A7.5, O1: Mapping of technologies to facilitate Micro-credential exchange Classification of micro-credentialing technologies

A7.5, O2: Piloting handbook (process and tools)

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Abstract

The objective of this report is to set the guidelines for ECIU University's piloting plan for issuing and managing Micro-credentials in a learner's digital storage solution, that is from hereafter referred to as the Learner's Wallet. The term may change during the project pilot activities. The piloting plan follows the conceptual framing presented in D4.2 conceptual framework for micro-credentials.

The piloting process is prepared due to availability of existing solutions to facilitate micro-credentials. Our initial analysis has shown that none of the solutions match the demand and vision of the ECIU Learner's Wallet. This is why a piloting plan is prepared to evaluate existing solutions on their feasibility (costs and practicality of proposed solutions). The potential initial solutions are firstly undergoing Walkthrough pilots with the developer organizations to make sure their fit for the ECIU University Learner's Wallet. The live piloting of the existing initial solutions are referred to as Alpha solutions. This initial piloting step that takes mostly place with learners in selected partner institutions leads to a better understanding of the strengths and weaknesses of the proposed solutions. The most promising solution or solutions will be customized during the ECIU University project to fit the vision of Learner's Wallet. The customized solution is referred to as Beta solution. Beta solution or solutions will undergo wider piloting activities with more involved partners and international collaboration.

The report is structured as follows. An overview of the existing solutions for managing Micro-credentials will be presented along with other supporting solutions. Then, an overview of the piloting process and the different types of pilots that will be conducted for the purpose of managing Micro-credentials are demonstrated. Finally, the piloting methods, tools and plan are presented in detail. This piloting plan is subject to change along the process according to new insights and lessons learnt.

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Symbols, abbreviations and acronyms

AAU	Aalborg University, Denmark
DCU	Dublin City University, Ireland
EC	European Commission
ECIU	European Consortium of Innovative Universities
KTU	Kaunas University of Technology, Lithuania
LiU	Linköping University, Sweden
TAU	Tampereen Korkeakoulusäätiö sr, Finland
TUHH	Hamburg University of Technology, Germany
UA	Universidade de Aveiro, Portugal
UAB	Universitat Autonoma de Barcelona, Spain
UiS	University of Stavanger, Norway
UNITN	Universita degli Studi di Trento, Italy
UT	University of Twente, Netherlands
OBI	Open Badges Infrastructure
API	Application Programming Interface
CSV	Comma Separated Value
PNG	Portable Network Graphics
SVG	Scalable Vector Graphics
UI	User Interface
NZQA	New Zealand Qualifications Authority
NEA	National Education Association

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1 Introduction

In order to make the ECIU University's vision for recognition and management of Micro-credentials through the Learner's Wallet (described in D4.2), a piloting process is essential. A pilot study can be described as a small study to test existing or newly solutions (such as technical solutions to capture micro-credentials), research protocols, data collection instruments, sample recruitment strategies, and other research techniques in preparation for a larger study or implementation. A pilot study is a critical stage to rapidly test potential solution(s) to identify potential problem areas and deficiencies that may limit larger implementations (Zailinawati, et al., 2006). It can also help partners to become familiar with the proposed concept in practice and can help decide between the potential available technologies and solutions for the Learner's Wallet. The piloting process can help achieve ECIU University's vision for managing micro-credentials (WP4) with an optimal use of resources. The ECIU University uses the term **micro-credential** to refer to "*certification of learning that can accumulate into a larger credential or degree, be part of a portfolio that demonstrates individuals' proof of learning or have a value in itself*".

The objective of the Micro-Credential piloting process is to follow up on the key requirements for the Learner's Wallet identified in the conceptual framework in WP4. The ECIU University uses the term micro-credential to refer to "certification of learning that can accumulate into a larger credential or degree, be part of a portfolio that demonstrates individuals' proof of learning or have a value in itself".

Next, we remind the concept of Learner's Wallet from D4.2.

1.1 What is the Learner's Wallet?

The ECIU University Learner's Wallet is a digital certification tool and a digital wallet that documents learner's proof of learning. It brings the learner to the center and allows them to take ownership of their micro-credentials.

Note. the term Learner's Wallet is only indicative to the conceptual approach for managing micro-credentials and may change during the project pilots based on the feedback of key stakeholders.

The Learner's Wallet displays various information about the micro-modules and challenges achieved along with the achievement related to such learning, e.g., the competences that were acquired in the process. This enables a credible, relevant and transparent method to proof the skills of learners of the ECIU University. The Learner's Wallet is an essential element of the ECIU University and its vision to adopt a challenge-based education system. The Learner's Wallet aims at complementing and even replacing traditional certification tools adopted in degree-based education systems. It acts as a credible proof of skill tool for learners, allowing them to demonstrate their verified (and potentially non-verified) competences to potential employers. This leads to many new opportunities (Crow, 2016) and is foreseen to affect societies positively. Figure (1) shows a snapshot of the conceptual vision of information that could be stored in a Learner's Wallet.

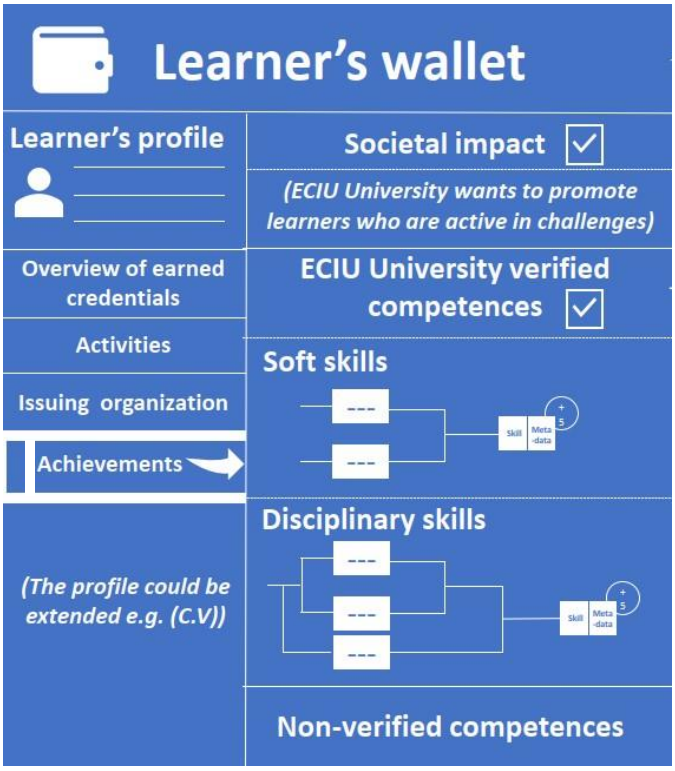

Figure 1 A conceptual ECIU University Learner's Wallet

The Wallet is essentially owned by the learner. It contains information about the learner and stores proof-of-learning for the learning they have achieved in formal and non-formal settings. ECIU University promotes a verified approach to capture the competences achieved by partaking in ECIU challenges and micro-modules. Thus, the wallet displays information that is essential to the proof of learning, including information about the issuing organizations. The figure below displays how the Learner's Wallet aligns with the overall vision of ECIU University.

