Credentials in Open Education

Final report of Intellectual Output 1

OEPASS

The Oepass Consortium

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Executive Summary

Open education is offered by a multitude of different providers within Higher Education, and can take many forms, often blending formal, non-formal and informal education, as well as a variety of modes of provision. Credentials may take the form of certificates of participation, certificates that are valid for transferring credit in certain specific situations, ECTS and micro-degrees to mention but a few options.

Since different credentials may have different value in the workplace and in academia for purposes of recognition, transfer and portability, the report will introduce the concept of quality assurance of credentials whereby a high-quality credential would have to meet a set of minimum criteria in these areas.

One of the aims of the OEPass project is to address the problematic issues of the recognition of open education and virtual mobility experiences by creating a standard format to describe it in terms of ECTS which:

- addresses common criticisms (lack of trust) of open education, in particular with respect to student assessment and identity,

- is scalable to hundreds or thousands of students through automatic issuing and verification of certificates, and

- can capture a wide range of non-formal and formal open education experiences.

The final report of the assembled O1 Intellectual output responding the original aims of his output to:

- describe a quality system for analysing the quality of credentials through a lens of ease-of-recognition and portability;

- classify different kinds of open credential according to a typology developed in the project;

- provide an easy-to-read label showing the quality of a credential at a glance providing initial quality-assessments for a number of commonly issued open credentials in Higher Education.

The report is containing a Concept paper on Quality assurance of credentials, as a starting theoretical founding of the work (Chapter 1).

- Based on this founding, as a second step a collection of different digital credentials in a common framework, of more than 100 items, was carried out. This collection is annexed and is a basis of the analysis (Annex 2).

- The collection of credentials were followed by an analysis to suggest a state of the art typology (Chapter 2) and Classification system (Chapter 3) of credentials.

- This system was used by the partnership to sort and classify the collected credentials as a first piloting of the quality system. To better understand this process, categories and pointing, Chapter 4 shows a sample classification of an item (a Vocal project open-badge case).

- Following the presentation of this case, the whole set of digital credentials collection was analysed (categorised and classified) by the typology and the classification system. The analysis of the findings can be read in Chapter 5.

- Finally an easy to read label system is developed and presented in Chapter 6, using the medal type graphical representation of a spider diagram.

- A concluding section (Chapter 7) summarises the lessons learned during the elaboration of intellectual output 1 of the OEPass project.

1 Concept Paper on Quality Assurance of Credentials

(Anthony F. Camilleri, Florian Rampelt)

1.1 Introduction

The credential-space is currently seeing significant innovation, driven by twin priorities, namely the unbundling of learning, and the drive to digitise credentials as prioritised by the Bologna Digital Agenda and the EU's Digital Education Action Plan. While traditionally students could depend on recognition of widely understood signals of experience and expertise such as university degrees, the same cannot be said for the creatures of MOOCS such as 'nanodegrees' and 'specialisations'.

While degrees from accredited HEIs rarely raise concerns about recognition and portability, the quality of new forms of credentials is more questionable, due to the lack of commonly agreed standards, technologies and comprehensive criteria applied to their assessment. The OEPass project, therefore, set out to propose a framework for such analysis in the form of a set of quality characteristics for credentials.

This Concept Paper tries to establish a basic strategy to build up a quality assurance system to micro-credentials in higher education. This includes identifying and describing the key players of the field, the considerations that led to the selection of the suggested quality criteria as well as proposing an initial set of indicators.

1.2 Context – Digital transformation as catalyst for new credential types

Digital transformation is already a reality for both labour markets as well as higher education systems. Although such developments have not been neglected in recent years, "the progress on integrating technology in education remains limited" (European Commission, 2018, p. 2). Especially the world of work increasingly demands a quick response from the education system to provide people with newly desired qualifications or "future skills" and technology can play a major role in this. In response to this increasing demand different education providers have developed open educational opportunities that go beyond the formal structures that make up current educational systems.

While it is clear, that degrees from accredited higher education institutions (HEIs) consist of the gold standard in terms of their reputation, recognition and portability, no clear set of

comprehensive criteria exists to assess the quality of new forms of credentials. We argue that a discourse on the quality of credentials in the growing open education market is needed on two main aspects: A) The **quality of open learning** and the necessary information that has to be documented for formal and informal recognition of open learning and B) the **quality of technologies and the required standards** to enable the digital documentation of learning in the form of (open) credentials.

New types of credentials have been developed in recent years in order to make learning pathways as digestible and flexible as possible. This has been especially visible, yet controversial, in the context of Massive Open Online Courses (MOOCs). As a basic principle, in order to make university education available to a theoretically unlimited audience, traditional degrees are broken into smaller units made available online. As in the Bologna system, degrees are broken into modules, modules into courses. These courses can be even further split up into short segments based on empirical evidence on the effectiveness of smaller learning units. Universities are becoming part of this trend by partnering up with international MOOC platforms, applying such modular approaches themselves, and adding a certain degree of stackability. For example, EdX has developed a MicroMaster system for university partners (Rampelt et al., 2018)[1]. MicroMasters from a wide range of topics such as Supply Chain Management or Artificial Intelligence can only either be taken on their own or additionally count towards a full master at universities such as the MIT. However, other MOOC platforms, such as Coursera and FutureLearn, also offer different university level units, from full-degrees to single courses – with content often offered for free and learners paying for assessment and credentialisation at the end of the course. Udacity has developed its own brand in the business with so-called "Nanodegrees"[2] that explicitly aim to serve labour market needs as an alternative to traditional degrees.

However, while traditionally students could depend on the recognition and trust in widely understood signals of experience and expertise such as university degrees, the same cannot be said for the new different forms of unbundled education. A typical university, therefore, may today offer several different types of credentials – ranging from certificates of MOOC participation all the way up to full degrees –, but these credentials would not have equal universal value and reputation.

The private sector is proposing a host of solutions to recognise learning in smaller segments, from the aforementioned Nanodegrees or MicroMasters, to centralised skill-banks verified by standardised testing to online systems of recommendation similar to peer-reviewed literature (The Economist, Lifelong Learning Supplement, 2017).

Additionally, a mixture of technological developments, currently for example visible in the emergence of blockchain for educational credentials (Grech & Camilleri, 2018), and policy developments, in particular the focus on credentials as part of the European Commission's Digital Education Plan (European Commission, 2018) or the "Bologna Digital" initiative (Orr et

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[1] Further information here: https://www.edx.org/micromasters
[2] Further information here: https://eu.udacity.com/nanodegree

al., 2018) make it even more clear that such an increased focus on innovation in credentials has to be accompanied by a discourse on standards and guidelines regarding the quality of technologies and the quality of open learning.

The OEPass Concept Paper therefore proposes a framework for such analysis in the form of a set of required elements and quality characteristics of credentials.

A credential, in its most essential form, is a statement awarded from one party to another describing the latter's **qualities**. Credentials are used for the purpose of **proving to a third party** that the holder **qualifies for something**. An educational credential is typically awarded by a responsible and authorized body that attests that an individual has achieved specific learning outcomes or attained a defined level of knowledge or skill relative to a given standard. (ACE, 2016, p. 5)

Examples of credentials might include:

- a degree is a *formal qualification* from a **university** to a **graduate** describing that they have **achieved expertise in a subject** (e.g. medicine). This credential can be used to prove to another **educational institution** that the holder qualifies for admittance into a **doctoral degree programme**;

- a job-reference is a *social recommendation* from an **employer** to a **previous employee** describing their **job performance and attitude**. This credential can be used to prove to a **recruiter** that the person qualifies for a **job**;

- a medical licence is an *identity* from a **medical chamber** to a **doctor** describing that they have the required **medical knowledge, skills and conduct**. This credential can be used to prove to a **patient** that the holder is qualified to **practice medicine**.

In the context of OEPass, **educational credentials** may be divided into the following categories:

Figure 1: Types of Educational Credentials.

For the purpose of the Concept Paper, we have considered: (1) Formal recognition in higher education (2) formal recognition in the labour market and (3) Informal recognition in the labour market. For formal recognition of credentials in higher education, the criteria for the value of a credential are based on existing standards and guidelines. In a European context these are the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG, 2015) but also practical guidelines for credential evaluators and admission officers developed from within the ENIC-NARIC network, especially the EAR Manual (2016).

1.3 Roles in credentialing

Different key stakeholders interact differently with the same credential; therefore, the quality of credentials has to be defined with all their interests and purposes in mind. A "role based" quality approach prompts us to distinguish between earners, issuers, consumers, endorsers and viewers. The key stakeholder groups that OEPass is concerned with could be characterised as follows:

- **Earners** are people who have participated in a learning process. Most of the time earners are face-to-face, part time or on-line students. In continuous professional development (CPD) we may also think of post graduate learners who hold bachelor, master or higher degrees, and participate in courses that require HE credentials as entry requirement.

- **Issuers** are the institutions that award credentials, in our case predominantly higher education institutions. In special cases, issuers may have agreements to award mutual credentials (Joint or Dual Degrees) for the same learning experience.

- **Consumers** are those stakeholders who make decisions about the value and validity of credentials. Typically, they are either **Higher Educational Institutions** who require entry-level credentials or prior learning experience or **recruiters and employers** who make hiring or career advancement decisions based on their perceived value of a candidate's credentials.

1.4 Elements of a Credential Statement

In general, the standards that exist for formal recognition and quality assurance in higher education can and should be applicable to any new forms of (open) learning, certification and credentialization. This means, that when assessing credentials as a proof for the quality of (open) learning, key elements of a qualification should always be considered, with **learning outcomes** being the most important criterion (Nuffic, 2016).

As part of the PARADIGMS project, the Dutch NARIC Nuffic published a policy paper focussing on the evaluation of MOOCs that suggests seven criteria for the assessment of a MOOC certificate (Nuffic, 2018). These criteria can also be translated in the more general context of credentials and their trustworthiness for recognition in higher education. Based on a JRC report from 2016, the Nuffic policy paper also suggests the use of a basic traffic light model that describes different levels of meeting certain criteria (Witthaus et al., 2016). For the characteristics of credentials that describe the required elements of a credential statement, we

made use of most of the criteria described by the PARADIGMS project for MOOCs and suggest additional criteria for the assessment of a credential for formal recognition in higher education. For the labour market, informal recognition could be based on some or all of these criteria.

Next to clearly defined **learning outcomes**, a credential also needs to contain transparent information on the **quality** of the programme or learning opportunity leading to the credential, the **level** of learning (ideally referenced to a qualifications framework) and the **workload** required for getting the credential. The learning outcomes should also be backed up by a robust **assessment** mechanism described in the credential that also verifies the **identity** of the **learner** as well as the **issuing organisation**. Additionally, the **reputation** of the organisation issuing the credential can support trust in the credential.

Based on this, we have slightly adapted the traffic light model suggested by the PARADIGMS project for the evaluation of the necessary elements of the credential statement (see figure 2).

	Learning Outcomes	Quality of Learning	Level of Learning	Workload of Learning	Assessment of Learning Outcomes	Identity of Learner	Identity & Reputation of Issuer
Credential	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info	o Red o Orange o Green o No Info

Figure 2. Elements of a Credential Statement

When using such criteria to evaluate the quality of a credential it also has to be clear, though, that high quality credentials can have different characteristics and do not necessarily need to comply with all criteria to the same extent (also see Nuffic, 2018).

1.5 Quality of a Credential

As a document, which proves the eligibility of the learner to qualify for something, it can be said to have three purposes, namely to act:

- as a unit of account;

- as a means of exchange;

- as a store of value.

