# O4 Technology enabled credentials

**Public report- July 2022**

## Authors

Carmen L. Padrón Nápoles, Ildiko Mazar (KIC)

## Contributors

Alessandra Antonaci, Deborah Arnold, Jochen Ehrenreich, Solange Faria Pereira, Ada Giannatelli,Thomas Fradet, Mykolė Lukošienė, Beatriz Sedano, Timothy Read, Airina Volungevičienė

## Layout

Tara Drev

## Copyright

(C) 2019, ECCOE

## The ECCOE Consortium

| | | |
|---|---|---|
| Fondation UNIT | AUNEGe | FR |
| Knowledge Innovation Centre | KIC | MT |
| Universidad Nacional de Educación a Distancia | UNED | ES |
| Duale Hochschule Baden-Württemberg | DHBW | DE |
| Politecnico di Milano | METID | IT |
| Vytauto Didziojo Universiteta | VMU | LT |
| European Association of Distance Teaching Universities | EADTU | NL |

# Table of Contents

# 1 Introduction

## 1.1 Background

The main aim of ECCOE 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.

The project actions were planned to:

- Create quality criteria to describe learning opportunities (MOOC; courses, programs) to ensure the availability of properties used or desirable for their credentials' external recognition (Output 1)
- Create and validate the Model Credit Recognition Agreement to provide a fast-track model for the recognition of credentials available in 6 languages (Output 2)
- Develop an online catalogue to showcase multidisciplinary and transversal modules which passed a selection process based on quality criteria for cross-institution recognition (Output 3)
- Design a system for technology-enabled credentials to support their transparency, portability and, recognition (Output 4)
- Lay the ground for a wider take-up via the ECCOE system by producing and disseminating the supporting documentation needed by stakeholders to make use of the project results to ensure open, online, and flexible education.

This report focuses on the technology-enabled credentials resulting from the work carried out in Output 4. And you can find the reports for the rest of the project outputs on each of the Outputs dedicated pages on the project [website](#).

## 1.2 Objectives

Output 4 had the objective of providing technical means to ensure credential transparency and portability evenly observing the needs of the three key players. i.e. HEIs, credential holders (i.e. learners), and employers. Accordingly, its main goal was to convert existing/expanded EU standards and the quality criteria produced by IO1 into machine-readable representations to be processed by an ecosystem of open technology standards.

# 2  Methodology

The main methodology used in the project was based on an iterative process of internal design, development, and revision, together with external processes of open peer review. The overall work of this O4 output has been in constant alignment with the other related outputs and the technology-enabled credentials were obtained through the following stages:

## 2.1 Research and extension of MicroHE metadata standard (originally extended from ESCO)

This task focused on collecting and analysing existing open data models, metadata schemas, and ontologies that could contribute to the development of an HEI-specific data model. Particular attention was paid to the suitability of comprehensive lists of existing credential types, grading schemes, assessment methods, etc. - properties that mirrored the findings of the IO1 research. At the same time, in addition to the requirements of HEIs that are strongly represented in the ECCOE consortium, the needs of credential holders and employers were also closely observed to be able to connect supply and demand intelligently.

As the new Europass is the most trusted European tool to manage EU citizens' learning and career, the close analysis of the Europass Learning Model(ELM) https://bit.ly/3dqxEid served this very purpose and confirmed to be ECCOE's ideal choice of the credential data model to utilise (https://bit.ly/3dlLti1). Since the time the project proposal was written and submitted, the Europass Learning Model gained an undoubtedly strong position and became a highly suitable and favourable reference for ECCOE as it incorporates ISCED, ESCO, and EQF and seeks/enables/supports interoperability with other international standards examined in the initial stage of this task. This suggested that further exploring those alternatives seemed slightly unnecessary and would be a replication of the analysis undertaken by the Europass team already.

