The educational system, a social institution by nature, is being affected in this process, and it consequently draws principles and practices from the interaction field of State vis-a-vis Citizen. Despite the innovative initiatives (e.g., “Photodentro”) non-formal and informal education are not being successfully mainstreamed across society and the educational system, and thus, the validation processes thereof are not easily accepted or appreciated.

DISCO VET partners in **Hungary** need to focus on stakeholders from this field where at least there is a strategic level presence of digital badges and certificates. They plan on developing an educational register which is authenticated that can collect the skills of a person and able to plan an individual learning path. They also realised that there needs to be high level authentication and access for this repository to access personal and learner data, diplomas, and other certificates from educational institutions etc. For these reasons, the strategy states that a government body should be responsible to develop and maintain such a repository.

Currently there is no specific regulation in **Latvia** that determines the use of digital / open certificates and digitally signed credentials. The education community in Latvia is ready to use electronic services, however, in the country there is a lower level than average level of digital tool use of the European Union and regional countries. In Latvia, it would be very useful and purposeful to develop opportunities to receive digital / Open Badges and digitally signed credentials for both issuers of certificates, their recipients, and their approvers, obtaining such certificates would offer new opportunities to increase the reliability and transparency of qualifications and also protection against forgery.

The situation in **Lithuania** regarding digital badges and other digitally signed credentials is rather limited to project and research group initiatives. A state agency “Centre for Quality Assessment in Higher Education” (SKVC) has introduced in 2020 term in Lithuanian language “*mikro-kredencialai*” to denote “micro-credentials”. The mentioned agency SKVC is following the European developments towards micro-credentials, but no further formal initiatives are being offered yet. University based research groups are investigating the improvement of Digital Badge metadata to increase their value to learners. Even though the policy developments in Lithuanian education sector regarding micro-credentials are only yet to come, the digital infrastructure to operate digital signatures is in place.

According to Borrás (2017) open badges and digitally signed credentials in **Spain** seem to represent an opportunity for issuers, earners, and employers. There are policies and regulations regarding Interoperability for the Public Administrations according to a set of rules that are part of the national framework. Moreover, electronic signatures are commonly used, especially in technology-driven companies or digital environments. Additionally, the use of a certificate-based digital signature, specifically a Qualified Electronic Signature (QES) may be mandatory to conduct certain administrative procedures or formalities conducted with the Spanish Administration (Adobe Sign, 2021).

The overall **situation in Europe** regarding digital badges and other digitally signed credentials can be analysed from a two-fold perspective: the efforts at European level and the implementations at national levels. At European level there are a set of policies, initiatives based on such policies providing technological and financial support for the generation of a common understanding on the importance of digitally signed credentials and the development of infrastructures to support the implementation of their whole life cycle (creation, issuing, awarding, owning and verification). Meanwhile, at national level the state of art of art of digitally signed credentials varies as there are countries like The Netherlands where a national approach to digital credentialing is being set through the implementation of a unified infrastructure in which educational institutions can issue digital credentials at scale using Badgr. In other countries efforts are rather limited to participation on EC funded projects and research group initiatives based in universities or small companies and they are working on solutions to introduce and digitally signed credentials into their organizational procedure and institutional systems.

At **international level**, there are international initiatives like the Digital Credentials Consortium (Digital Credentials Consortium, 2021), which was founded in 2018 by leading universities from Europe and North America (US, Canada and Mexico) with expertise in the design of verifiable digital credentials. Moreover, private actors like *Accredible* which provides a comprehensive digital badge and certificate platform with a full-service digital credentialing solution for creating and managing credentials and their integration with the organizations’ legacy systems

## Summary of Field research:

We can assure there is a lot of homogeneity by country in the responses in the 3 sections analysed:

- **Challenges in open and online learning regarding assessment and recognition:** Regarding the challenges, *“A validation by formal, institutional actor is a prerequisite” in Greece. In Hungary “There are multiple solutions and platforms. The processes of defining and gaining a badge greatly differ, thus the badge system is far from being stable. This also causes confusion for the users and discourage them to try the badge system.”. In Latvia it is stated that “Recognition probably requires a management infrastructure agreement at the level of educational institutions - state - EU, conditions, skills for use”. In Lithuania several challenges are mentioned such as “the link of non-formal learning with formal learning and employer” and the “(Procedures) it is still not completely clear how people can collect recognitions and assessments of non-formal learning and recognize them”. In Spain it is stated that “EDCI can be an opportunity to homogenize but many institutions in Spain are already investing in digitally signed credentials”.*
- **Potential integration of the EUROPASS Digital Credentials Infrastructure (EDCI) into the digital strategy for the assessment:** even though not all the interviewees were familiar with EDCI and its potential integration, we can state that there was a general agreement on the potential EDCI has *“to be adopted in all levels of education and support building a common understanding and consistent references to qualifications, skills, and occupations on a European level”.*
- **General questions,** most important course features: most interviewees opted for blended learning, visually strong and multimedia elements, including videos and podcasts with instructions, practiced oriented, combining group and individual self-paced learning.

## Implications for IO2: DISPLAYER

We hereby present an overview of the educational credential state of play from a technical perspective. Taking into account that IMS Open Badges specification is included as technical prerequisite in the initial definition DISCOVET project scope, and the existing partnership experience in the development of the EDCI to support the whole lifecycle of digitally signed credentials, we recommend enhancing the Open Badges expressiveness regarding the information about the issuer, earner and details of the learning process and achievements with the elements of the Europass Learning Model as it presented in the following table introducing the starting point of an analysis for mapping the existing elements of the *Europass Learning Model* to the quality criteria proposed by VMU to be included in a digital badge description.

We recommend using this table to **further elaborate on the contents of the quality criteria to be used in DISCOVET IO2, DISPLAYER:**

*Table 1: Quality criteria visible in digital badge description metadata template in virtual learning environment (VMU proposal)*

Europass QM/LM	Quality criteria that need to be visible in digital badge description metadata template in virtual learning environment (VMU proposal)	Assessment	Recognition
Europass allows National ID and/or alternative identifiers	Information about the learner (name and ID number)	X	X
Europass interprets credential type by application profile, e.g., Generic, Learning Activity, Diploma Supplement	Type of badge (open digital badge; digital badge)		X
Included in Europass (can be extended with the EdDiCo proposal)	Name and type of the issuing institution (HE institution; continuing education institution; online/MOOC provider together with a HE institution; online/MOOC provider; employer organization; professional organisation / chamber, etc.)		X
Included in Europass	Type of learning (short learning program (qualification, modular, etc.); ECTS based non-formal course; non-formal course (not ECTS based) certificate; informal learning activity evidence; ECTS based informal learning activity evidence)		X
Can be added to Europass (ECCOE proposal)	Badge category (formal qualification / degree; non-formal certificate; record of experience / portfolio / badges)		X
Included in Europass	Type of learning outcome (knowledge; skills; autonomy / responsibility)	X	X
Europass is specifically asking for EQF and/or NQF and/or level from within another semantic framework	Level of learning (EQF or NQF)		X
Included in Europass	Mode of learning (online; face-to-face; blended; placement; workplace)		X
Included in Europass	Activity type (workshop, seminar or conference; discussion; group work; teamwork; individual work; internship / placement; apprenticeship / shadowing; job experience; project work)		X
Included in Europass	Volume of learning (in ECTS and contact hours)		X
Included in Europass	Type of assessment (formative (accumulative); summative (at a conclusion of a defined instructional period); or both)	X	
Included in Europass (Method assessment and can be extended proposal ECCOE)	Procedural requirements for learner authentication and ID verification (online assessment without ID verification; online assessment with ID verification (proctoring); ID verification with secure login + password in learning management system; ID verification with third party tool; ID verification against national ID databases; biometric ID verification; other)	X	
Included in Europass (Method assessment and can be extended proposal ECCOE)	Assessed by whom (peer assessment; self-assessment; teacher assessment; independent assessor (third party))		X
Included in Europass (Method assessment and can be extended proposal ECCOE)	Format of assessment (automatic grading; manual grading; both, automatic and manual grading)		X
Included in Europass	Grading scheme (pass or fail; 100% to 0%; A+ (excellent) to F- (fail); 10 (excellent) to 0 (fail) grade scale)	X	