The more these characteristics are met by a credential, the higher its **fitness for purpose**, that is, the more likely third parties will accept it. The importance attached to these characteristics depends on users and their intended use-case. Given this, we have developed a matrix to describe the fitness for purpose of the elements above:

	Quality of the Statement *The statement should:*	**Quality of the Medium** *The medium should:*
Distinct	• represent a specific, identifiable and measurable experience, skill or fact • be attributable to a single, identifiable person	• allow for the storage and display of the statement, as well as any and all associated metadata
Authentic	contain enough information to: • verify when, where and by whom it was issued • trace and reproduce the conditions under which it was issued • be able to be issued for a limited period and be revocable	• only allow an issuer to create a certificate • not allow for any kind of tampering or editing • be able to store or link to the information required to verify • display its validity status
Accessible	• be issued in a widely-spoken language or in an easy to read graphical format • be issued in a standardised form, according to standardised processes	• allow for a credential to be issued in a widely-used and/or open format
Exchangeable	• be modular, allowing for the credential to be subdivided into smaller credentials or stacked into larger credentials • be convertible into other types of credentials	• allow for relational links to be created between credentials • allow for credentials to be created out of other credentials
Portable	• be owned by the learner	• allow for the user to physically possess the credential in a place of their choosing • enable that the credential is easily shareable by the user

Table 1. Overview Quality of a credential.

1.6 Conclusion and Outlook

The concept of assuring the quality of the credentials represents a genuine new frontier for European Quality Assurance. On the one hand, it must reflect standards with regard to the quality of the statement, but it also has to consider the quality of learning. This has already been successfully implemented throughout the European Higher Education Area. It is, however, still necessary to clarify with all relevant stakeholders what the minimum requirements are, especially for the recognition of open learning.

At the same time, new standards and quality characteristics must be added to justice the complexity of credentials. Combining these different characteristics that form the quality of credentials is an approach that has just started to emerge and will still need several iterations in order to develop robust frameworks. A trusted system of credentials thus requires considerations of the following aspects holistically: Principles, standards and technology.

Figure 3. Key aspects of credential systems

Based on these considerations, we see the OEPass quality framework having the following uses:

- As a design tool for institutions thinking of innovating in the credential space, to ensure that the eventual credentials meet appropriate quality standards from a holistic perspective;

- as a basic set of design-requirements for implementations of credential technology;

- as a transparency tool for students who are trying to determine equivalency between similar programmes offering different credentials;

- as a transparency tool for credential evaluators at higher education institutions who are trying to assess the quality of learning documented through a credential and at the same time need to build trust into the robustness and quality of new technologies.

For the acceptance of any new credential model to become a reality in the higher education context, it does not only need to complement the long existing standards, it needs to provide an easily adoptable mechanism, that can form part of the administrative, legislative and technological accreditation process. However, based on our conceptual framework, we hope for a broad discourse on implementation possibilities, which has to be closely connected to

real-world application with various stakeholders, especially including universities. Therefore, higher educational institutions have to inevitably consider themselves to be part of the change process in quality systems.

2 Typology

2.1 About the research

Following the theoretical basement of credential quality, the typology of digital (micro)credentials were developed in the framework of a field research.

The research was conducted by the OEPass partner institutions during January and February 2018, the leader of the research activity was the Budapest University of Technology and Economics. After the core collection phase the collection did not finish. The partnership had the freedom to occasionally collect credentials until August 2019, which were not part of this analysis but were subject to participate in the piloting quality assessment in a later phase of the development.

The gradual steps of the research went as follows:

1. Clarification workshop (Partner meeting Heilbronn)

2. Definition for research purposes

3. Credential collection roadmap

4. Common collection table with detailed explanation

5. Peer reviewing collection table and research roadmap

6. Finalisation and opening common online table for avoiding overlaps

7. Analysis

8. Suggested typology (and classification)

Micro-credential definitions used for the purposes of research:

a) Micro-credentials are a digital form of certification indicating that a person has demonstrated competency in a specific skill, such as data literacy, teacher leadership, or growth mind-set.

b) Micro-credentials offer students and working professionals alike a way to bulk up their resumes with field-specific skills. Micro-credentials are like certifications. Students or professionals take courses and develop specific skills in certain fields. (https://www.onlineschoolscenter.com/micro-credentials/)

c) To earn a micro-credential, you would need to complete a certain number of activities, assessments, or projects related to the topic. Once you have completed the requirements, you submit your work in order to earn the credential. (https://study.com/academy/popular/what-is-micro-credentialing.html)

d) At their core, micro-credentials are proof that the recipient has earned a skill or level of mastery. Think of micro-credentials as mini-certifications in a specific area of study or professional development, like leading a team or applying computer coding skills to complete a project. (http://blog.portfolium.com/what-is-a-micro-credential/)

Expressions that were searched:

- Micro-credentials

- Digital badges

- Micro-certifications

- Web badges

- Mini-degrees

- Nano-degrees

Gathering of information was done by a shared google spreadsheet, in a common template:

- code (partner code)

- HEI

- Location

- Name

- Description

- Rules to earn

- Suggested (own) classification

- Link

- Date

- Researcher

- Comment

2.2 Analyses of research data

Research data were collected in an excel table and the collection of 143 records can be seen in Annex 2 of this report. During the development of typology, the first 85 complex records were analysed, others, that were found on on-going basis served as a pool for a later typology and classification expertise.

The first lot of 85 complex records were split in more cases when consortia of HEIs issued common credentials to have one record per HEI. The final number of records with the split and the on-going collection resulted a higher volume. The final research table exceeded the targeted 100 records (143 records).

In the time frame of this activity we have analysed 85 complex records, in terms of quantitative and qualitative content. Quantitative content is showing the geographical distribution, issuers of credentials, while qualitative research was counting the content of the description, names, rules to earn and suggested typology of the credentials.

To find a referred credential later in the report the partner code (for example B01) of the collected credential is important to know.

2.2.1 Quantitative results

The significant majority of the credentials came from higher educational institutions, all the other results have connection to HE, such as projects of HEIs, HE related associations like the European Schoolnet, institutes that are connected to Ministry of Education and training companies specialising on training of teachers.
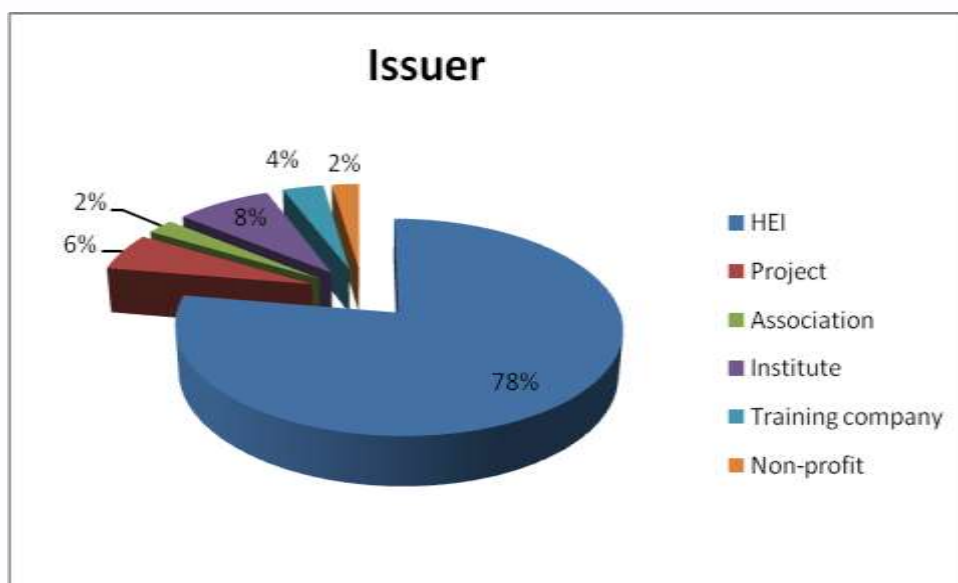

Chart 1. Issuer.

On the geographical coverage of the credentials, the results came mostly from Europe with a couple of American cases.
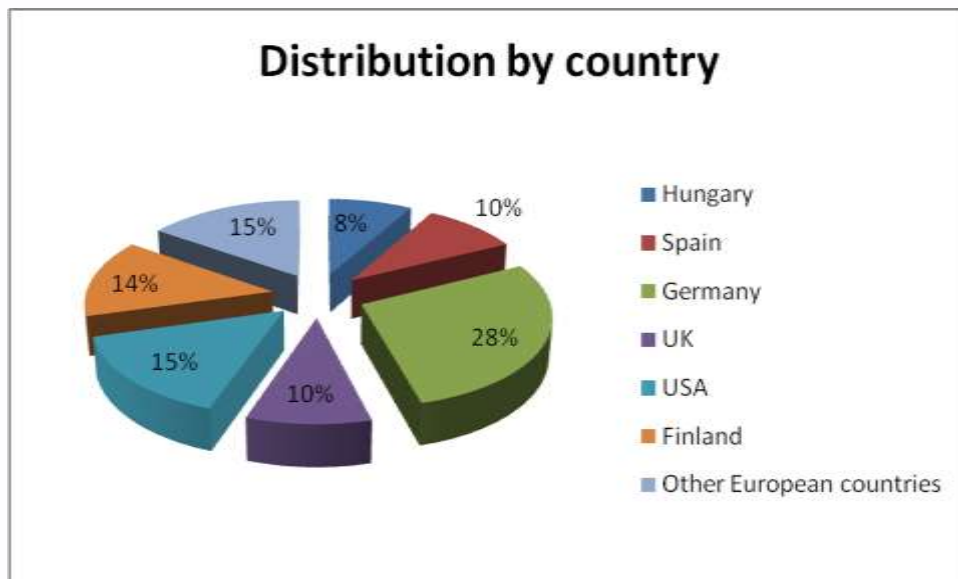
Chart 2. Distribution by country.

2.2.2 Qualitative results

The two most common name for credentials are **certificate and badge**. In some cases, there were overlaps between the two categories: in some cases, learners are entitled to certificate (usually a certificate of attendance), however when they do pass a final test or complete an activity they can get a badge as well. These cases were listed for badges.

There were three cases of awards: completing several badges entitled the owner to be awarded as well. There were listed for badges as well.

Not defined cases cover cases where it is unknown or it has no digital recognition yet.
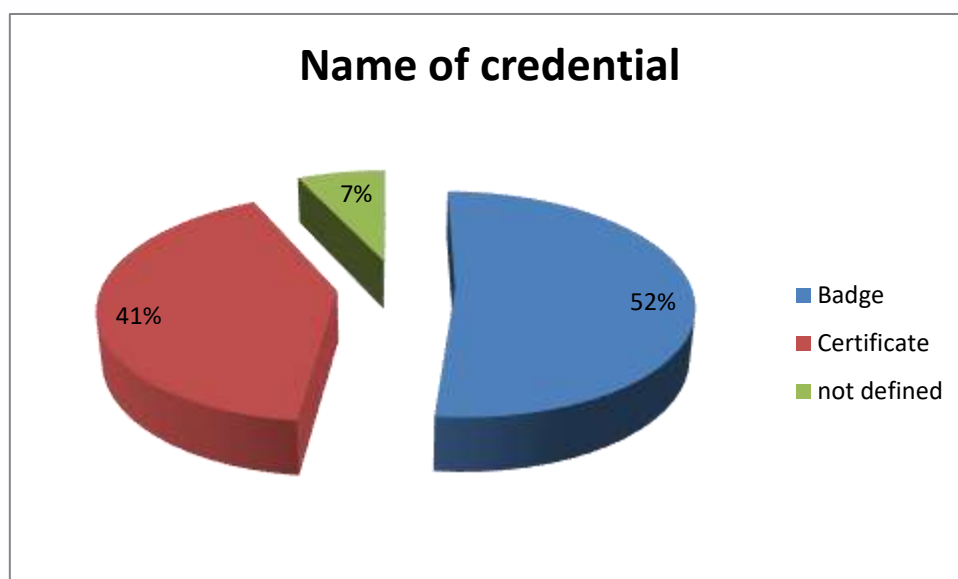

Chart 3. Name of credential.