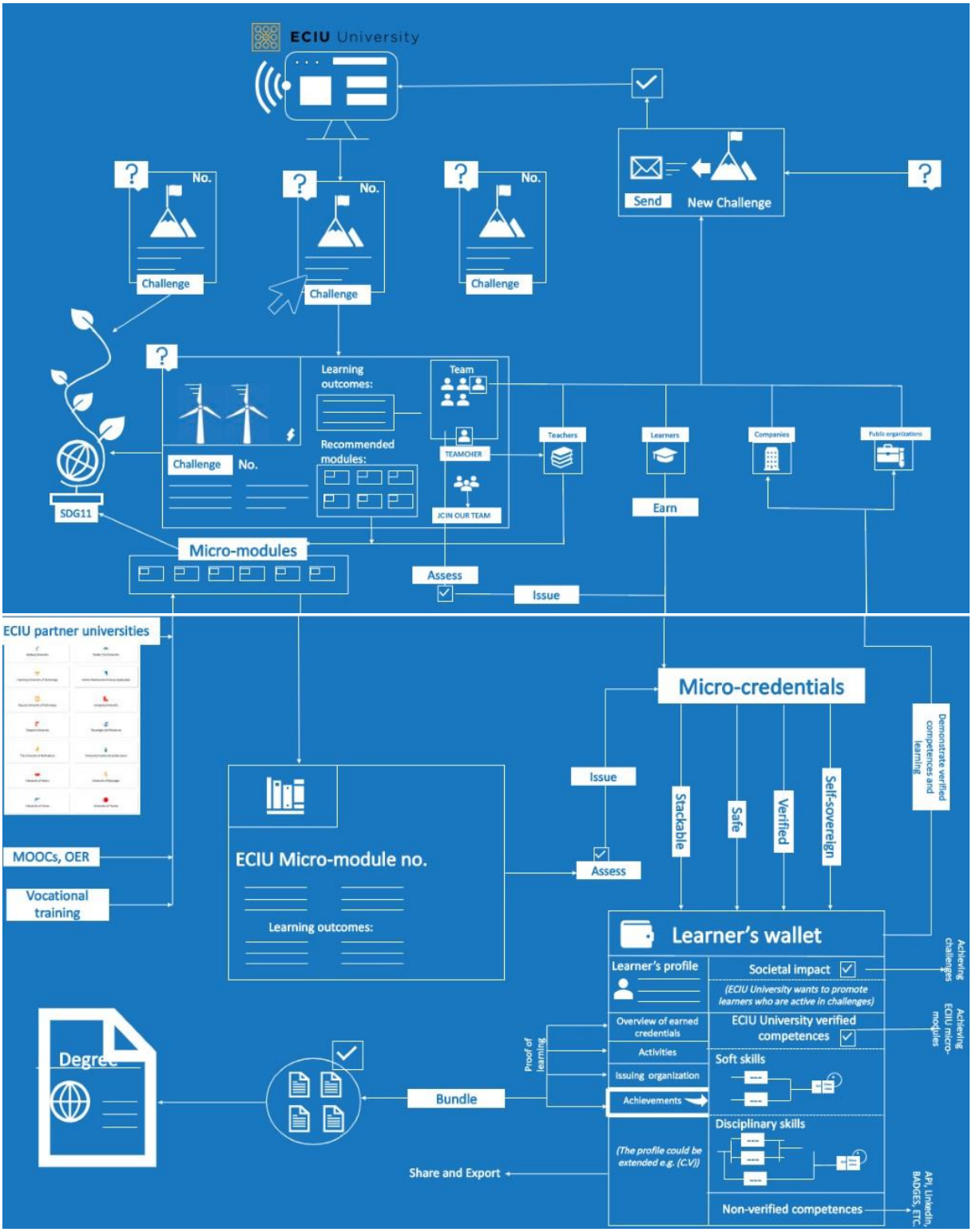

Figure 2 Initial concept on how Micro-credentials are earned and stored in the wallet

As can be seen from the initial concept, learners earn micro-credentials (stored in Learner's Wallet) by successfully completing ECIU University challenges (offered by private and public stakeholders or learners themselves) and / or ECIU micro-modules (offered by ECIU University partners or external partners such as MOOC providers). For a full overview and initial requirements, please see D7.5 piloting handbook

1.2 **Overview of the piloting plan**

Multiple piloting types will be presented in this report. The different types of pilots will be conducted by ECIU University's partners in collaboration with external providers of existing Micro-Credential solutions. We foresee a continuous validation of the developed solutions with ECIU platform users, that is, teachers and learners from partnering universities.

Considering that ECIU University is a pilot project and the fact that developing technology is highly expensive, we foresee that the a fully customized Micro-Credential solution that exchanges information from existing databases of partner universities is not feasible. However, piloting different customized technologies related to managing and storing Micro-credentials will enable ECIU University to understand the type of solution that fits to the need of the learners, providing opportunities to carry on the development and promoting continued use.

The initial requirements of the technology are drawn from conceptual framework D4.2 and potential available technologies are selected for piloting depending on their fit with this initial conceptual framing. Our initial consultations and research show that many of the proposed solutions can be customized for ECIU University purposes, and more solutions can be added at different stages of piloting. The timeline of the piloting process as well as the methodology of piloting are later demonstrated in this report.

The piloting process aims to conclude on a validated ECIU University Learner's Wallet for managing and storing Micro-credentials according to the ECIU University vision.

2 Digital solution platforms

2.1 Potential technologies to manage Micro-credentials

This section presents the existing technologies we have identified that could be potentially used to manage Micro-credentials in ECIU University. For each solution, background information concerning the system provider is presented as well as a more detailed description of the solution, its features, the opportunities it presents as well as its limitations. In order to make accurate informed decisions at this stage concerning which platforms are more suitable for the walkthrough pilots, it is essential to have in mind the initial requirements of the 'Learner's Wallet'.

We identified initially 8 promising technologies to manage Micro-credentials that are presented below. Namely, Badgr, Credentify, Cimea, Open Badge Factory, Europass EDCI, Badge factory, Badge collect and Accredible.

Many of them are related to using badges to represent learner's achievements while none fit exactly to the vision of the Learner's Wallet. Next, we give a short overview of each solution.

2.1.1 Badgr

Badgr is Concentric Sky and Mozilla's new proprietary software designed to give learners and institutions the means to earn, create and strengthen a digital badge and transversal competency culture. It replaced Mozilla's Backpack, since its developers felt it didn't cater to the needs of possible issuers, which are a core part of the Open Badge Initiative. Badgr is a complex platform that, thanks to its .Api integrated functionality, can weave into any platform that a badging institution may be using, making it a very flexible and complete tool for digital badges. Furthermore, there exists a PRO version better suited for institutional use. Badgr have a free version that involves all the basic features needed for a badging ecosystem, and a Pro version that have more advanced features such as bulk awarding badges, learning pathways, white labels and claim codes. The pro version requires contacting their sales team and providing a request for quote.