During the analysis of the Europass Learning Model and the EDCI Digital Credentials building Excel template (downloadable from https://bit.ly/3Bnjbvo), the IO4 lead took detailed notes of differences and recommendable deviations.

As parallel work threads in IO1 and IO3 were researching and validating - both internally and via open public consultations - credential and learning opportunity properties to propose harmonised sets of descriptors optimised for Higher Education Institutions, IO4 contributed to the IO1 and IO3 research and consultations by providing references to the above mentioned readily available resources. At the same time, IO4 also noted requirements and extended controlled vocabularies emerging from these outputs to adjust and finetune the proposal for the ECCOE data model to support the description of both learning opportunities and corresponding digital credentials in a machine-readable format. Considering the maturity and readiness of the Europass infrastructure (EDCI), it was decided that the proposed ECCOE data model should be based on the ELM and extended with IO1 results as the O4A1 final

outcome and the ECCOE credential template was to be implemented as a Europass Digital credential for the consultations to carry out as described in the following sections.

## 2.2 Internal peer review of extended and clustered metadata standards

The internal peer review was conducted in two stages: In the first stage, the IO4 leader focused on a comparison between the set of quality criteria and the credential template, its vocabulary translations created in O1, and the initial proposal for the ECCOE data model. While in the second stage, the results of the analysis conducted in the previous stage were further discussed with the partners and their feedback was considered to finetuning the proposed ECCOE data model before the implementation of the ECCOE credential template to be issued as a Europass Digital credential using the EDCI issuing tools.

## 2.3 Public consultation on improved metadata standard propositions

To validate the proposed ECCOE data model and the ECCOE credential template, a double validation was taken through internal and external consultation processes.

The whole process started with the preparation of contents for the questionnaires to be used in both consultations, instructions for carrying out the consultations and invitations to be extended to experts who will participate.

The internal consultation was conducted in two stages: the first one involved the IO1 (VMU), IO2(AUNEGE), and IO3(KIC) leaders, and then the proposal was further discussed with the whole partnership. Their feedback was used for finishing the development of the consultation tool and a review questionnaire for the second stage of internal consultation, which was carried out by a group of 5 reviewers who are members of the partner's team but were not working on the project. Thanks to the inputs of the reviewers KIC did final adjustments to the consultation tool before launching the IO4 public consultation in March 2022.

The public consultation involved 42 experts who positively assessed the utility, suitability of the descriptors included in the credential data model, and the number of additional controlled vocabularies used to enhance the quality and transparency of digital micro-credentials.

## 2.4 Finalization and publication of consolidated metadata standards

The feedback from the experts consulted in the previous activity was firstly analysed and filtered to then finalize the publication of the proposed machine-readable ECCOE data model. As the model was used to describe both learning opportunities and corresponding digital credentials and was already the underlying data model utilized in the implementation of the ECCOE Catalogue of Learning Opportunities in Output 3. The second part of this activity was focused on updating the model according to the results of the internal analysis of the received

feedback as described in section 2.5 and publishing it in the <u>GitHub repository</u> used in the project.

## 2.5 Update of the open source code of the Credentials Clearinghouse to enable credential documentation with extended property fields

Taking into consideration the project decision taken in the activities described in 2.1 and 2.2 to use the European Digital Credential Infrastructure (<u>EDCI issuing tools</u>) for creating and issuing ECCOE technology-enabled credentials as digitally signed credentials. This activity complemented the one described in 2.4 as it focused on updating and customising the open-source code of the controlled vocabularies used by the ECCOE Catalogue of Learning Opportunities in the ECCOE system to enable credential documentation with the extended property fields validated by the external experts.

# 3  Results

As explained in previous sections, the ECCOE Credential model was developed as a European Digital Credential (Europass) template and it was used as a starting point for customising the credentials issued by the partners for participants in different multiplier events and other learning opportunities conducted during the last year of the project. The ECCOE data and credential model are integrated into the ECCOE website as part of the ECCOE system, which provides access to the different software artifacts developed in the project.