Regarding description, we studied the most common denominators when describing the credential, including learning time, outcome, target population, content of the course, level of the credential. In the description, the most common denominators were the target group description (see next chart for details) and the content of the course. The outcomes (skills and competences) were not highlighted, nor the learning time it takes to acquire them.
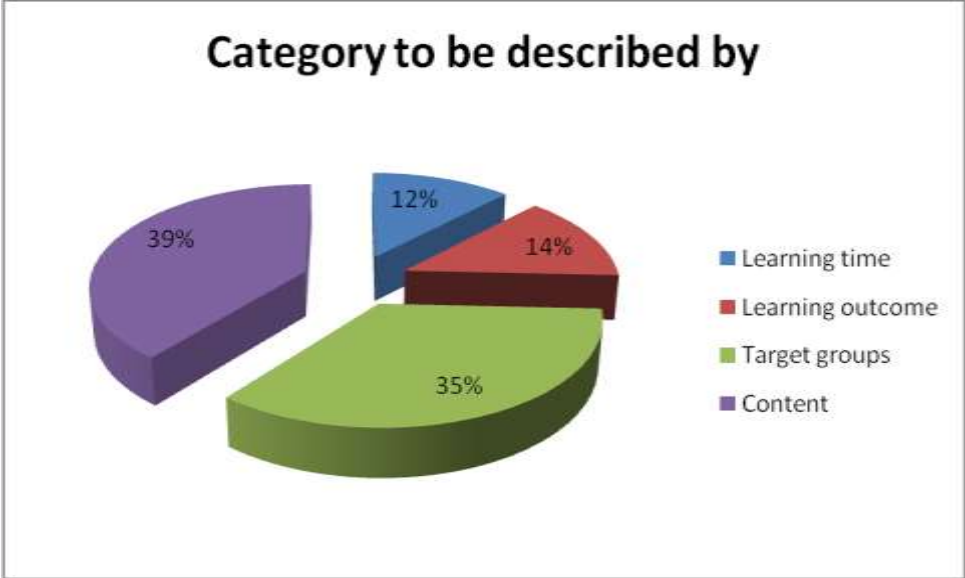

Chart 4. Category to be described.

When the credential was described by the target group, its distribution is as follows (other CPD means: Other Continuing Professional Development):
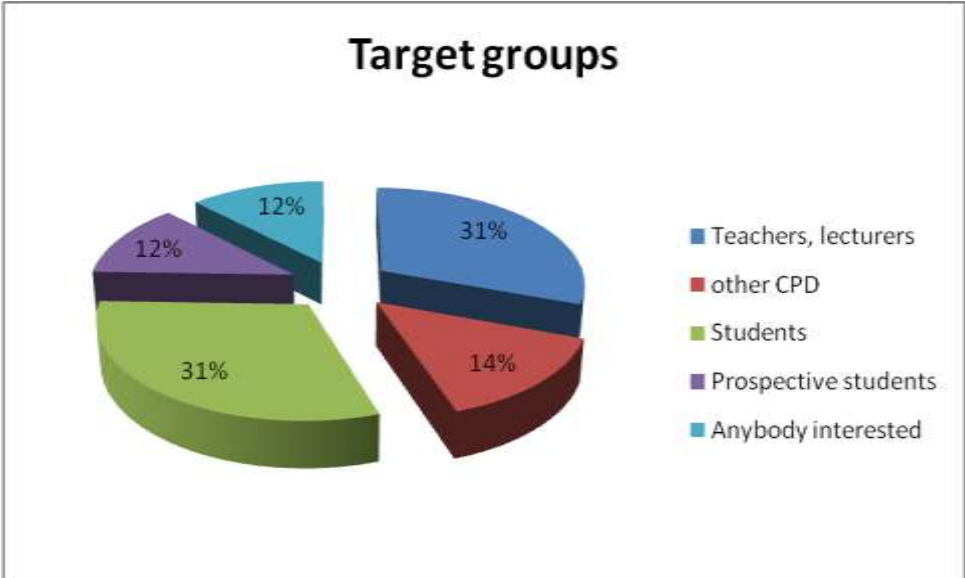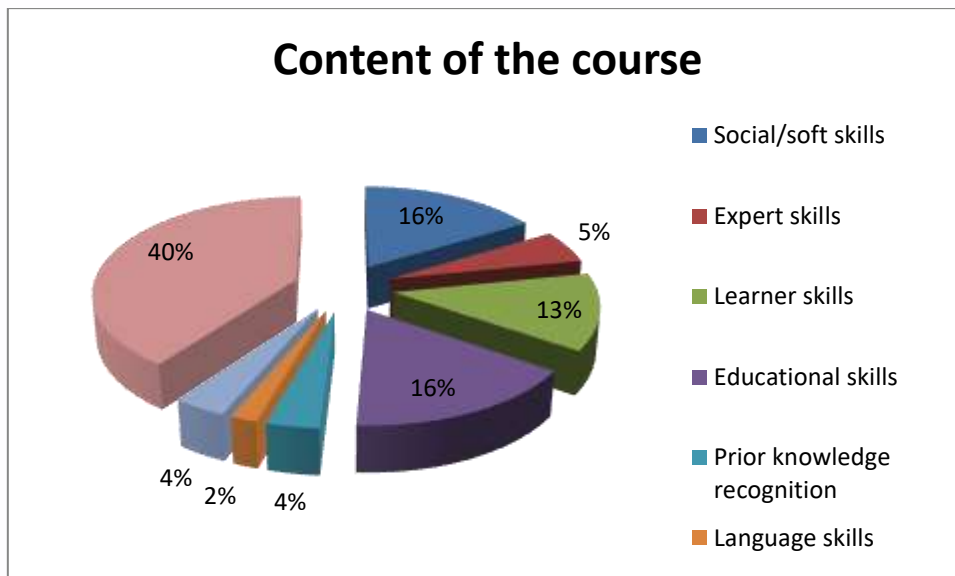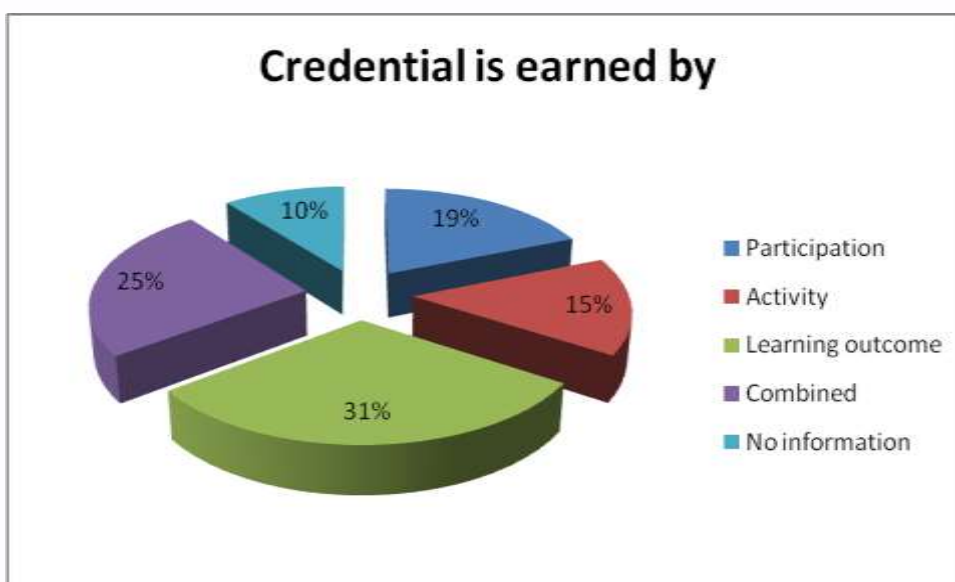

Chart 5. Target groups.

When studying the descriptions, when it was available, we created content clusters. Non-defined contents describe cases when the description referred more than one credential thus there were different contents or cases when it was not available in the description.

Content of the course

Legend:
- Social/soft skills
- Expert skills
- Learner skills
- Educational skills
- Prior knowledge recognition
- Language skills

Values: 16%, 5%, 13%, 16%, 40%, 4%, 2%, 4%

Chart 6. Content of the course.

Concerning the rules to earn, we have studied the different criteria that were provided in the research results:

- Participation: full participation is rare, when it is given as the decisive factor; usually a certain percentage of attendance is given. (Participated at least... in X % of …)

- Learning outcome: the most common are completing tests.

- Activity: there are some examples with the exact number of posts or detailed description of finished/completed activity (article, presentation etc.).

Credential is earned by

Legend:
- Participation
- Activity
- Learning outcome
- Combined
- No information

Values: 10%, 19%, 25%, 15%, 31%

Chart 7. Credentials is earned by.

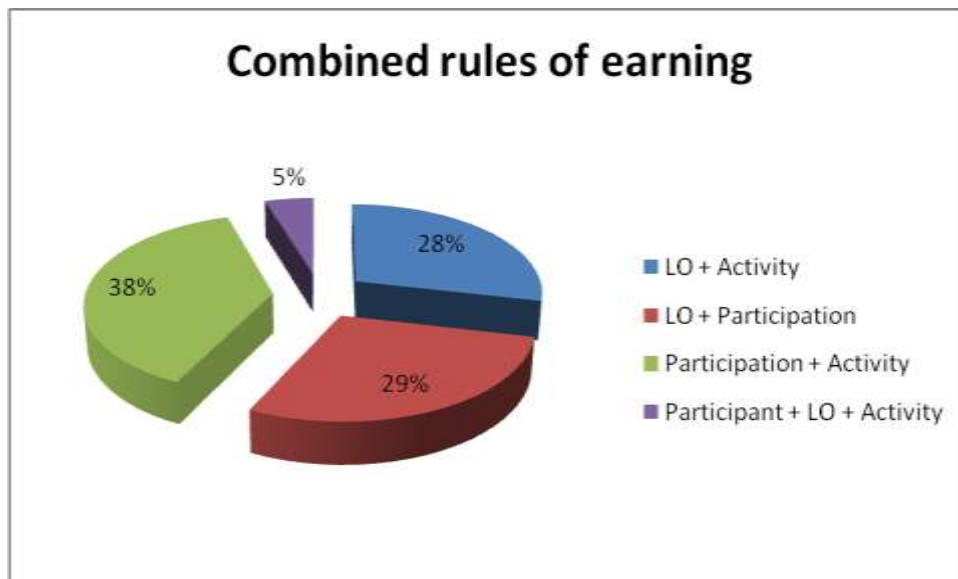Combined rules of earning is distributed as such. (LO = Learning Outcome)

Chart 8. Combinded rules of earning.

2.3 Draft typology suggested by researchers

During the collection of credentials, we collected suggested typology from researchers who had limited overview on findings, but deep understanding on the cohort they found. We have got plenty of suggestions of different manner, sometimes overlapping and definitely not disjunctive.

In 15 cases, we had no indication, or suggestion. The most popular typology was – in a way – continuing the paper based typology of certifications:

- More than 10 suggestions were mentioning Certificate for successful completion. Some variations of it: Certificate for successful completion of a MOOC.

- Another type was the participatory type: Credential for participation, Credential for active learning. Participation in most of the cases mean full, or X% presence at face-to-face classes, seminars, workshops.

- Another set of suggestion was made to the prior learning experience that is helping the enrolment to the University. A variation of prior learning was the badges of extra-curricular learning experience in different fields, parallel with HE studies, like STEM studies. Those badges were aiming at awarding important knowledge and skills areas that are important on the job market and could raise the value of the HE diploma.

- There were suggestions of different and more specific content on successful completion, in the dimension of evidence based learning: Badge for evidence based learning outcomes.

- We had also variations of participatory badges that was focusing on learning or training experience and student progress. Student experience and progress badges were combined with awards of best practices/achievements.

- There was a set of suggestions that were focusing on the skills rather than outcomes, and were suggesting different type of skills like: Networking skills badge, Social skills badge, soft skills badge.

- There were suggestions for credentials to teachers, educators, for their career development: Educators' badge.