Badgr features:

- Badgr can be installed in five minutes and can be easily configured
- Badges can be awarded automatically for module completion in Canvas Courses
- Portable and verifiable badges compatible with Open Badges Specification
- Free badge hosting on Badgr's cloud infrastructure
- Students don't need a Badgr account
- Learners share badges to social media services
- Gamify courses with a privacy-protecting leaderboard
- Real-time view of course progress for teachers and students
- Student profile page showing badges earned across all Canvas courses
- CSV course progress export
- Student opt-in to receive badges (optionally enabled)
- See externally awarded badges in Canvas courses
- Course analytics for teachers

- Account analytics for administrators
- Data storage options outside the U.S.A
- GDPR compliant

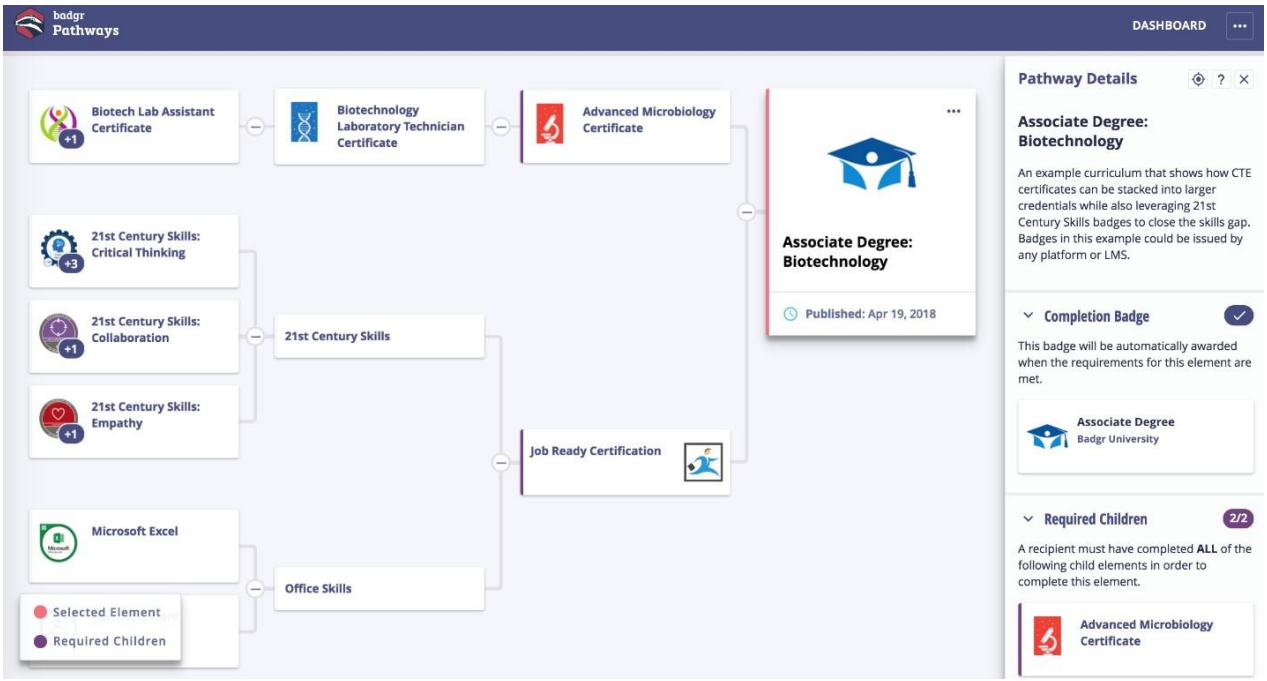

Figure 3 Badgr's Pathway feature

Figure (1) presents Badgr's pathway feature, which allows the stackability of competences into larger qualifications. In this example, in order to acquire the '21st Century Skills' badge, learners have to acquire three badges first: critical thinking, collaboration and empathy. While the 'Office Skills' badge requires the acquisition of the 'Microsoft Excel' and the 'Microsoft Word' badge. Acquiring the 'Office skills' and the '21st Century Skills' badges leads to a larger qualification which is the 'Job Ready Qualification' badge. This feature provides an ideal answer to the stackability requirements for ECIU University's 'Learners' wallet'. Badgr's pathway feature can be used for both disciplinary and soft skills.

Opportunities Badgr presents:

- A robust and complex platform, with several functionalities
- Adaptable to various contexts
- A PRO version is available for institutions, though it needs a compatible LMS system to work
- Pathways: allow us to display our badges in an academic roadmap, thus contextualizing a badge's value as a mean to an end-goal for the earner (or other users)
- Allows for attribution of badges in bulk by uploading .CSV sheets or email lists
- Allows for integration via .API

Limitations of Badgr:

- There does not exist a stand-alone app for the platform, unless it is developed by an external party and then having Badgr's .API integrated within it
- A functionality for statistical data export exists only within the PRO version
- There is no evidence submission function
- The application's stability has not been tested yet

2.1.2 **Credentify/MicroHE**

Credentify is a decentralized micro-credentials clearinghouse powered by a blockchain network across European universities allowing safe transfer of millions of micro-credentials as smaller units summing up into ECTS credits. This empowers European students, educational workers and universities across Europe to make the accreditation of their traditional learning experience fast, dynamic, safe, reliable, transparent and accountable. Credentify is an open source and free to use platform.

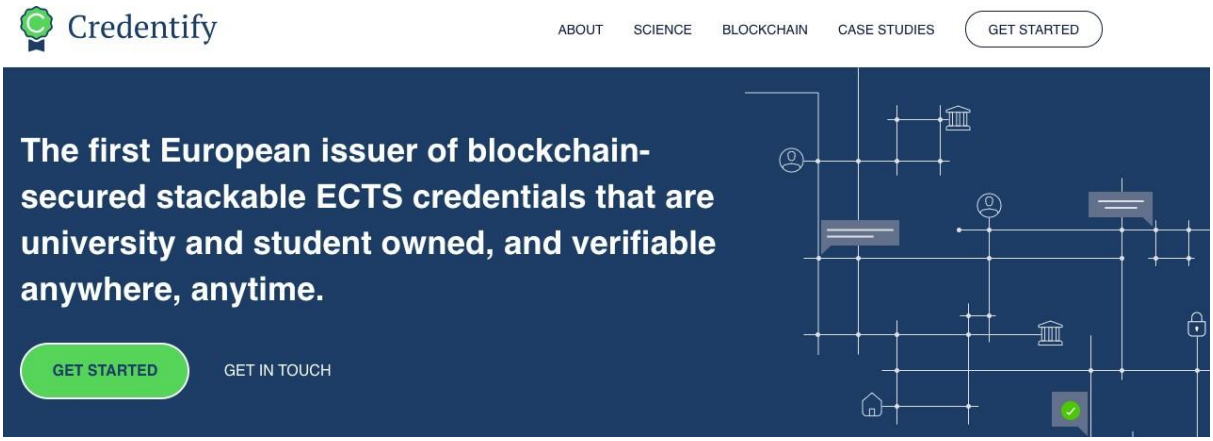

Figure 4 Snapshot of Credentify's front page

Credentify ensures that micro-credentials are certified and mapped to European qualifications frameworks and can scale into other forms of Higher Education. Credentify therefore empowers students and universities with equitable knowledge accreditation by allowing it to be fairer and more flexible in its delivery. Credentify is built on native European technologies, extensive policy and research analysis and is integrated with ESCO to maximize impact in the European Education Area and Digital Single Market.

Credentify features:

Credentify is an API service in the cloud that enables universities and students to issue and receive micro-credentials that can be stacked into ECTS. It is already integrated into an open education video platform and piloted by four European universities to create new educational experiences. It is based on blockchain technologies and offers tools for developers and researchers. Credentify is the first European free and open credentials service to use European blockchain conventions for educational content, which immensely improves transfer and transparency of credentials.