## Implications for IO3 COURSE DEVELOPMENT

Regarding **SKILLS**, the preferred skill emerged from the 165 respondents to the survey are:

- **Skills for ISSUERS of OB and DSC:** The average rating of all skills is 2,6 which corresponds to “Agree”. The preferred skills were “be able to encourage learning for obtaining open badges and digitally signed credentials” (2,4) closely followed by “Be able to analyse learning data”, “Be able to draft the framework that will describe how badges will be used/earned, displayed/shared and designed” and “Be able to use the most popular platforms to identify the key features for OB + DSC” (2,5).
- **Skills for EARNERS of OB and DSC:** The average rating of all skills is 2,4 which corresponds to “Agree”. The preferred skill was “Be able to use a framework to use/earn and display/share open badges and digitally signed credentials” followed by “Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials” and “Know how to use, store and share my open badges and digitally signed credentials”.
- **Skills for VALIDATORS of OB and DSC:** The average rating of all skills is 2,2. The preferred skill is “Be able to analyse the different open badges and digitally signed credentials and choose the most appropriate for the continuous development of the employee” closely followed by “Be able to analyse and differentiate the open badges and digitally signed credentials and to be able to identify their advantages for the employer’s needs” and “Be able to use the most popular platforms to identify the key features for open badges and digitally signed credentials”.

For the respondents of the survey, the preferred MEDIA are learning platforms, followed by Audio and video files, OER and internet Link lists. This is reassured in the interviews as all interviewees assured that blended learning combining on-line synchronous, on-line asynchronous would fit the needs of the participants of the DISCO VET course on OB and DSC.

Regarding the METHODS, the survey shows that the preferred methods are “Everyday life problems” closely followed by “Stories and case studies” and “Group work” which is also reassured in the interviews with some particularities. For example, in Hungary it was mentioned to “(introduce) Visuals, strong, with multimedia”, in Greece “(include) Demos, videos”, in Latvia “(include) Explanatory videos with interactive support materials”, in Lithuania “Presentations and OER combined” and in Spain “practical and attractive”.

The preferred timings were:

- Not more than 30-40 hours.
- From 2 to 4 hours per week for 2-3 months.
- Follow-up should be worked out

According to the results of field research, we would suggest:

- Limit length to 30-40 hours.
- Make the learning as flexible as possible to be as adaptable as possible to the learner
- Indicate clearly the time needed for model, unit, and sub-unit
- Use Stories and case studies, videos, and podcasts that partners may adapt to their contexts
- Make emphasis on real life examples and a clear applicability and adaptability to the countries involved.
- Combine individual study and group work
- Try to reflect the benefit of the learning and the potential of increased employability

### **Implications for IO4 LLKIT and DISCO platform user guide**

We would emphasize the need of the LLKIT to try to reflect the potential and trends of open badges and digital credentials. As example, the potential of increased employability at EU level.

There are areas where there is more potential for micro-credentials and open badges:

- Talent management.
- Remedial modules could be supported for learning and understanding long, heavy learning materials and subjects,



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## ANNEXES

### ANNEX 1 LINKS TO SURVEYS IN THE PARTNER LANGUAGES

English: <http://appi.bme.hu/survey/index.php/449124/lang-en>  
Greek: <http://appi.bme.hu/survey/index.php/449124/lang-el>  
Hungarian: <http://appi.bme.hu/survey/index.php/449124/lang-hu>  
Spanish: <http://appi.bme.hu/survey/index.php/449124/lang-es>

### ANNEX 2 INTERVIEW TEMPLATE

Target audience: employers, trainers, and learners' input with regard to the challenges in this area, how they are addressed so far and what services, tools, training content would be useful for their stakeholder specific roles (issuer, earner, displayer, validator), according to their views.