The next figure shows how the ECCOE Credential model is presented in the EDCI Viewer facility.
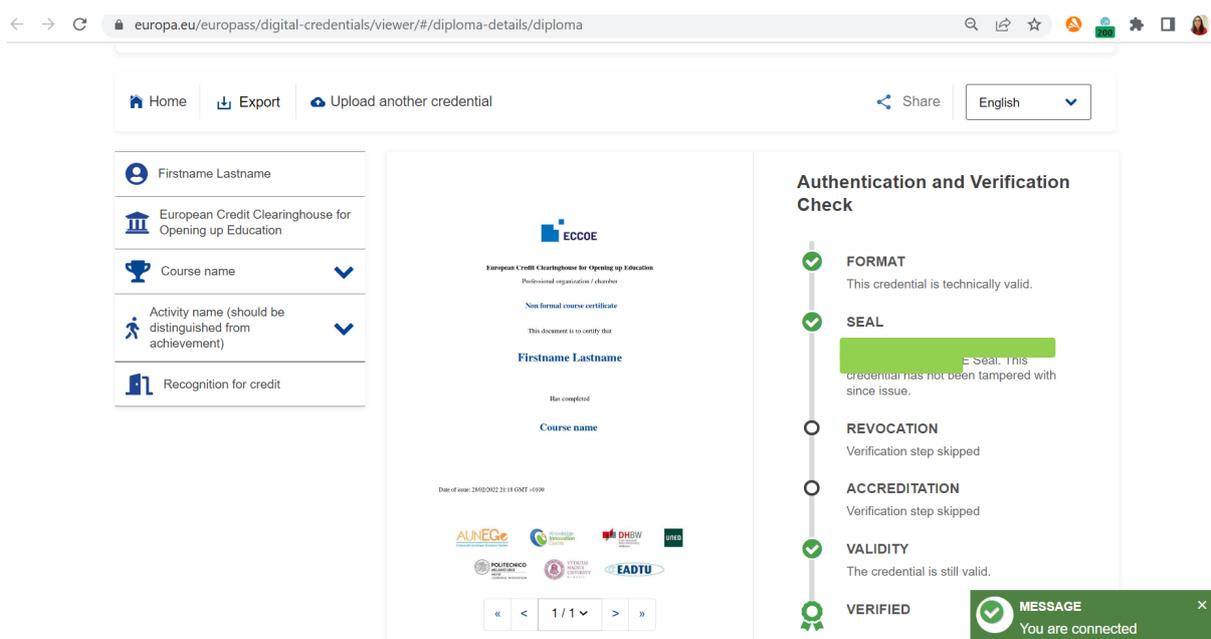
Figure 1 Screenshot of the ECCOE Credential model in EDC viewer

Three main how-to guides together with the ECCOE Credential model/ ECCOE Credential data model (see Section 8  References and further reading) were created to support partners and external stakeholders in preparing the data for creating and issuing digitally-signed credentials to all learners who completed their learning activities and reach the required competences as per the Learning opportunity description.

More than 320 digitally signed credentials as European Digital Credentials (EDCs) were issued using new credential templates derived from the ECCOE credential template and its underlying data model through the EDCI services.