2.1.3 **CIMEA/DiploMe**

CIMEA – Information Centre on Academic Mobility and Equivalence has performed since 1984 its specific activity of information and advising on the procedures of qualifications recognition and on themes linked to Italian and international higher education and training. CIMEA's project DiploMe is a blockchain-based open system dedicated for recognition of qualifications. DiploMe is free to use. CIMEA is more involved in the conversation around Micro-credentials and are targeting to make DiploMe a platform that recognizes learners' skills and competences.

DiploMe features:

1- Their certification system (DiploMe) is a blockchain-based open system (not proprietary)

2- The system is free for users (learners) and they are opened to provide the ECIU with free admin accounts for the piloting phase

3-Transparent and keen on collaborating with the ECIU since they are now more involved in the conversation around micro-credentials

4-For the piloting phase, they can give a template as a back office to enter the meta-data needed (They also have their own meta-data ontology for qualifications)

5-GDPR compliant, they do not use users' data at all

6-Their competence section is still under development

8- A blockchain-based verification system (when a learner shares their qualification to someone, that person receives keys to verify the authenticity of the qualification)

9-Customization is available for the piloting phase

10-They are also involved with MicroHE and other projects concerned with Micro-credentials

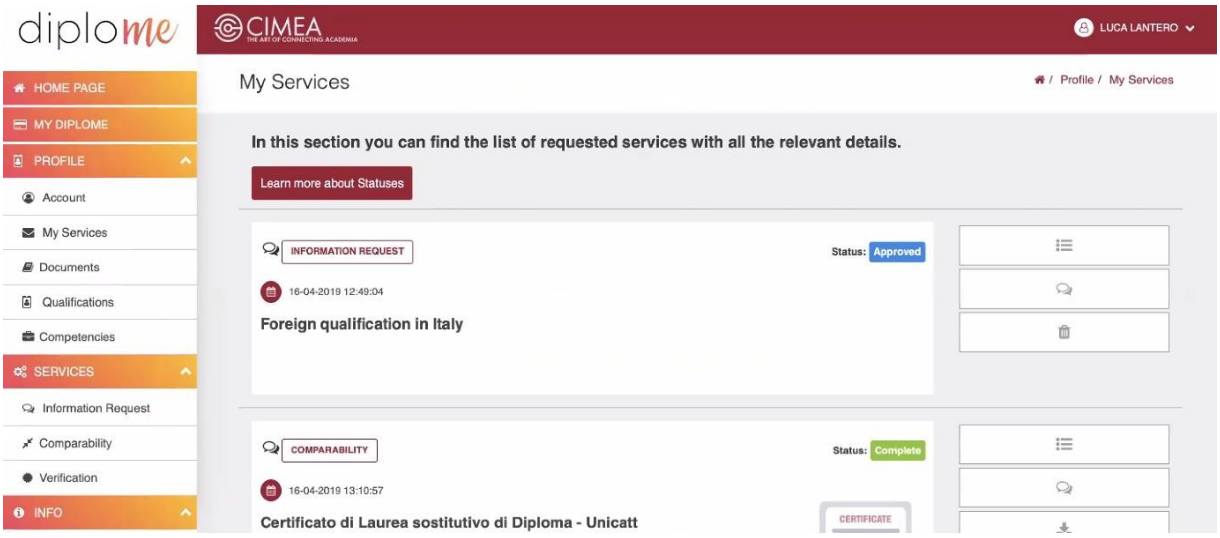

Figure 5 A snapshot of DiploMe's wallet

2.1.4 Open Badge Factory

Open Badge Factory (later OBF) is a proprietary platform that organisations can use to create, issue and manage Open Badges. Badges created with OBF align with the newest version of the Open Badge standard (version 2.0) and OBF will conform to the version 2.1 (version 2.0 + badge connect) when it will be officially released during this spring. OBF is a cloud service. This means that users can create, issue and manage their badges online without having to install and host the platform. OBF is hosted in Finland and is fully GDPR compliant. Open Badge Factory have four models: free, basic, premium and pro. The free version is very limited, mainly targeted to have an overview of the platform. The basic version has more extended features such unlimited user accounts, multilingual badges and endorsements and costs 200 Euros per year. The premium version enables badge sharing, milestone

badges, different user roles and sub-organizations for 680 Euros per year plus an additional 200 Euros for each sub-organization. The pro version includes all the features of Open Badge Factory and it costs 1260 Euros per year. All the prices mentioned are not including any taxes. Open Badge Factory's platform can be customized for additional fees.

As a European service provider with a large user community in EU, OBF has developed features which support European customers' needs:

- ESCO, the multilingual classification of European Skills, Competences, Qualifications and Occupations framework has been integrated to OBF. This means that a badge creator can browse ESCO classification and set up in their badges alignments (pointers) to ESCO competences and their definitions. This feature connects badges and employability.

- OBF is the only badge platform which can create multilingual badges. This feature is important in a European context. OBF user interface has been translated into several languages (English, French, Spanish, Finnish, German, …) and new languages can be easily added.

OBF has been designed to support collaboration between badge creator organisations and to enable the creation of badge ecosystems, which will serve large badge earner communities. Here some important features:

- Organisations using OBF can partner and share their badges. This means that a badge created by organisation A can be issued by organisation B and C.

- Organisations can endorse each other and each other's badges.

- At PRO level an OBF account can contain sub-organisations. This means that a consortium or network can operate under the same account, but common badges can be issued with different organisation identities.

Other features of OBF:

- Possibility to issue badges as "normal" badges (metadata baked in a PNG or SVG picture) and at the same time as PDF badges. PDF badges are standard badges (that can be validated, and it is possible to check that the PDF has not been modified) but the advantage of the PDF badge is that it is really portable and can be used without a displayer (backpack or Passport). The PDF badge becomes a "normal" badge when it is uploaded into Open Badge Passport.

- In OBF it is possible to set up badge applications. A badge application is a badge with a questionnaire that is set up by the badge creator to capture evidence from a badge earner. Badge application can be displayed with a link or embed code anywhere (website, intranet, portfolio etc.) It is a powerful tool for recognizing prior learning. Badges earned by applications have a better acceptance (80% - 95%) rate than badges "pushed" by badge creators after a course or completion of another activity.

- In OBF it is possible to set up milestone badges meaning badge pathways. When the badges required in a milestone badge are earned, the milestone badge is issued.

- BRS (Badge Record Store) is a proxy server, which enables you to store badge assertions in your own server. The main advantage of the BRS is that a customer can have full control of his badges and his badges stay "live" even if the customer ceases to use OBF. A university network can have a common BRS.

- OBF provides an open API that can be used by customers to develop their own badge issuing plugins, for example, for their Learning Management Systems. OBF has some readymade plugins (for example for Moodle) and supports LTI (Learning Tools Interoperability)

Open Badge Passport feature:

Open Badge Passport (OBP) is an open source platform developed by Open Badge Factory. Open Badge Passport is much more than a badge repository (backpack) . It is a social platform where badge earners can receive, share and manage their badges. In OBP a badge earner can request other users to endorse his badges. A user can also "enrich" his badges, meaning that he can add additional evidence to a previously earned badge. Open Badge Factory can set up dedicated (white-labelled) passports for big organisations or customer networks. The advantage of a dedicated passport is that it supports a community in a clearly defined context.