2.4 Final (enhanced) typology of credentials

By analysing the mapped credentials and suggested typology, we have concluded the following credential types that can later be represented by labels: In the light of peer reviewing the first version of the Concept Paper, and the subsequent research that was continued during the peer reviewing period, a slightly modified definition and differentiation was formulated in the paper. There were also observations on the specific typology of credentials, therefore the final specific typology also changed slightly in the wording. The new suggestion is to use nine types:

- Four sectoral types of credentials (defined earlier in the concept paper):

    o Formal qualifications

    o Non-formal certificates

    o Recognition of skills

    o Records of experience

- Five specific types of credentials:

    o Participation (input type - presence)

    o Activity (relative to other learners – awarding for active communication)

    o Role (former earner – for teachers, authors, students)

    o Performance (learning outcome, skills, containing learning experience as well)

    o Context (for example: prior learning, open learning or STEM)

During the process of analysing similarities and differences between collected credentials, we also experienced that we can distinguish not only different content and technical oriented categories, but there are already introduced brands and standards with well-known names that we have to use and indicate in our system.

Content wise we can easily identify brands like: Micro-masters, MOOC credentials and technically: digital certificates and Open badges.

The former two sets (sectoral and specific types) have to be regularly checked and updated as the educational market is constantly changing, new types appear/disappear, new technologies and standards develop and fade out.

For the sake of starting an easy to read label system (discussed in Chapter 5) we used the four sectoral and five specific types (see above) of content with possible specific denomination of a brand, and two types of technical typology: **digital certificate** and **open badge**.

3 Classification System

3.1 Content oriented criteria (indicators)

The content oriented indicators were outlined in the Concept Paper (Chapter 1) as inherent value characteristics.

A recent research project titled "Paradigms" offers a complete set of indicators called "Green Light Model" (Nuffic, 2018), adapted from an earlier EU JRC report in 2016 which we can use here more broadly discussed in the Concept Paper. The OEPass modified system is based on the following six indicators (and is more explained in the scoring table in Annex1):

- Learning outcomes

- Quality of learning (QA system)

- Level of learning

- Workload of learning

- Identity of learner

- Identity of the Higher Education (HE) institution (Reputation issuer)

Those indicators can be used in the classification system by objectively analysing it and to decide whether they are covered by the respective credential.

The classification can be based on a pointing system. The pointing system may use the following values:

- Indicator that cannot be evaluated (observed), no info = 0 points

- Indicator that is NOT fulfilled = 0 points

- Indicator only partly observed/fulfilled = 1 point

- Indicator fully observed/fulfilled = 2 points

(Therefore 0 points means that the indicator is either not met or there is no info on it.)

3.2 Technical criteria (indicators)

The Concept Paper (Chapter 1) is already explaining in detail and working with a complex set of indicators, and explored further in Annex 1 (Table 2 and 3) where there are five categories of technological indicator in two columns as a matrix.

The suggested system is the following:

- Distinct

- Authentic

- Accessible

- Exchangeable

- Portable

All those criteria (indicators) can be related to the credential statement (technical content) and to the carrier medium (technology), therefore the indicators can be further split in two types:

- Credential statement

- Medium statement

The technology indicators are representing further observable elements. The easiest way to classify those indicators is, to have 3 values: 0, 1, 2. (not able to classify/not met, partly met, and fully met). This system leads to a matrix of points, that can be added in each line or row, the maximum is 20.

	Statement	Medium	Σ
Distinct	2	2	4
Authentic	2	2	4
Accessible	2	2	4
Exchangeable	2	2	4
Portable	2	2	4
Σ	10	10	

Table 2. Classification system.

Classification scoring table for both content and technical see Annex 1.

We have finished the quality system that is containing an initial typology, content and technical classification structure. Based on this, we will show a sample quality assessment and later the analysis of the whole collected data set.

4 Sample quality assessment (B03)

The sample quality assessment is a BME training material open badge coded as B03 in Annex2 awarded to participants in a project called VOCAL. (www.vocalerasmus.eu).

Badge link:
http://lms.vocalerasmus.eu/badges/badge.php?hash=a8c4a7542348a71e672c33ab0fbe370cfbf0fee2

and also from Mozilla Backpack.

Sectoral Typology: Recognition of skills

Specific typology:

- Role (Earner): Learner (in the system there are Trainer and Author badges as well)

- Performance: Learning outcome (Three outcomes are listed)

- Context: Free learning

Technical Typology: Open Badge

Content classification:

- Level of learning: EQF level 5 (not indicated, but can be categorised based on the award criteria)

- Workload of learning: 30 learning hours (defined on the project portal)

- Identity of learner: YES Name and e-mail

- Identity of HE institution: YES: BME as consortium coordinator.

Content classification:

- Learning outcomes: 1 (evaluation not transparent)

- Quality of learning: 1 peer reviewed (quality system not transparent)

- Level of learning :2 (clearly defined in the project description EQF level 5)

- Workload of learning: 1 (30 hours are not explicitly shown on the badge)

- Identity of learner/earners: 1 (shown but not digitally identifiable by other data or profile)

- Identity of HE institution : 2 (Name and e-mail of the institution, trackable)

Overall: 8/12

Technical classification:

0,1,2 point system	Statement	Medium
Distinct	2	2
Authentic	2	2
Accessible	2	2
Exchangeable	1	1
Portable	2	2
Sum	9	9

Table 3. Technical classification.

Overall technical classification: 18, Gold quality.

5 Analysis of collected credentials

To be able to decide whether the suggested quality system is meaningful, the OEPass partnership analysed the collected credentials using the framework described above. Partners were briefed about the process with a detailed guideline, and every partner worked with its' own collection. A total of 143 credentials were collected, but for technical reasons only **125** credentials could be evaluated and classified **partly** (Content indicators) and **58** credentials were evaluated and classified **fully**. The technical reason was that many credentials' technical background was not accessible for the evaluators, while the statement of the credential and the course behind the credential appeared to be classifiable.

5.1 Sectoral content typology

The explanation and background of sectoral typology was discussed in Chapter 2. During the analysis, 51 credentials were categorized into four types. 73 credentials could not be categorized.
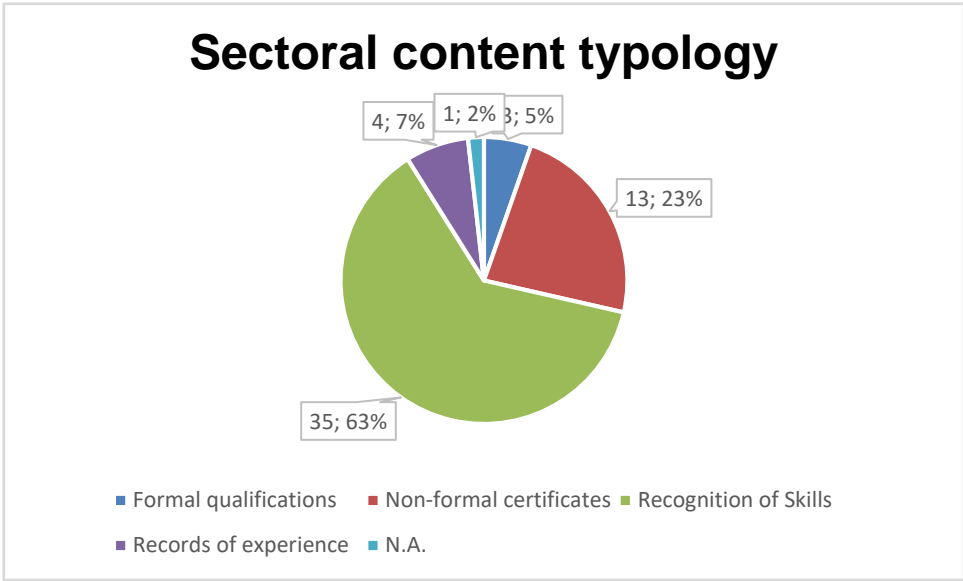
Chart 9. Sectoral content typology.

The most populated digital credential was the recognition of skills (32) while 13 non-formal certificates were found. The formal qualification category was counted as 2 examples that show that digital certificates have started to appear in HE, starting from the specific skills recognition, moving on to higher level of the non-formal certificates category which represents a less competitive part than formal qualifications where issuing requirements are obvious among other HE certificates. There is much to do in HE to gain a digital representation of formal qualifications, as this area (formal qualifications) is the most regulated as well as the most conservative part of HE certification and branding.

Looking at the relatively high number of non-categorized certificates, we may formulate some conclusions:

- During this analysis period, there were no suggestions from evaluators for new content type categories.

- Certificates are not self-explanatory, thus there should be a more detailed description on each category for the evaluators to be able to find the most fitting category.

- A direct contact to the issuer of the certificate may help to put the credential to the respective sectoral type.

5.2 Specific content typology

The explanation and background of specific content typology was discussed in Chapter 2. The originally defined specific content typology worked well, all types were relatively populated. The following suggestions were indicated during ranking and classification testing period: automated certificate, professional growth certificate, short course certificate, certificate for successful completion, certificate for educators, certificate for professional growth, easy to earn badge, webinar badge, social skills badge, and student progress badge. All those suggestions fit in the overall five specific types.

The most popular specific content type was the **Performance based** (common category of different performance types in Higher Education – Learning Outcome, Vocational Education and Training - Skills plus Adult Education- Experience) credential with only two certificates in the „Not able to classify" category. The three major performance types were Learning outcome (25), Skills (27) and experience (2).
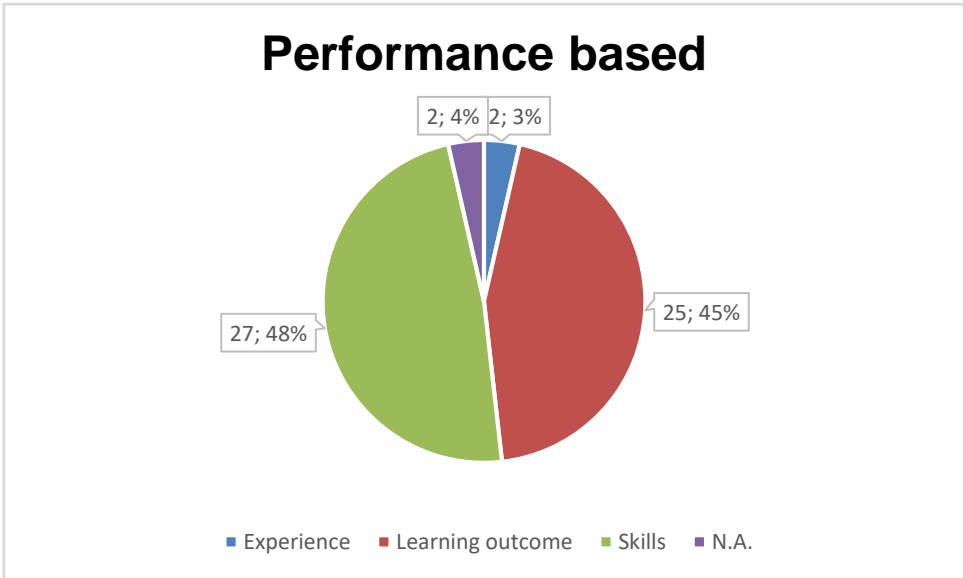

Chart 10. Performance based.

The **role based** type (former earner type) was also very well accepted and used (50 categorisations), with eight cases in the N.A. category. Testing scores indicated 40 learner and 10 teacher (educator) type certificates.
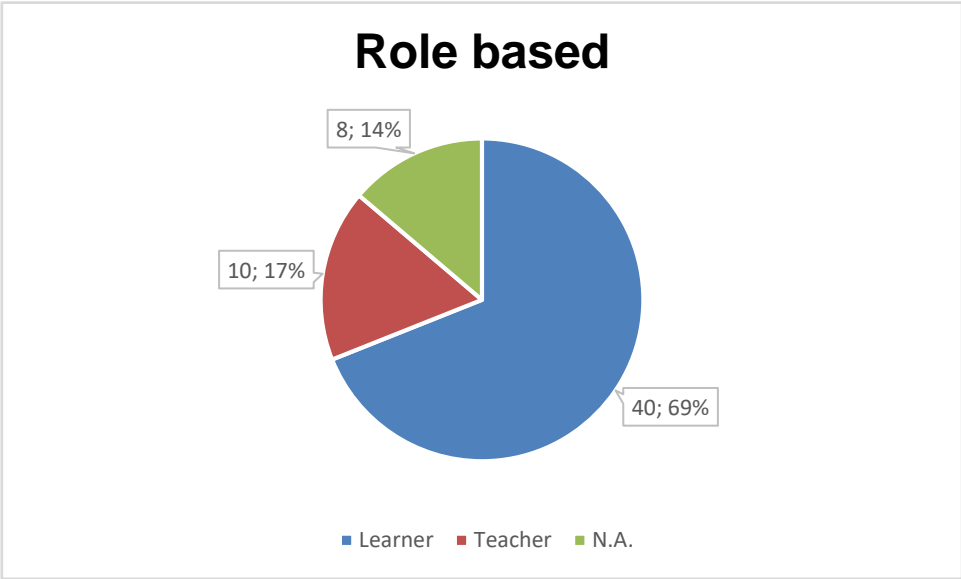

Chart 11. Role based.