The next figure shows a sample of the digitally signed credentials issued by POLIMI as it is visualised on a digital wallet from the EDCI.
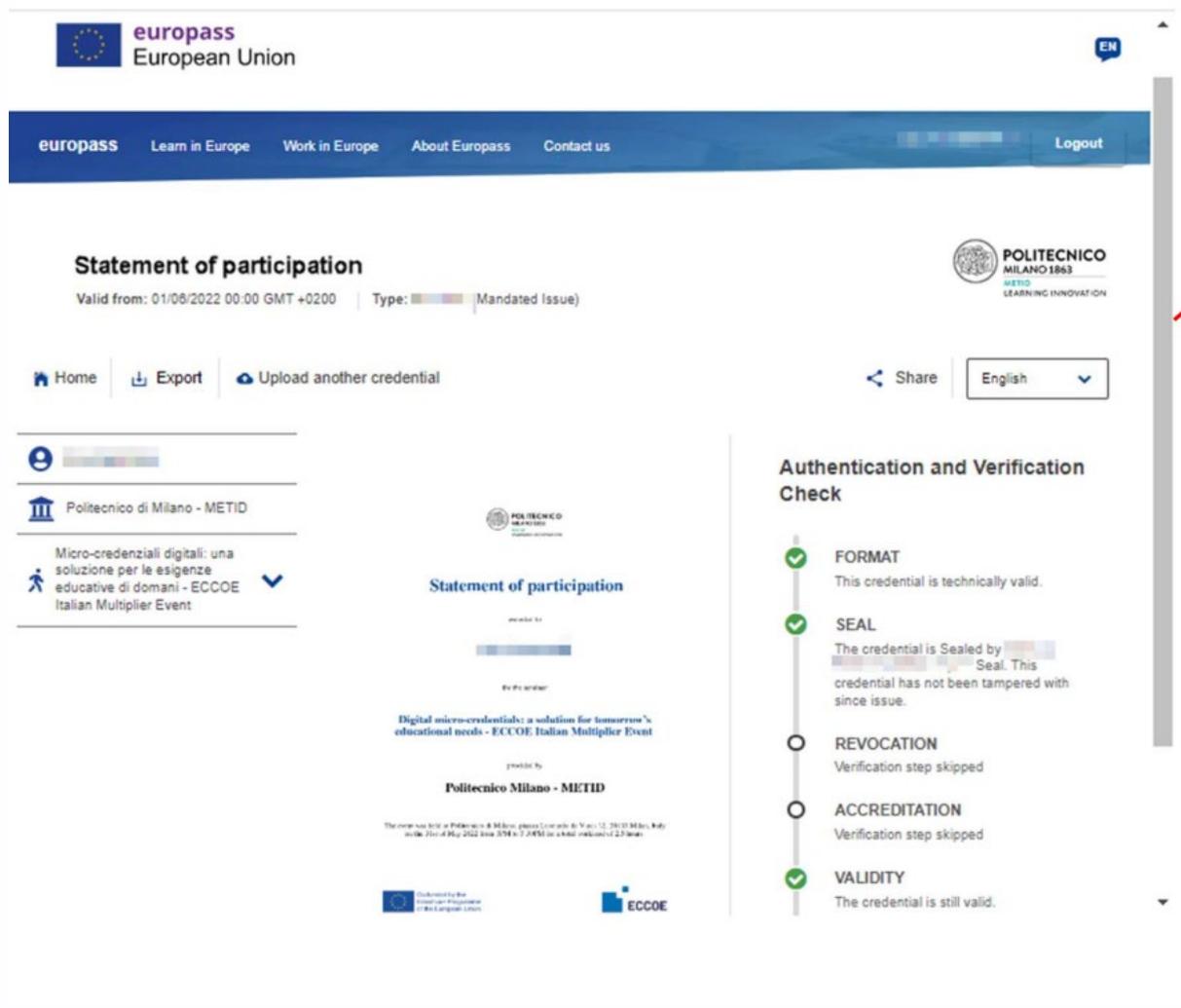
Figure 2 Sample of a digitally signed credential issued by Politecnico de Milano as an official Statement of participation in an ECCOE multiplier event.

# 4  Implications

The work in IO4 focused on providing technological means to support the credentials' transparency and portability considering the needs of credentials' main stakeholders (HEIs, credential owners, and employers).  Next, we explain the implications for each of those stakeholder groups.