2.1.5 **EuroPass EDCI**

Europass is currently working on a technical infrastructure that organisations can use to issue digital credentials across the EU. This technical infrastructure could be used by the Member States and various stakeholders when issuing Europass Digital Credential to learners. IT systems of awarding bodies, for example, could implement this infrastructure to create diplomas and certificates for students. Europass Digital Credentials Infrastructure provides a secure, trustworthy and fraud-resistant system that ensures data privacy and data protection. Europass' platform is an open source and free to use solution.

A common technical approach for issuing Europass Digital Credentials ensures that certificates from one Member State can be understood and verified in any other. Learners Employers, education and training providers and other bodies will be able to check that certificates and other qualifications are valid and authentic. They can also have easy access to background information on a certificate or qualification.

The new Europass will offer tools and information for learners, workers and jobseekers across the EU to manage their careers and studies. The new Europass will include:

- the Europass e-Portfolio: an online tool for users to describe their skills, find interesting job and learning opportunities, to manage their applications, and create CVs and cover letters
- Information on working and studying in different EU countries
- Digital credentials: free tools and software for institutions to issue digital, tamper-proof qualifications and other learning credentials
- Interoperability: Europass can connect with employment and learning services to allow users connect and make applications.

Europass supports understanding of skills and qualifications to help people manage each stage of their career and learning.

The new Europass will:

- Offer tools and information for stakeholders, service providers and practitioners from the labour market and education and training systems.
- Be a secure, accessible and user-friendly platform offered by the European Union.

- Be interoperable for any organisation that wishes to exchange data with Europass, while fully respecting data privacy.
- Be developed through cooperation between the European Commission and EU Member States, participating countries, and stakeholders.

EDCI (Europass digital credentials infrastructure) facilitates the issuing, viewing and automatic verification of credentials. These functions will benefit a wide range of stakeholders, including individuals, universities, vocational training providers and employers. The infrastructure can ensure:

- a common understanding of qualifications and types of certifications across and beyond the European Union;
- that qualifications, competences and skills can be easily identified and understood by any EU Member State.

The infrastructure can also:

- Improve transparency and portability of qualifications and skills between countries;
- Reduce administrative burden for citizens, learning providers and employers;
- Make tampering and credential-fraud easily identifiable;
- Empower people to own and control their own credentials; and
- Contribute towards digitisation of government processes.

Issuers can:

- Identify the individual who is going to be awarded a certificate documenting her/his skills, competences or qualifications;
- Issue a Europass Digital Credential or a revocation certificate to an individual. Both certificates should be issued by an awarding body;

Graduates and learners that receive credentials can:

- Store and organise their digital credentials in their Europass library, e-Portfolio or other platforms and wallets;
- Share their Europass Digital Credentials with employers or other organisations. Owners will control what they share (e.g. whether they will send a web link or send information directly) and for how long (e.g. they can determine how long the web link stays active).

Employers can:

- Verify the authenticity of digital credentials that holders willingly shared. The accreditation of the awarding body could also be verified (i.e. if an awarding body is licensed or authorised to issue a specific qualification), where applicable.

2.1.6 **Badge factor**

BadgeFactor is an open source WordPress plugin allowing the implementation of a system of digital badges that combines several features of BadgeOS, BuddyPress, Gravity Forms and Advanced Custom Fields in a coherent and autonomous way.

a. For administrators, the dashboard allows:

- Configuration of the Badge Factor extension
- Significant url creation (yoursite.com/members/name)
- Management of user roles and access levels
- Organization Management
- Custom statistics report
- All options in the Trainer role

b. For trainers, the dashboard allows:

- Creation and management of learners (individual registration, group)
- Creation of digital badges (title, description, criteria, image, duration, issuing body, endorser)
- Creation of a personalized form for the request of a badge (Gravity Form plugin)
  Creation of proof in a PDF attached to the digital badge
- Award of badges by submission and appointment
- Personalized statistics of badges and users (report)

c. For learners, the badge portfolio allows:

- Creating and editing a learner's portfolio (image, biography, custom fields) (BuddyPress plugin)
- Storage and display of badges, classification by category
- Badge sharing options (social media, printing, integration, PDF certificate)

2.1.7 **Badge Collect**

BadgeCollect is a platform for micro credentialing that conforms with the open badges standard which is already in use. Several organizations and projects are making use of the platform.

BadgeCollect is a platform for lifelong learning implementing the Open Badges standard in a modern and complete UI. The platform is in use at several High Schools and (Applied) Universities in the Netherlands, as well as at several companies and commercial educators.

The blockchain is permissioned for 'writes' and public for everyone to become a node (read / copy).

2.1.8 **Accredible**

Accredible is a proprietary digital badge issuer that help design, create and manage open badges.

Features of Accredible include:

The ECIU University

Creation and Branding

- Certificate Designer
- Badge Designer
- Email Templates
- Domain White-labelling
- Customize Recipient Features
- Social Media White-labelling

Credential Management

- Edit or Update
- Revoke Credentials
- Automatic Expiration
- Certification Renewal
- Program Stackable Credentials
- Dynamic Design Data
- Automated Typo Correction
- Multi-language Support
- Single Sign on

Sharing

- 1-Click Sharing
- Export to PDF
- Embed in Email Signatures
- Embeddable on Websites
- HQ Print PDF
- Job Market Insights

Analytics

- Social Media Analytics
- Engagement and Views
- Referral Traffic
- Events Logging
- Analytics Export
- Audit Log
- Usage Summary

Automation

- LMS Plugins
- Integrations
- Spreadsheet Upload
- API Access

Security

- Bank-level Credential Encryption
- Blockchain Security

- Export Your Data
- Data Privacy & GDPR

Accredible provides four plans with yearly costs ranging from 960 Euros to 7680 Euros, in addition to other services and features that require a separate payment.

2.2 Potential supporting initiatives

Our research and consultation showed many interesting ongoing initiatives for unbundling higher education and focus on micro-credentials. Some of the initiatives provide technologies that relate to promoting learner's competence development. Although these solutions might not fit the concept of Learner's Wallet exactly, ECIU University will seek collaboration with such solutions to understand how to, for example, represent and capture learner's skills and competences in the best possible way.

The following list will be updated during the piloting activities if necessary.

2.3.1 HeadAI

HeadAI is Finnish technology company that uses big data for forecasting the future need of skills at job markets, driving educational offering to match better with job market needs and lead educational organizations with up-to-date information. They have 2 solutions that align with the ECIU University's overall vision, Microcompetencies and Fast Degree.

The Microcompetencies service models the demand for skills into skills maps. Since the world and the job market change radically, it's difficult to know which skills are needed in the future. HeadAI harnesses an artificial intelligence to find out. HeadAI compiles maps of regions, cities and organizations and compare them to one another. The maps show in real time which skills are in most demand and where they are needed. Fast Degree is an APP where HeadAI creates the courses, teaches the topics but also does the evaluation. Testing comes first and learners study only the relevant topics. The app helps in revealing the true skill set learners possess and supporting continuous learning with open material collected by HeadAI's AI. HeadAI collaborated with 3AMK (Helsinki) for educational planning using Microcometencies.

2.3.2 Bazaar

Bazaar is a community and a platform, to support co-creation and continuous learning. Bazaar concept integrates the alumni to the university community, enables more streamlined and automated matchmaking to build competence, to take on challenges, to create new business opportunities, to co-create and to co-innovate. Bazaar also enables enriching the learning offering through enabling 3rd parties to offer their competence as trusted members of the Bazaar-community.