The third specific type that was widely used in 40 items was the **context based** credential with 16 items in N.A. choice. The most popular context was the free learning (Open Learning), and here we assume that other categories may be included from the long list of earlier suggested categories by evaluators (automated certificate, professional growth certificate, short course certificate, certificate for successful completion, certificate for educators, certificate for professional growth, easy to earn badge, webinar badge, social skills badge, and student progress badge).
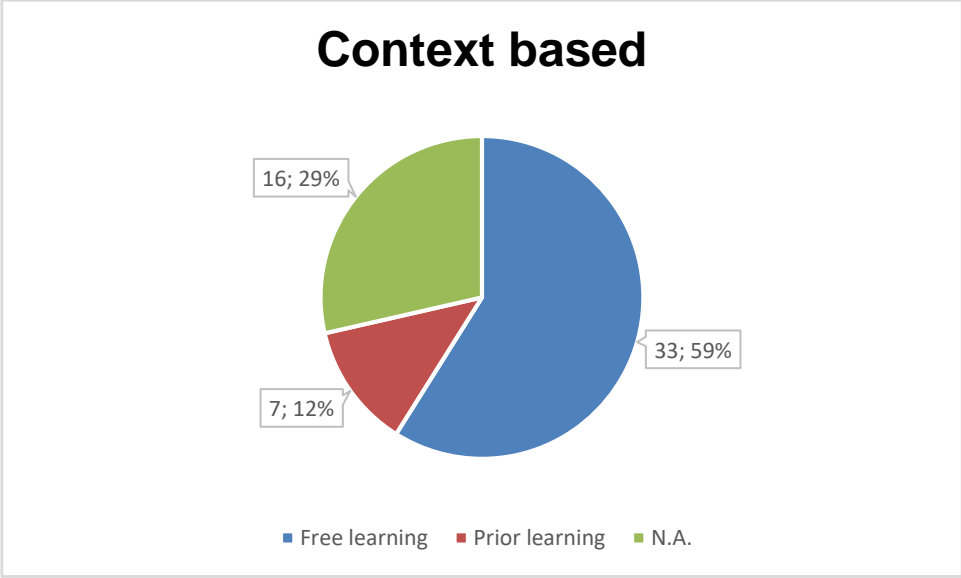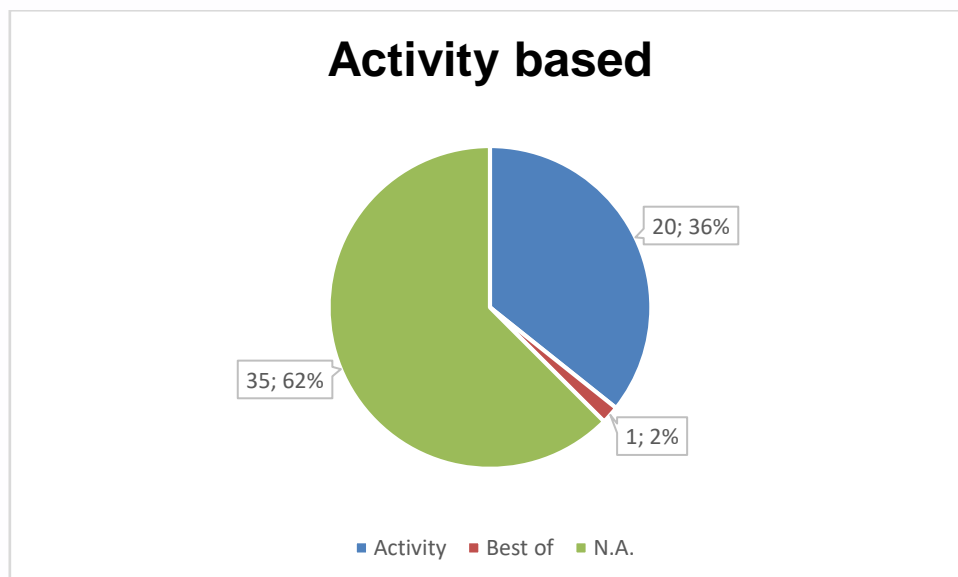

Chart 12. Context based.

The last categorised types were the:

- **participation based** credentials with 33 items and 24 items in the N.A. category, and

- the **activity based** category (21 items), with 35 N.A. choices.

- Both categories should be further defined, as many of the suggested types may fall in this type (certificate for learning, summer school certificate).

Participation based

14; 25%

24; 42%

19; 33%

■ Yes ■ No ■ N.A.
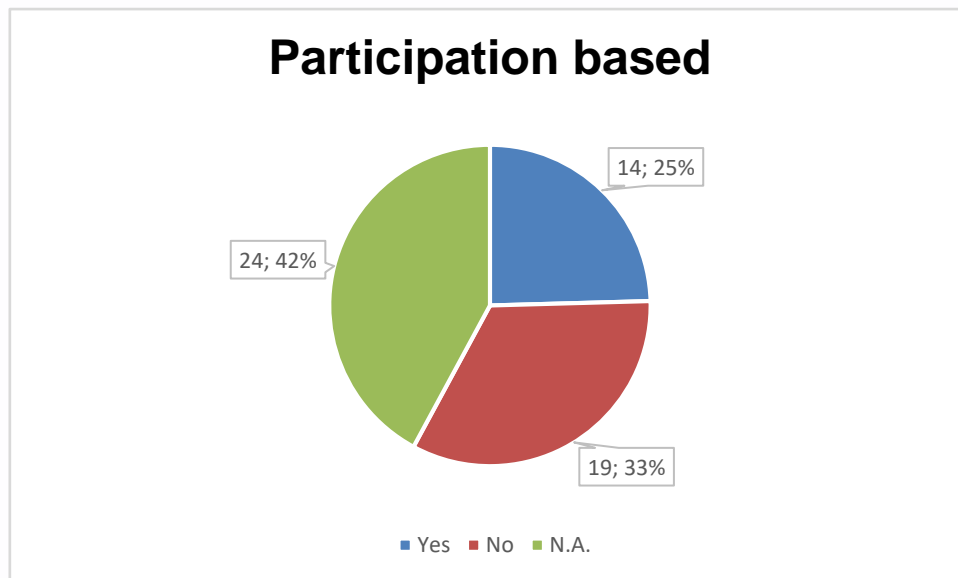
Chart 13. Participation based.

Activity based

20; 36%

35; 62%

1; 2%

■ Activity ■ Best of ■ N.A.

Chart 14. Activity based.

5.3 Technical typology

During the analysis, 52 credentials were fit in digital certificate/open badge/other categorization while 73 were in the category not able to classify (lack of information).
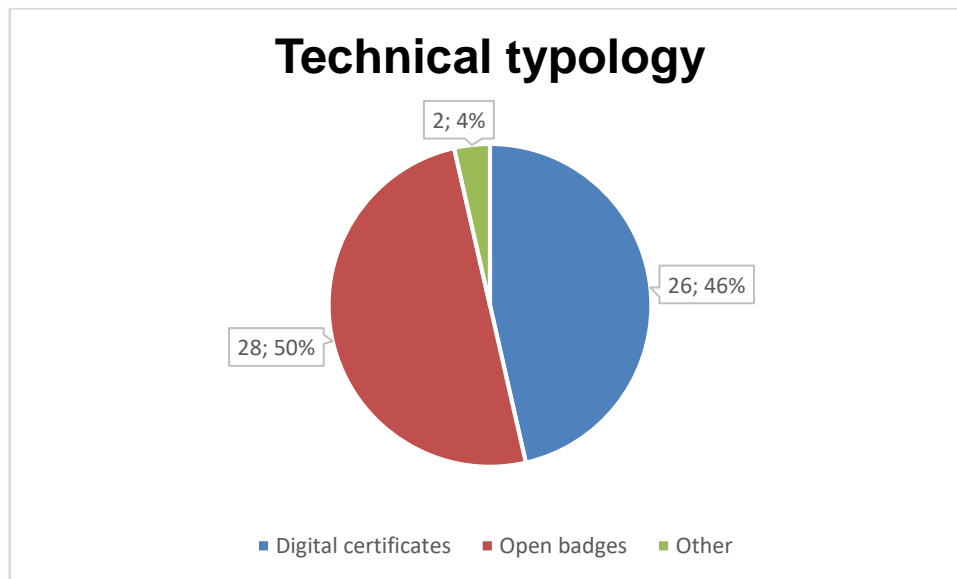
Chart 15. Technical typology.

From the 52 technical types, 28 were categorized as open badge, 22 as digital certificate, while only two fell in other category (most possibly custom programmed certificate). From the findings, we may say that those two suggested technical types are well representing the technical solutions of digital certificates with only two other types. At the time of this analysis, the technical platform of Micromasters and the technical platform of the new EuroPass credential standard was still under development. On the other hand regarding the big number of non-categorized credentials, we may conclude:

- Certificates are not self-explanatory in this technical respect as well. There should be a more detailed description for the evaluators on each technical category to be able to find the best type.

- A direct contact to the issuer of the certificate may help to put the credential to the respective category.

- In the next few years, new technical platforms may possibly show up. (Certainly in case of Europass Digital Credentials Infrastructure – EDCI)