- Basic info:
  - Name
  - Role
  - Specialisation (subjects)
  - School: level, etc.
  - City/country
  - # Years of experience

**Existing situation:**

#### ASSESSMENT AND RECOGNITION

- IV. Are there differences between the assessment and recognition in traditional and open and online learning? There are existing practices in traditional learning. Is assessment and recognition in open and online learning already accepted practice? and why?
- V. Are there existing, valid practices of assessment and recognition in open and online learning?
- VI. What are the challenges of assessment and recognition in open and online learning?

#### REQUIREMENTS

- VII. What are the requirements for the process of open and online learning assessment and credentials recognition to ensure their validity?
- VIII. There are theoretical considerations which say that digital badges are a new form of credentialization with implications to personal and career development/CPD. What is your opinion? What tendencies or potentials do you see?
- IX. How universities should prepare now for further digital credentialization to be a competent and competitive stakeholder?
- X. What is the role of Blockchain technologies applied to Education for open and online assessment and recognition?
- XI. How do you believe assessment and recognition of open and online learning should relate to EQF (European qualification framework) or NQF (national qualification framework)?

## EUROPASS LEARNING MODEL EDCI INTEGRATION AND METADATA

1. Do you know about the Europass Digital Credentials Infrastructure (EDCI)?
2. If so, do you think it can be integrated into the digital strategy for the assessment implemented available in your institution?
3. If you think so, please provide details about it: how the digital strategy for the assessment implemented in your institution includes details about digital credentials i.e., digital credentials metadata.

## GENERAL QUESTIONS

- What **learning resources**, books, and courses would they recommend regarding open badges and digitally signed credentials?
- What **good practices** would you spot? Why? What works? What doesn't work?

## DISCO VET SPECIFIC COURSE ON OPEN BADGES AND DIGITALLY SIGNED CREDENTIALS

- where most probably they will apply the skills and knowledge obtained during the course?
- Do they have any experience using open badges and digitally signed credentials? What level are their skills at regarding OB and DSC?
- What are their skills now? ICT, user needs, training, etc.
- What are the **most important course features**? For example:
  - Blended or online?
  - For online learning what kind of computer and connection they have?
  - What kind of online teaching media they prefer (presentations, OER...)?
  - Teaching methods (group work, storytelling, role playing, online collaboration...etc)?
- Do they know of **training initiatives** in open badges and digitally signed credentials that could serve DISCO VET as an example?
- How much **time can they devote to the course**? How many hours per week, how many weeks?
- What questions do they ask? What information do they need? What are their **doubts and concerns**?

**Instructions and important tips:** Interview organization, note taking etc.

1. When asking for time, ask for a 15–20-minute conversation, but be prepared for approx. 30 minutes
2. Optimally come in a team of 2:  
First person focuses on interview  
Second person, if possible, take notes in a template containing the questions above.

3. Recommended interview structure:

- **Ice-breaking (1-2')**
- **A brief (3') introduction of DISCO VET idea (see introductory text)**
  - *open badges and digitally signed credentials*
- **How do you like the idea?**
  - *Main interviewer: keywords on paper*
  - *“Secretary”: fills in an interview template*
- **1' summary.**
- **When you look at all these ideas, what else comes to your mind?**
  - *Main interviewer: keywords on paper*
  - *“Secretary”: fills in an interview template*
- **3' summary.**
- **What is your view about the existing situation?**
  - *Requirements*
  - *Metadata*
  - *General questions*
  - *DISCO VET specific course*
- **3' summary.**
- **What would you recommend to the DISCO VET team?**
  - *What are your favourite learning resources (books, courses, etc.) in the topic of open badges and digitally signed credentials?*
  - *What are your personal experiences in this field?*
  - *What is your experience in this field?*
    1. *What works?*
    2. *What doesn't work?*
    3. *Some other remarks*
- **3' summary.**
- **Is there anything else what comes to your mind?**
  - *Main interviewer: keywords on paper*
  - *“Secretary”: fills in an interview template*
- **Interview summary, closing thoughts**
- **Whom else would you suggest interviewing to get the best possible feedback on this idea?**
- **Thank you, small gift.**