The platform includes the following features:

- Alumni Session and Collaboration Pass
- Matchmaking tool
- Marketplace

This solution is in the first stage of development and will be built one block at a time. First, Bazaar will complete the proof of concept, then, create a minimum viable product. This is an agile and iterative design process that includes much testing, validation, and engagement of key stakeholders.

2.3.3 KTU Digital badges

Kaunas Technical University have launched their own digital badges program using the 'Badge Craft' platform which is a platform for managing and issuing digital badges. The badges are a visual record of learners' experience and achievements. Learners' achievements can be shared on social media and professional networks. Learners can be awarded two types of certificates, a certificate of participation in the program that reflects the learner's participation in the activities of a particular project and a certificate of participation according to the type of activity where the learner can choose particular activities currently relevant to them and receive a certificate with consistent representation of their participation in these activities.

Learners are awarded a portfolio of competences which is a summary of their activities provided according to 7 types of activities: volunteering; additional and volunteer internship; membership of KTU organisation; additional education (learning) at KTU; research activities; transfer of knowledge and experience; achievements at the Olympiads and competitions and contests. A portfolio reflects the learner's participation in various activities.

2.3.4 HFDcert

HFDcert is an initiative lead by Hochschulforum Digitalisierung (HFD) in Germany. With HFDcert it is possible to have activities and skills in the field of digital teaching and learning recognised by the community and documented in an online portfolio. The HFDcert enables above all the recognition of informally and self-taught skills. Through a peer review process, all submissions are checked by the community before they can be transferred to the participant's own online portfolio.

Participants can download the HFDcert (badge) as a PDF or add their badge to professional profile pages and make their achievements visible.

2.3.5 Digital Credentials Consortium

The digital credentials consortium was founded in 2018 by leading universities (TU Delft, MIT, Harvard University, McMaster University, UC Berkley, UC Irvine, University of Milano-Bicocca, University of Toronto, Tecnologico de Monterrey, TU Munich and Georgia Tech) with expertise in the design of verifiable digital credentials. The main objective of the consortium is to design an infrastructure that will become the standard for issuing, storing, displaying and verifying academic credentials digitally. Building on earlier efforts by the participating institutions, the consortium is now focused on the design and governance of a technology infrastructure for academic credentials – transforming credentials into tokens of social and human capital that can create new opportunities for participation in education and industry. The consortium is currently working on developing a white paper for the technology.

The technology is envisioned to enable learners to maintain a compelling and verifiable record of their lifelong learning achievements to share with employers, receive their digital credentials digitally and safely, have ownership of their credentials without requesting or paying for their transcripts and it will enable them to compile their credentials they received from multiple institutions in one place.

While the digital verifiable credentials will enable institutions to store and distribute learners' records in a way that is safe, easy and inexpensive, remove the risk of fraud and issue multiple credentials to a single learner using a streamed process.

2.3.6 Colorado Community College System Digital Badges Initiative

The Colorado Community College System (CCCS) has taken an approach to align digital badges to skills and competencies that are essential for employees in different fields. CCCS deployed an early pilot to recognize 17 different competencies the students gained in an applied mathematics course. Through the pilot, local manufactures gained insight into the discrete, workforce-relevant skills of CCCS graduates. Eventually the digital badges initiative has led to badge earners who can show what they can do through a digital badge. In addition, the employers are better able to recognize their employees' skills and strengths, when they complete courses in CCCS and receive relevant badges.

2.3.7 Micro-credentialing initiative at University of Melbourne

The University of Melbourne is exploring the emerging use of micro-credentials as a means of certifying attainment of smaller and more specific elements of learning than are attested to by a degree. Assessment for micro-credentials is an area the University is exploring. The development of robust, scalable and innovative approaches including new technologies will be crucial to supporting the validity and community's acceptance and uptake of micro-credentials.

The University is developing a coherent strategy for micro-credentialing learning, that responds directly to the needs of professions and the wider community and addresses the emergent challenges to the utility of and trust in the traditional degree. Micro-credentials may stimulate a range of changes to university policies and practices, designed to build trust about what students know and can do.

The initiative is considering Micro-credentialing as a legitimate means of evidencing not only learning or competence credited by other institutions, but also that attained in the workplace or in other forms of informal learning. The initiative is also looking at Micro-credentials as a solution that will enable learners to flexible education through stacked credentials and they can build their micro-credentials into a larger, and more recognisable, aggregated award. The University of Melbourne is also aware of the role of Micro-credentials for recognizing different types of skills since micro-credentials focus on small, discreet components of learning, they are particularly useful in providing the evidentiary base for graduate attributes typically not referenced in degree transcripts. These attributes include so-called soft skills, specific specialist professional skills and competencies, and metacognitive skills.

2.3.8 New Zealand Qualifications Authority pilots

The ''New Zealand Qualifications Authority (NZQA)'' undertook micro-credential pilot projects with three organisations from 1 August 2017 to 30 June 2018. These pilots enabled NZQA to better understand the role micro-credentials could play in New Zealand's education, training and qualification system of the future. Micro-credentials recognise the achievement of a defined set of skills and knowledge. The component of learning undertaken is validated in a micro credential and is important (not simply as a steppingstone to any subsequent qualification).

These pilots are a steppingstone to NZQA developing a full micro-credential system, so that employers and learners can access the skills they need throughout their lifetime. The three organizations involved

in the pilots are: Udacity, Otago Polytechnic and Young Enterprise Scheme. In the transportation sector, Udacity have worked with Mercedes Benz, BMW, NVIDIA, McLaren Applied Technologies and other global automotive industry leaders to identify the skills they need to support transportation in a digital world. These companies have recognised the Udacity Nanodegree programme as a credential for hiring students ready to join the workforce.

The Self-Driving Car Engineer Nanodegree programme covers deep learning, computer vision, sensor fusion, controllers, and related automotive hardware skills and takes nine months of part time study. Udacity's Self-Driving Car Engineer Nanodegree is a micro-credential that was assessed by the NZQA for the purposes of the pilot as equivalent to a 60-credit package of learning at Level 9 (Masters Level) on the New Zealand Qualifications Framework.

2.3.9 Digital Promise

The ‘’National Education Association (NEA)’’ launched its micro-credential work in the fall of 2017 and has worked in partnership with Digital Promise to develop more than 150 modules and create a platform for its members in state and local affiliates to be recognized for formal and informal learning. According to Digital Promise Micro-credentials are digital certifications that verify an individual’s competence in a specific skill or set of skills.

Micro-credentials put learners in the driver’s seat of their professional learning. By selecting micro-credentials that are aligned to their personal goals, needs, or school-wide priorities, learners can personalize their professional learning, earning recognition for the skills they develop throughout their career.

Digital Promise works with schools and districts to implement and build incentive structures for micro-credentials. Micro-credentials in Digital Promise’s perspective can be aligned with school and district priorities to support professional learning structures and to evaluate the impact of professional learning to gain insight into whether state/district goals are being met. Digital Promise has expanded its work on competency-based professional learning beyond the field of education to advocate for the use of micro-credentials across workforce development. Digital Promise works with employers to help identify gaps in learning opportunities and skills, design systems to recognize employees for their skills, and develop competency-based career pathways.