5.4 Content indicators

Out of the 125 credentials, less than 20% were not classified at all, which is a good number. In this respect, Identity of the issuer HE (e. g. the exact name of the institution) was the most classifiable indicator where only 2% were "not able to classify". On the other hand, the less classifiable indicator among the six was the identity of the learner with 19 (15%) not classifiable items (where the evaluator could not decide whether the learners' identification was part of the credential or not.)
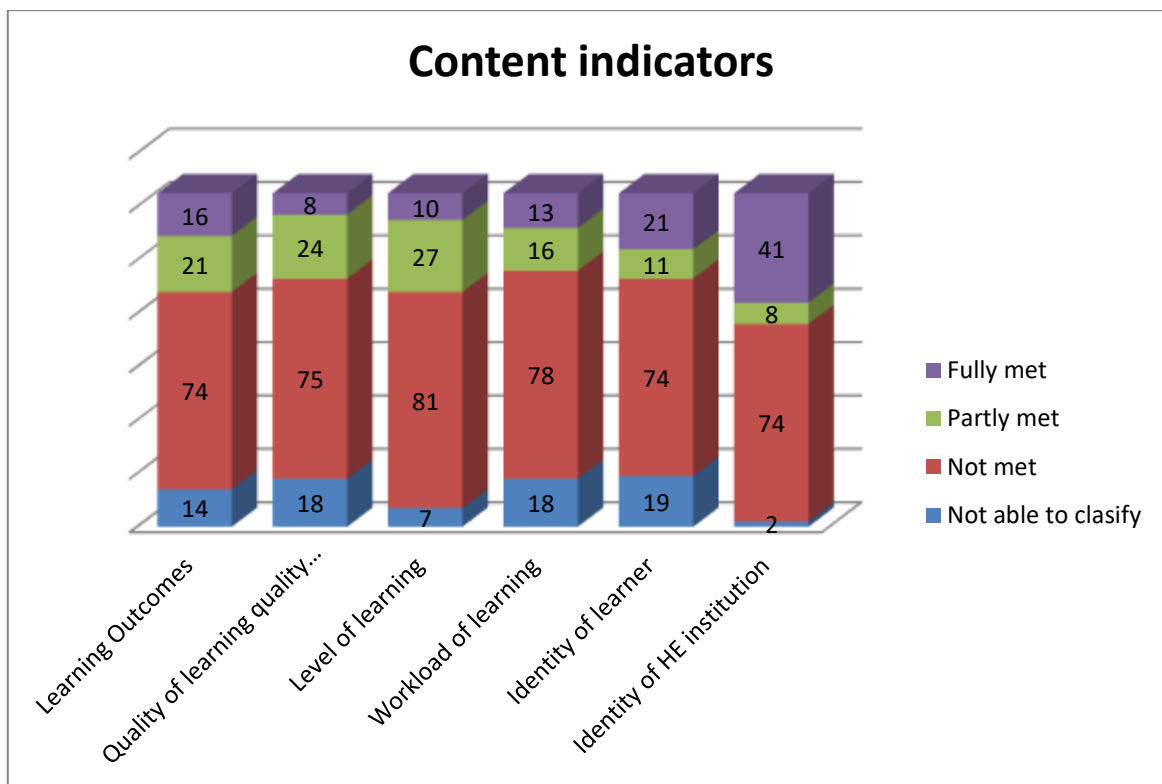
Content indicators
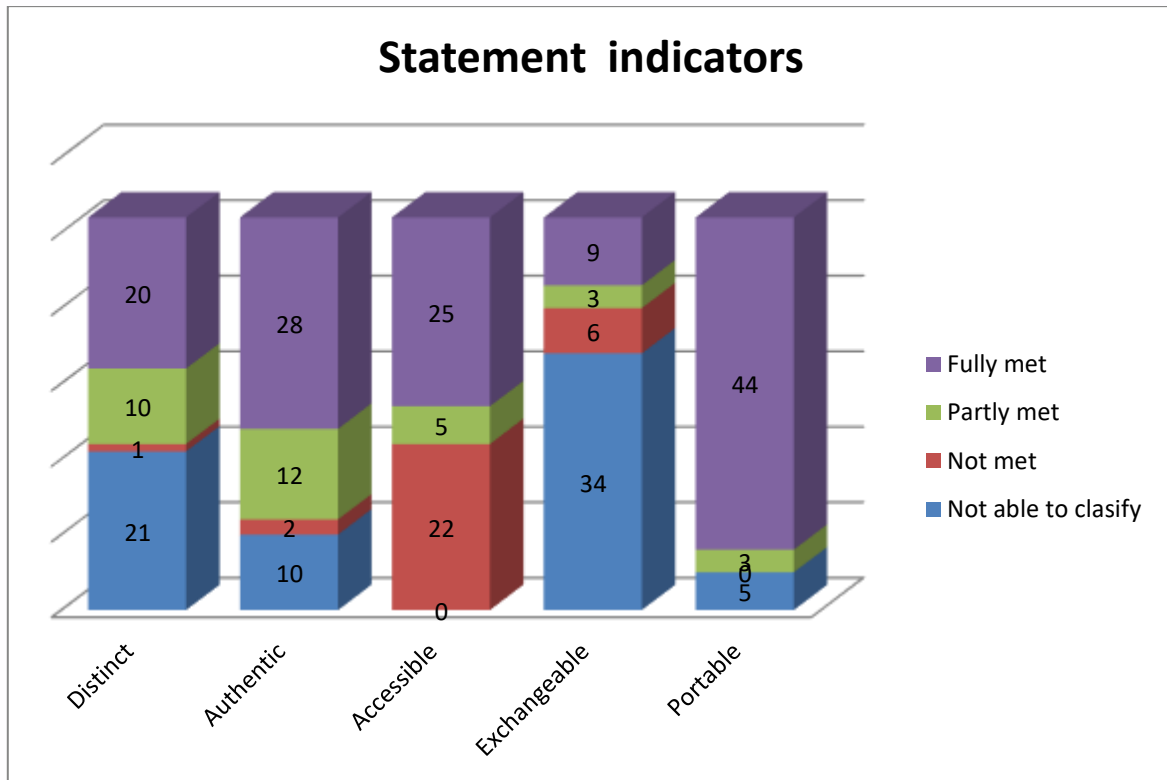

Chart 16. Content indicators.

Focusing on the classified items, we may say that the best performer indicator was also the institution where 41 credentials were fully met by the criterion (see Annex 1). The second biggest population was the «identity of learners«, and then 16 fully met »learning outcomes«.

The least performing indicator type was the level of learning (81 »Not met«) followed by workload of learning (78 »Not met«), and the quality of QA system (75 »Not met«).

This type of the indicator system turned out to be the most used indicator set with meaningful outcomes and less misunderstanding.

5.5 Technical indicators

Technical indicators were discussed and explained in Chapter 3. Examples of conformity can be checked in Annex1 page 2 and 3. Due to the lack of access and technical transparency many credentials, only 52 items could be categorized in any of the defied categories. If we add to this number the classification: »not able to classify« with the maximum of 34, we may say that technical evaluation was a hard task for the evaluators.

Chart 17. Statement indicators.

The most difficult category to assign was **exchangeability**, where regarding statement indicators, 32, and regarding medium indicators, 34 records, could not have been able to classify. The highest in this respect was the portability indicator in both categories with 41 and 43 findings in the »fully met« category.

Regarding the »not met category« only the statement indicator »accessible« was mentioned 22 times, while it was not the same with medium indicator. That means that language or graphical accessibility was more a problem than the technical accessibility (special format).
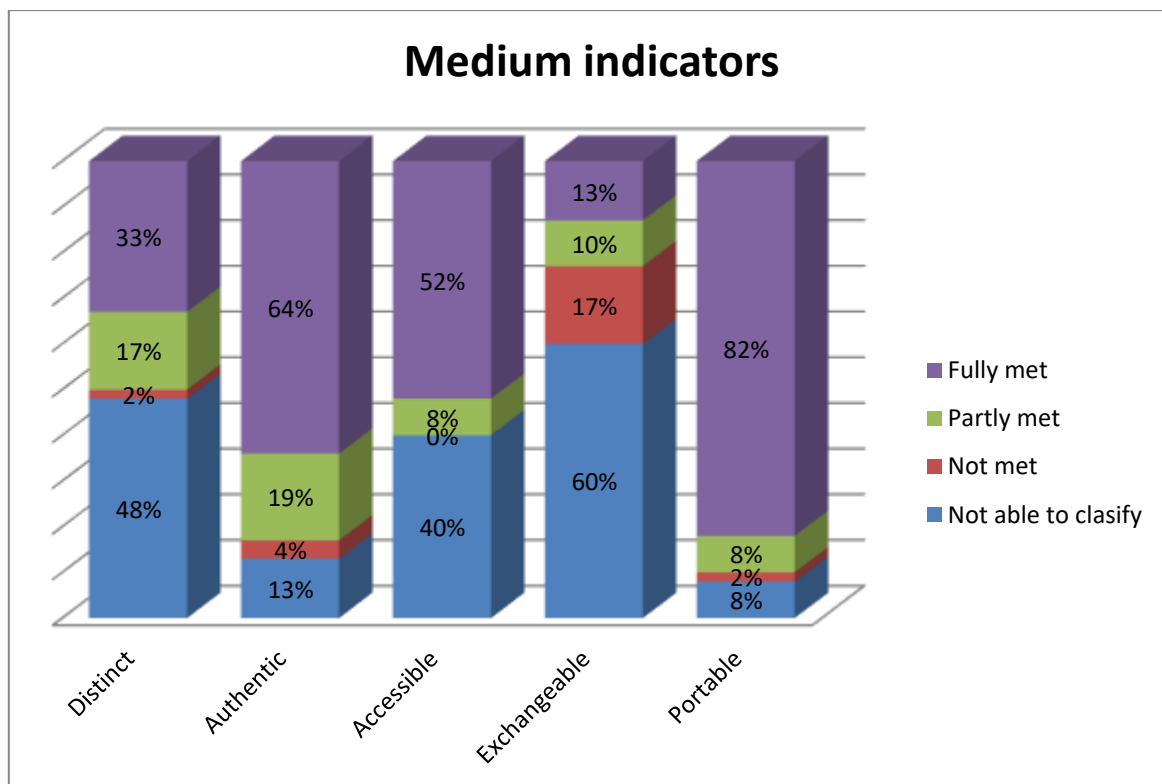
Chart 18. Medium indicators.

Concluding remarks: Technical indicators are less used indicators than content indicators, so in line with the typology we may conclude:

- There should be a more detailed description of the meaning of different technical indicators, more examples should be developed.

- A longer training for the evaluators should be designed, and evaluators should be selected for the purpose with deeper technical knowledge of technology.

- A direct contact to the issuer of the credential may help to classify the credential to the respective category.

5.6 Quality ranking according to the defined quality scale

After having analysed the typology and the indicators, we may state that despite of many items where the evaluators showed an inability to analyse, we could gather enough credentials to make the first rankings.

As the partnership agreed the focus of the ranking is not an overall quality rank, rather a more meaningful ranking of each category. The following ranking is based upon the pilot evaluation of collected items that can be found in Annex 2. The cited credentials in the following part are denominated by the partner code. See Chapter 4 with a sample evaluation, and Annex 2 with the list of items that were analysed.

5.7 Ranking of Content quality

In case of content indicators, the maximum possible compliance were 12 points (fully met all categories; see Annex 1).

Among the 125 credentials, we had 5 credentials with maximum points: L02, T02, T03, E23 and L07 (see Annex 2).

Two credentials reached almost maximum with 11 points (L01, L03).

Two credentials reached 10 points (D02, L05).

This relatively high number can also be observed at the level of 6 points (at least partly met each) with 37 findings.

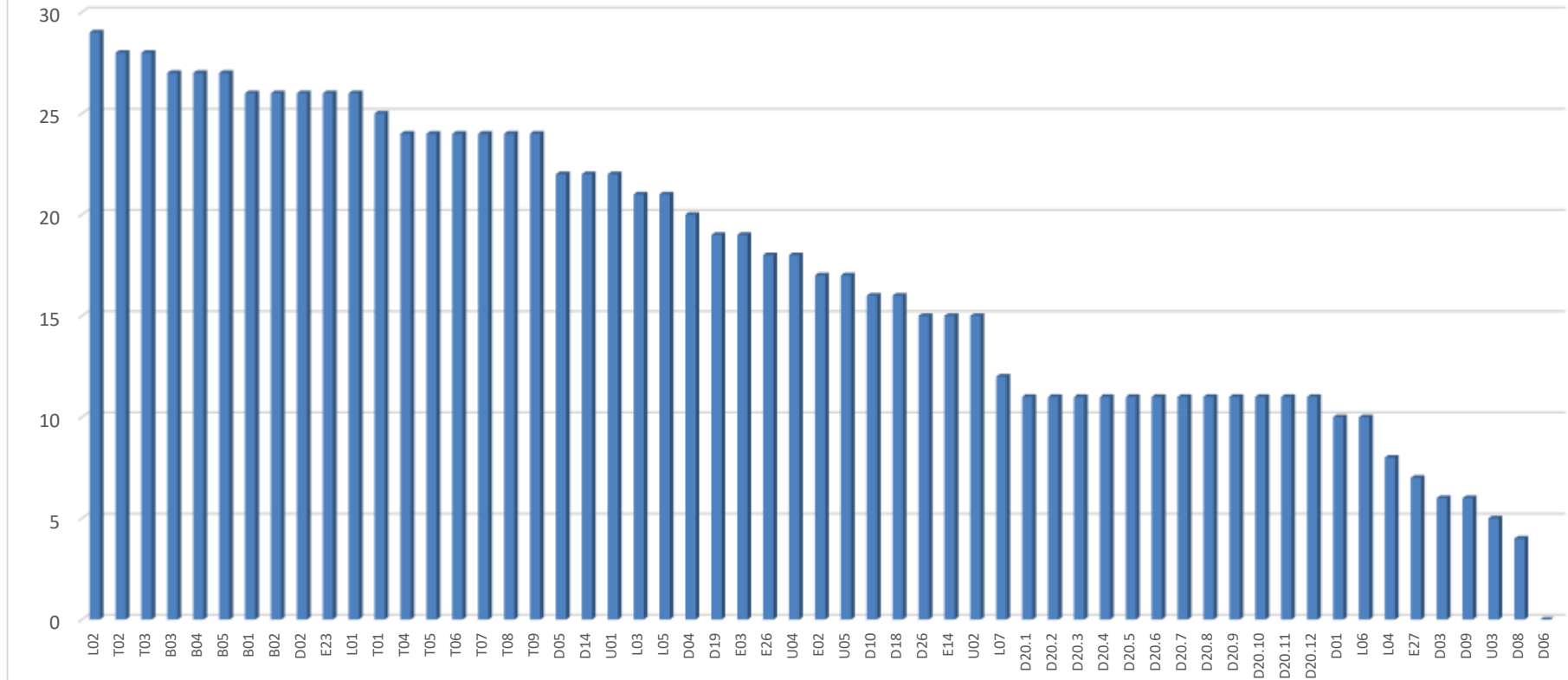*Chart 19. Overall ranking.*

5.8 Ranking of technical statement quality

The maximum compliance in technical statement quality category was 10.