## 4.1 For Higher Education Institutions and other learning providers

Any HEI or learning provider that offers learning opportunities (let it be Short Learning Programmes, MOOCs, SPOCs, or any other learning programme or course) and that needs

to issue digital credentials to learners who successfully complete those opportunities will not only improve the quality of the credential creation process through the use of the ECCOE data model standardized format of digital credentials and the how-to guides mentioned in the Results section. In addition by applying these standards in the credential documentation, such credentials will also become more transparent and suitable for recognition by other organizations (HEIs, education providers or employers).

## 4.2 For employers

The availability of technology-enabled credentials (i.e. digitally signed credentials) describing a person learning achievements in human and machine-readable format will help employers to make more efficiently informed decisions about candidates' credential recognition. Relying on a flexible trust framework for credentials like EDCI will mean that all processes of verification and recognition of digitally signed credentials would scale efficiently and employers will have a shorter hiring process.

## 4.3 For learners

Digitally signed credentials contribute to the learner's data sovereignty as learners will have full control of their learning achievements described in a human and machine-readable format, which in addition are tamper-evident. Moreover, the availability of identifiable digital Micro-Credential information within digitally signed credentials allows learners to easily show the competences they had achieved and facilitates a secure and transparent process for their recognition. Therefore, they will benefit from increased opportunities in support of their transnational mobility as well as improvements in their employability.

## 4.4 For the European Commission

The work carried out in the ECCOE project contributes to enlarging the outreach of the Europass tools as it showed a complete application of how to make the most of the facilities offered by the EDCI infrastructure services since the project provided HEI and any organisation offering learning opportunities with practical guides on the credential creation process and how to award digitally signed credentials to learners who had successfully achieved the required competences.

# 5 Added value

Over and above the results promised in the project proposal, Output 4 also formulated a series of recommendations to selected providers to help through the process of designing and issuing digitally signed credentials. Moreover, the project team using the experience derived from creating such recommendations contributed to the define a series of training sessions for representatives of several European universities and private learning providers held in the framework of the StrategyHack and DISCOVET projects.

# 6  Links to other ECCOE outputs

The ECCOE technology-enabled credentials (Output 4):

- Converted the existing/expanded EU standards and the finer quality criteria produced by IO1 into the ECCOE data model and credential template which are machine-readable representations backed by an ecosystem of open technology standards (ELM and EDCI).
- are complementary to the Learning Opportunities Catalogue (Output 3), as both outputs are based on the ECCOE data model to fully describe these learning opportunities in terms of learning settings, achievements, and awarded credentials or micro-credentials. The use of this model contributes to improving the semantics, and transparency and facilitating the recognition of micro-credentials.
- The credentials awarded to learners after completing some of the learning opportunities available on the Learning Opportunites Catalogue, could potentially be recognized in a MCRA (Output 2)
- Are fully integrated into the ECCOE-system (Output 5)

# 7  Conclusion

The work carried out in the definition of the ECCOE Credential model and data model based on integrating the results from IO1 into ELM and the analysis conducted in IO3 to fully describe Learning opportunities helped the consortium to get a better understanding of the closed relation and differences between the learning opportunities (sometimes called micro-credentials) and their (micro) credentials to be awarded to learners certifying their learning achievements.

The resulting ECCOE credential template contributes to setting a good practice in the process of designing and issuing digital credentials in addition to the provision of practical examples. Those can be considered as starting point for the further work required in harmonising credential issuing processes to facilitate mobility, upskilling, and the recognition of obtained competences.

# 8  References and further reading

To find out more about the design of the ECCOE Credential Model and its descriptors check the following document: »How ECCOE credential properties look in a credential building template and on the credential preview«which is available on the ECCOE website here

**Links**

- The ECCOE credential template and the ECCOE credential data model available on Github
- An example of how the digitally signed credentials are received by their owner and how the credential XML file should be uploaded to the EDCI viewer for its visualisation in the owner's wallet. Available on the ECCOE website here

**ECCOE How-To guides** (downloadable from https://eccoe.eu/eccoe-system/)

- How to obtain a qualified eSeal
- How to issue digitally signed credentials
- How to recognise a credentials