3 Piloting process and method

3.1 Overview

The aim of piloting process is to validate ECIU University’s Micro-credentials solution. The potential technologies for facilitating Micro-credential exchange and management are firstly adjusted for the initial pilots and tested across partner institutions. Then the piloted solutions are refined based on a validation process and technology development efforts for the large-scale pilots. The potential technologies that were presented above are prioritized for further collaboration and piloting. There are 3 types of pilots that will be conducted across the timeline of the project: walkthrough pilots, initial pilots and large-scale pilots.

The ECIU University wants to promote learning in all forms, which is why the Learner’s Wallet is aimed at any learner. We foresee that learners include at least the following:

- Students from ECIU University partner organizations

- Lifelong learners from different parts of the world
- Teachers who are engaging in further learning opportunities
- Researchers who want to make a societal impact and partake in ECIU University challenges
- Employees of ECIU industry and public partners who are looking to boost their portfolio by strengthening their competences and making a real societal impact

The piloting activities will target all of these potential end-users.

Methodology selection and Data collection

In general, one can differentiate between three groups of research methodological movements:

- Quantitative oriented research that is primarily interested in gathering, analysing, interpreting, and presenting numerical information/data
- Qualitative oriented research that is primarily interested in gathering, analysing, interpreting, and presenting narrative information/data
- Mixed-methods research that uses quantitative and qualitative approaches in types of questions, research methods, data collection and analysis procedures

Depending on the evaluation objective (e.g., technology acceptance) different evaluation methods are used which are summarized in the following table 1.

Table 1-Design evaluation methods

Design evaluation methods	
1. Observational	Case Study: Study artefact in depth in business environment
	Field Study: Monitor use of artefact in multiple projects
2. Analytical	Static Analysis: Examine structure of artefact for static qualities (e.g., complexity)
	Architecture Analysis: Study fit of artefact into technical information system (IS) architecture
	Optimization: Demonstrate inherent optimal properties of artefact or provide optimality bounds on artefact behaviour
	Dynamic Analysis: Study artefact in use for dynamic qualities (e.g., performance, acceptance)
3. Experimental	Controlled Experiment: Study artefact in controlled environment for qualities (e.g., usability)
	Simulation . Execute artefact with artificial data

4. Testing	Functional (Black Box) Testing: Execute artefact interfaces to discover failures and identify defects
	Structural (White Box) Testing: Perform coverage testing of some metric (e.g., execution paths) in the artefact implementation
5. Descriptive	Informed Argument: Use information from the knowledge base (e.g., relevant research) to build a convincing argument for the artefact's utility
	Scenarios: Construct detailed scenarios around the artefact to demonstrate its utility

However, qualitative oriented researchers use different approaches in collecting data than quantitative oriented researchers. Although qualitative and quantitative methods have advantages, researchers often claim that neither is inherently superior (Curall, et al., 1999). The dictum is that one's evaluation objective must determine the appropriate method. According to Curall et al. we have decided to interweave both techniques, following a mixed-method approach, whenever it is possible and reasonable in order to maximize the 'knowledge yield' (McCall & Bobko, 1990) of an evaluation endeavour. According to Cresswell's classification of research designs which combine quantitative and qualitative methods, the following three types can be differentiated (Cresswell, 1994):

- Two-phase design: Either a qualitative phase followed by a quantitative phase or vice versa. The assumptions of both paradigms are well described and separate. An example could be to use qualitative interviews to describe users' activities in searching for management related content and use those data to generate hypotheses about activities, usability, and user-specific processes. Quantitative survey data are then collected for hypothesis testing.
  Dominant-less dominant design: The study will be based largely on a single method with small components drawn from alternative methods. An example could be to use the brainstorm method for asking professors at a partner institution about a relevant topic at this time. The study relies on qualitative data, and yet it could be supplemented by quantitative survey data as well.
- Mixed-Method Design: This type denotes the greatest extent of combining methods. Aspects of quantitative and qualitative methods are used at all or many steps of the study. When selecting the appropriate data collection tool, it is of crucial meaning to take two main criteria into consideration which have a major impact on the quality of the collected data (Bortz & Döring, 2006)
- Reliability: Is the consistency of a set of measurements or measuring instrument and is often used to describe a test. There are several general classes of reliability estimates which can be used (e.g. inter-rater reliability, test-retest reliability, internal consistency reliability etc.)
- Validity: Extent to which a concept, conclusion or measurement is well-founded and corresponds accurately to the real world. There are different methods to test validity and which can be beneficially applied (e.g., criterion validity, construct validity, convergent validity etc.)

Design science research (DSR) is an approach that combines many of the above approaches in order to validate technical solution together with stakeholders who develop and use them. ECIU University adopts this approach for the piloting of micro-credential technologies.

The design science research (DSR) paradigm creates and evaluates solutions which enable researchers and practitioners to understand and address the problems inherent in developing and successfully implementing information systems (Hevner, et al., 2004). Hevner et al. (2004) established a set of guidelines for conducting and evaluating effective design science research. For the implementation within the project these steps have been adapted leading to five fundamental development process steps which include evaluation:

1. Definition of problem and objectives of the solution: The first phase is to understand the need for a solution and to derive the objectives of the technical solution. The outcome of this step should be a clear understanding of the problem, the kind of solution it requires and a first idea of how to solve these problems. A conceptual framework of the Learner's Wallet was presented in D4.2 which presents the foundation for the objectives of a solution.

2. Identification of relevant solutions: A number of technologies are selected for initial piloting in this report in light of the initial requirements of the Learner's Wallet. For the initial pilots, readymade solutions will be tested with minimal or zero customization. A customized solution will be used for the large-scale validation.

3. Demonstration and evaluation: Demonstrate that the technology solves the problem and how, what works well and what does not. This includes evaluation activities that are discussed in this report. The initial findings are demonstrated in M15 with an update of this report.

5. Deployment and continuous evaluation: The second stage of piloting is a large-scale phase in which customized solution(s) will be developed as a result of the evaluation of the initially piloted solutions. This activity also finds out how to deploy the Learner's Wallet solution in ECIU University (e.g., integration in existing processes and workflows of partner universities). The goal is to make customized Learner's Wallet accessible for all partners and stakeholders.

The piloting activities will be carried out by multiple partner universities, led by TAU as activity leads of WP7.5.

3.2 Approach for each pilot type

Different types of pilots will take place throughout the 3-year piloting period with the objective of refining existing platforms for managing and storing Micro-credentials and to achieve the ECIU University's vision for the Learner's Wallet. Here, we draw from Design Science Research and separate between pilots that are targeted for different stakeholders to gain a comprehensive validation of the learner's wallet's requirements. This will lay the foundation to continue adjusting the Learner's Wallet for future needs of the learners. Figure (6) is an adjustment of the DSR approach. It displays an overview of the ECIU University's approach to the different pilot types as well as the roles that each group of stakeholders play in the piloting process and their contributions.