This number was reached in case of 5 credential items: B01, B02, B03, B04, B05.

While there was no 9 points, the class with 8 points were quite populated with 15 items: L02, T02, T03, E23, L01, D02, T01, D05, T04, T05, T06, T07, T08, T09, and D04.

There were two 7 point cases: D14, U01.

A relatively high number of credentials reached at least half of the points (average partly met) 30 items.

5.9 Ranking of technical medium quality

The maximum compliance in technical medium quality category was 10.

This number was reached in case of the same five credential items as in case of statements: B01, B02, B03, B04, B05.

One credential reached 9 points: L02.

Ten credentials reached 8 points: T02, T03, D02, T01, T04, T05, T06, T07, T08, T09.

Five credentials reached 7 points: L01, U01, E03, D10, and E02.

Here again a relatively high number of credentials reached at least half of the points: 34 items.

Technical statement indicator classification
Sum Statement and Media

Media ■ Statement

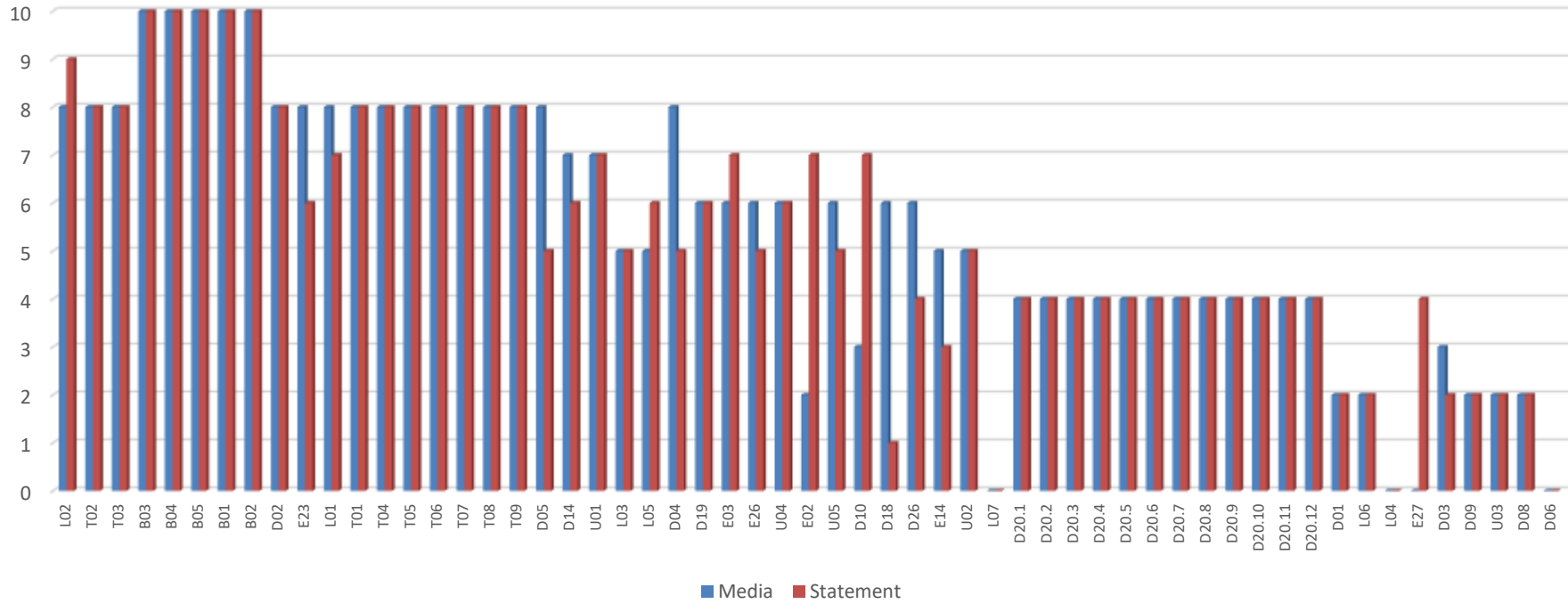*Chart 20. Technical statement indicator classification. Sum Statement and Media.*

5.10 Well performing credentials in all categories

Although researchers agreed that an overall ranking is not really meaningful, it is however interesting to know which credentials could reach the maximum (32 points) at all categories.

First of all: None of the examined credentials could reach maximal compliance in all of the categories; we may observe only relative well performing credentials.

The highest performance during the testing period was: L02 with 29 points (out of 32) Vytautas Magnus University Re-Open project's Open Badge.

Two credentials reached 28 points (T02 and T03) Lahti University: Professional communicator Open Badge.

Three credentials reached 27 points (B3, B4, B5) BME-Vocal project Open badges.

Here again a relatively large number of credentials could collect at least half of the points, namely 34 examples.
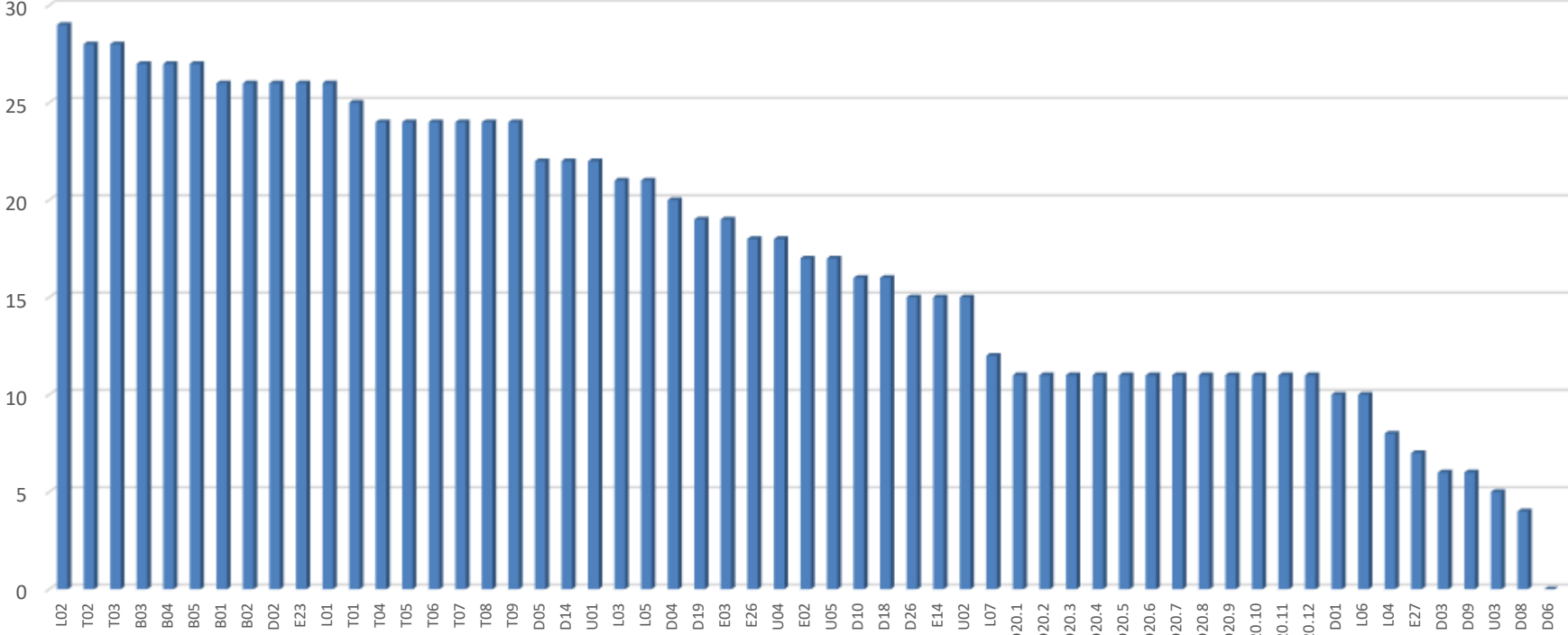
Chart 21. Well performing credentials in all categories.

6 Suggestions to an Easy to Read Label System

In order to collect in an easy to read label system all the above mentioned typology and criteria, we suggest to use state award or military honours medal "metaphor":
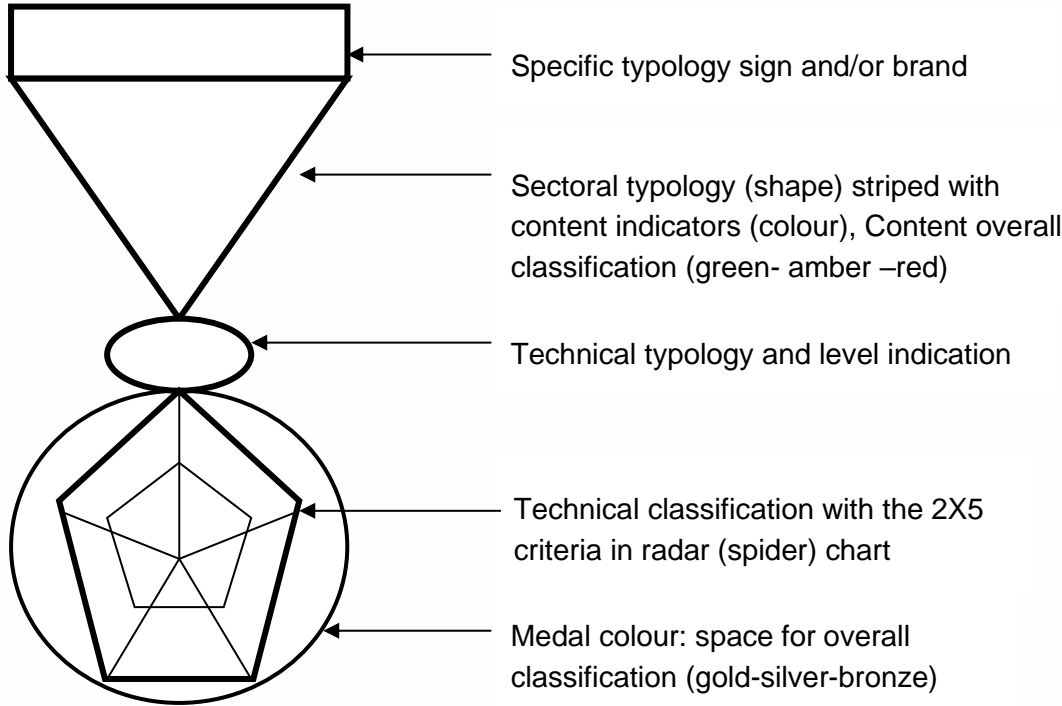

Specific typology sign and/or brand

Sectoral typology (shape) striped with content indicators (colour), Content overall classification (green- amber –red)

Technical typology and level indication

Technical classification with the 2X5 criteria in radar (spider) chart

Medal colour: space for overall classification (gold-silver-bronze)

Figure 4. Military honours medal "metaphor".

As it was discussed in chapter 3, the new system has four piles.

|	Content	Technical
Typology	4+5 types	2 technical standards
Classification	6 indicators	2X5 indicators

Table 4. Easy to read label system.

Let us see first how we could visualize the four piles:

6.1 Content indicators

Content indicators may be shown by their letters (or Icons) in a box, and the box colour could show the red – light system (fully met – green, partly met – yellow, not met – red):

- Learning outcomes = O (outcomes)

- Quality of learning (QA system) = Q

- Level of learning = L (Level)

- Workload of learning = W (Workload)

- Identity of learner/earners = E (Earner)

- Identity of HE institution (Reputation issuer) = I (Institution)
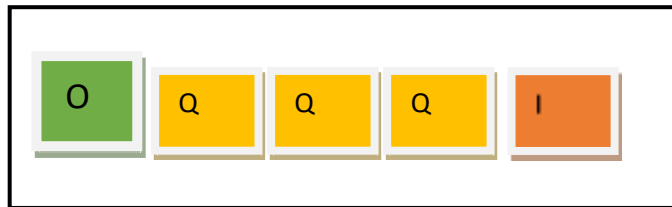
Figure 5. Content indicators.

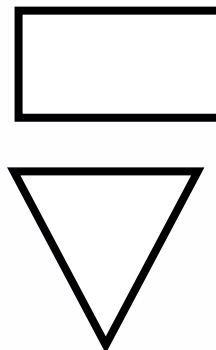# 6.2 Structural Content typology

For content structural typology we suggest three icons for that:
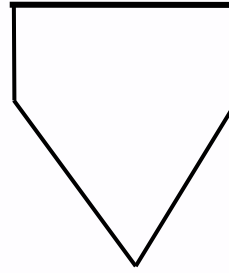
Rectangular, triangular, combined shape:

All types may contain a brand if the micro-credential is falling in a brand.
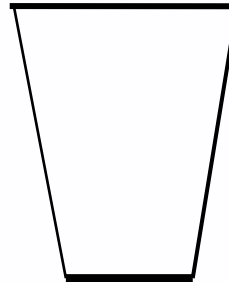
Example:

- Records of experience

- - Recognition of Skills

- Formal qualifications

- Non-formal certificates

6.3 Specific content typology

Following the plans there are five more types of credentials that can be on the top of the label by their Letters (or icons) and can be presented by coloured stripes in the structural type shapes:

Participation type: No letter, no stripe

Role (earner) type: Teacher = dark red stripe or Learner = brick red stripe

Activity type: Active or frequent user = yellow stripe, Best of = brown stripe

Performance type: Learning outcome = dark green stripe, Skills = green stripe, Experience = light green stripe
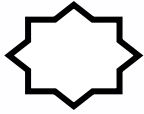
Complementary type: Prior learning = dark blue stripe, Free learning = blue stripe

This specific content typology have to be updated frequently, as this area is changing rapidly.
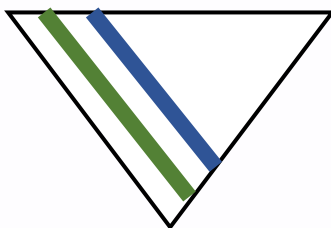
6.4 Technical type and level of credential

Technical type can be shown under content typology by using:

Digital certificates,
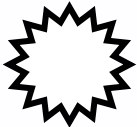
Open Badges,
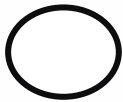
Others.

In the middle, the level of learning can be shown (EQF or other classification):

Language exam Open badge level B2.

6.5 Technical indicator classification

The classification is based upon radar diagram. The five elements of classification are represented by five axes forming a pentagon.

The two types can be represented by two pentagons embedded one in the other.

Distinct
Authentic
Accessible
Exchangeable
Portable

Medium

statement
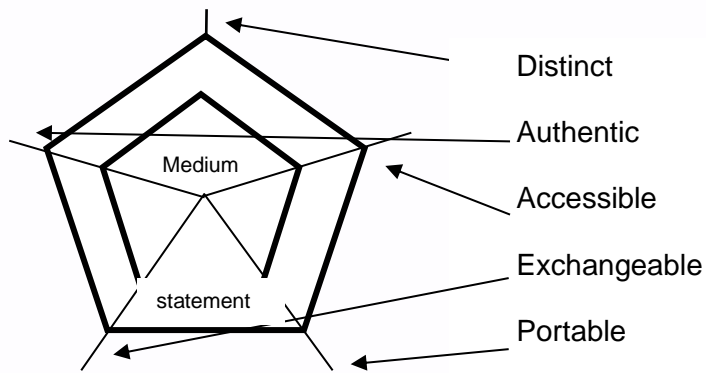
Figure 6. Technical indicator classification.

6.6 Summarised classification

Taking the pointing system 0, 1, 2, there are 20 technical points.

- 0-10 BRONZE (0-50%)

- 11-17 SILVER (51- 75%)

- 18-20 GOLD (76-100%)

The colours can be given as metal colour of the pentagon diagram, or to a circle around the pentagon.

7 Conclusion

Credentials in Open Education is a rapidly developing area. Our task was to present a position paper on quality, collect and analyse more than 100 digital credentials and develop a state of the art typology and a quality scheme. The position paper outlined, field research and analysis showed, that it is possible to set-up an initial system for typology, quality and ranking. The easy to read label system that was planned, discussed and modified twice to arrive a better solution, but it is still quite a composite label. The process showed that digital credentials are complex products, and it is not easy to visualise their content for an outside observer.

The pilot evaluation exercise during the field research activity was demanding, but successful and useful. The pilot evaluation produced the planned and targeted quality classification and ranking scale of the digital credentials in open education. In the light of the process, and the peer reviews serving to get objective feedback on the product, the following recommendations can be made for the further development of Credentials quality system:

- The field is rapidly changing. Typology of content and technical platforms need constant update and revision. New credential types will emerge. (During the research work, Micro masters working group did not publish final technological platform, Europass Digital Credentials Infrastructure was still in development phase.)

- The quality assessment is complex, demanding, much time and focused expert work is needed.

- The evaluation in most of the cases cannot be done anonymously; a contact with the credential issuer will be necessity.

- Terms and categories should be more precisely formulated.

- More examples and sample evaluations have to be developed as a pre-requisite to set-up a meaningful and objective service-ready evaluation system.

- Evaluators need specific skills on a multidisciplinary area. (IT, Encryption, learning theory, methodology, knowledge on educational systems and directives)

- Evaluators need dedicated training and guidance.

- More than one expert should do the evaluation. Specialisation on different parts of evaluation can be envisaged. In a piloting phase even three independent expert evaluation should be used.

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9 Annex 1 Classification scoring table (content – technical)

9.1 Content indicators

	Indicators	Not able to classify	Not met	Partly met	Fully met
	Content				
1C	Learning Outcomes	When the evaluator could not find info about the indicator	There are no objectives or learning outcomes indicated in the certificate statement	There are at least basic learning goals, objectives or outcomes. These are measurable.	There are well designed and structured learning goals, objectives or outcomes. Learning objectives or outcomes are appropriately and systematically evaluated.
2C	Quality of learning quality assessment system	When the evaluator could not find info about the indicator	There is no quality system references indicated on the statement, or on the portal of the issuer related to the statement.	There is at least basic local quality assessment system related to the learning activity, indicated on the statement or on the issuer portal.	There is a standardized quality system that is compliant to the national or EU level QA system, or an internationally recognized quality system indicated on the statement or on the issuer portal. (Example: ISO)
3C	Level of learning	When the evaluator could not find info about the indicator	There is no indication of the level of learning at all.	The level of learning is indicated, but it is a system that cannot be identified in professional, national, EU or international classification systems.	The level of learning is indicated in compliance with in a professional, national, EU or international classification system or systems. (example ECVET, EQF)
4C	Workload of learning	When the evaluator could not find info	Learning time or any other unit of measurement is missing.	Workload is indicated in qualitative un-standardized way that cannot be exactly translated into credit,	Workload is indicated in a quantitative and well defined way by indicating learning time or credit. Definition of workload can be tracked.

		about the indicator		learning time or other units.	
5C	Identity of learner	When the evaluator could not find info about the indicator	There is no learner identification possibility on the statement.	The learner can be recognized, but cannot be exactly identified.	The learner can exactly identified by a personal unique identifier.
6C	Identity of HE institution	When the evaluator could not find info about the indicator	There is no institutional identification, or it is not clear or misleading.	The identity of the HE institution can be recognized, but the real issuing entity within the institution cannot be identified.	The identity of the HE institution can be identified by unique identifier, and the awarding institution can be tracked by unique identifier.

9.2 Technical indicators

	Indicators	Not able to classify	Not met	Partly met	Fully met
	Statement				
1S	Distinct	When the evaluator could not find info about the indicator	The stated facts and the person are not distinct.	The statement and the person can be recognized, but are not specific enough to be exactly identifiable.	The statement and the person can be exactly identified by a unique identifier.
2S	Authentic	When the evaluator could not find info about the indicator	The stated facts are not verifiable, traceable nor revocable, and limitable.	The stated facts are partly authentic by containing some of the following information: either verifiable or traceable or revocable or limitable in time	The stated facts are containing all information to be able to verify, trace, limit the statement in time and to revoke it.
3S	Accessible	When the evaluator could not find info about the indicator	The statement is not accessible. E.g. The statement cannot be understood.	The statement is partly accessible by using a rarely used language or complicated graphical format.	The statement is accessible by using widely used language and graphical format.
4S	Exchangeable	When the evaluator could not find info about the indicator	The statement is not exchangeable.	The statement is partly exchangeable by handling modular composition or conversion to other credential types.	The statement is exchangeable. It is modular and convertible to other formats.

	Indicators	Not able to classify	Not met	Partly met	Fully met
5S	Portable	When the evaluator could not find info about the indicator	The credential statement is not owned by the learner.	The statement is partly portable. It is owned by the learner, but portability needs the agreement of the issuer.	The credential statement is fully owned by the learner.

	Indicators	**Not able to classify**	**Not met**	**Partly met**	**Fully met**
	<mark>Medium</mark>				
1M	Distinct	When the evaluator could not find info about the indicator	The storage, display and metadata of the statement are not allowed.	The medium is partly distinct by allowing only some of the following elements: display, storage or related metadata. (example: display)	Medium is distinct. Statement display, storage and associated metadata are all allowed by the medium.
2M	Authentic	When the evaluator could not find info about the indicator	The medium is not authentic.	The medium is partly authentic by allowing only some of the following elements: allowing only one issuer, not allowing editing, storing verification information, or to display validity.	Medium is authentic. Allows only one issuer, does not allow editing, stores verification information, and displays validity.
3M	Accessible	When the evaluator could not find info about the indicator	The medium is not accessible. E.g. The medium is not widely used (industry standard), not open	The medium is partly accessible by using open or widely used (industry standard) format.	The medium is accessible by using widely used (industry standard) and open format.
4M	Exchangeable	When the evaluator could not find info about the indicator	The medium is not exchangeable.	The medium is partly exchangeable by allowing either relational links to other credentials or to be created out of other credentials.	The medium is exchangeable by allowing relational links between credentials and can be created out of other credentials.
5M	Portable	When the evaluator could not find info about the indicator	The medium is not portable. It is not possessed by the earner.	The medium is partly portable. It is either physically possessed on a chosen place or easily shareable.	The medium is portable by allowing physical possession and easy sharing by the earner.

The Credentials in Open Education report

describes a quality system for analysing the quality of credentials through a lens of ease-of-recognition and portability;

classifies different kinds of open credential according to a typology developed in the project; and

provides an easy-to-read label showing the quality of a credential at a glance providing initial quality-assessments for a number of commonly issued open credentials in Higher Education.

Read about the concept of the quality assurance of credentials, the framework and the collection of digital credentials and their analyses. The report follows the process of the developing of the classification system of the credentials, the test application and the resulting final typology, classification and the findings of the application of them.

Find an easy to read label system presented in Chapter 6, using the medal type graphical representation of a spider diagram.