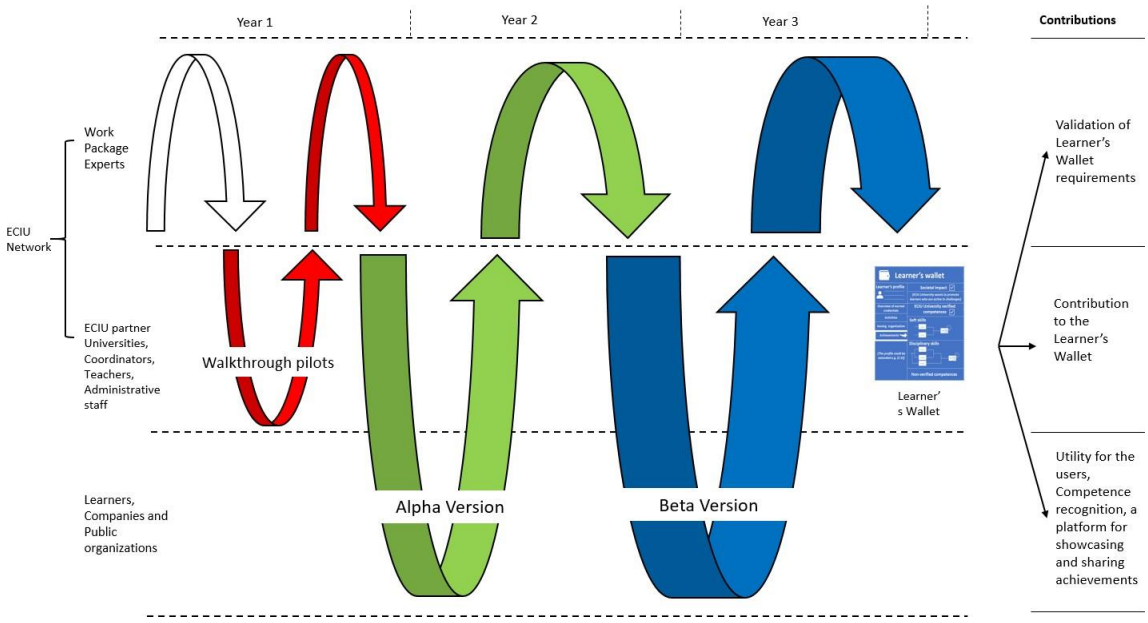

Figure 6 An overview of the ECIU University's approach to different pilot types

As the figure shows, there are 3 pilot types: walkthrough pilots, initial pilots (stage Alpha) and large-scale pilot (stage Beta); each is carried out by different groups of stakeholders. The piloting process begins with the work package experts mapping different technologies for managing and storing Micro-credentials and pin-pointing the ones that align with the vision for the Learner's Wallet.

*Small-scale **walkthrough pilots** seek to identify the most promising solutions for live pilots with learners in ECIU University challenges and micro-modules.*

> Walkthrough pilots are carried out mainly with the external providers of the potential technology solutions. This is to ensure the feasibility and compatibility of the identified solution for live pilots in ECIU University activities. The walkthrough pilots are ongoing from Month 7 to Month 36 of the project.

***The initial pilots (stage Alpha)** are pilots with learners in ECIU University challenges and micro-modules.*

> Alpha pilots include many key stakeholders and run from Month 8 to Month 15. Most partner universities are involved in the initial pilots (stage Alpha). The initial pilots take place with minimal or no customization to the piloted platforms. The pilots are validated by stakeholders and the key lessons will be used for decision making for proceeding to customizing the most promising solution(s) to the large-scale phase (Beta version).

***The large-scale pilots (stage Beta)** are pilots with learners and all key stakeholders in ECIU University challenges and micro-modules.*

> The large-scale pilots (stage Beta) include at least one customized solution that will run through all partner universities from Month 16 to Month 36. The large-scale pilots will include internal and external stakeholders as well. The key lessons from the large-scale pilots will be used for refining the platform and reaching a clear understanding of the requirements of the Learner's Wallet which will pave the way for full adoption of the platform by the ECIU University after making necessary adjustments.

The DSR method recommends validating the lessons learnt from the walkthrough, initial and large-scale pilots with semi-structured interviews that each partner carries out using the sample questions (described in section 4.1) provided. TAU and DCU will provide support for capturing key lessons learnt. The interviews will provide a more in-depth views to feasibility of each tested solution. We recommend (but do not force) that you audio-record the interview and summarize the highlights of each interview

in a Word document (if you can identify a striking quote from each interview and transcribe that word-for-word). Test your recording equipment before the interview to avoid any problems.

3.2.1 Walkthrough pilots

Walkthrough pilots are continuous pilots that go throughout the project from Month 7 to Month 36 when identifying new potential and promising technologies. We will try out different systems together with the organizations that develop those solutions by running through a real-life scenario but potentially with mock-up and example data.

Stakeholders involved

Walkthrough pilots can be organized with developers of the externally provided solution and even without the involvement of end-users if the feasibility of the solution for ECIU University is unclear.

Only selected partners will do the walkthrough pilots and at minimum, 5 solutions will be included.

Approach

The walkthrough pilots will be implemented mainly by a Context-scenario approach where the technical solution will be tested by using either a fictional representative user story or with a selected number of end users. Do the following:

1. Identify opportunity for testing an existing solution that could fit the concept of Learner's Wallet. This can happen top-down (suggested by TAU or DCU based on emerging opportunities) or bottom-up (based on your institution's own current plans). A template for adding potential solutions for piloting is made ready on Teams through in WP4.2 can be accessed through this link.
2. Notify TAU in Teams, WP7.5 space that you are planning to run a simple walkthrough pilot or discuss with developers of promising solution
3. Inform TAU on the plan
4. Capture key lessons learnt by group or individual interviews with participants of the pilot (see sample questions in Section 4.1)
5. Report the key lessons learnt by (1) summarizing the findings in the online excel (reporting sheet) and (2) report the detailed interview findings in a Word document. Please upload the word document to WP7 Teams in 7.5 files.

3.2.2 Initial pilots (stage Alpha)

ECIU University will run technology adoption pilots in each partner organization by linking the solution to ECIU University . The aim is to identify the feasibility of the state-of-the-art solutions for facilitating micro-credential exchange. The alpha version of the micro-credential exchange platform may therefore refer to any potential existing solution to facilitate a Learner's Wallet or key aspects of it.

We also recommend validating the lessons learnt from the initial pilots with semi-structured interviews that each partner carries out using the sample questions (described in section 4.1) provided. TAU and DCU will provide support for capturing key lessons learnt. The analysis of the interview will provide an insight on how to proceed for the large-scale pilots. Customized solution(s) will be developed based on the result of that analysis and evaluation of the initial piloting phase. We recommend (but do not force) that you audio-record the interview and summarize the highlights of each interview in a Word

document (if you can identify a striking quote from each interview and transcribe that word-for-word). Test your recording equipment before the interview to avoid any problems.

Initially, Europass EDCI, Badgr and Credentify seem to be the best options so far for this phase, but walkthrough pilots will be conducted and analysed beforehand. These platforms are chosen for the walkthrough pilots based on the initial requirements for the Learner's Wallet and expert group discussions. The alpha versions will be a working prototype that demonstrates the management of Micro-credentials and recognition of skills.

Stakeholders involved

Initial pilots can be organized with developers of the externally provided solution but essentially, require the involvement of end-users. Learners, staff members, policy makers and potential employers can be among the stakeholders participating in the pilots.

Note. We expect that the initial potential alpha versions of external solutions do not need to be tested by each partner university separately. 6 partners (appointed by TAU) will join the alpha pilots in minimum.

Approach

1. Identify opportunity for testing an existing solution that could fit the concept of Learner's Wallet. This can happen top-down (suggested by TAU or DCU based on emerging opportunities) or bottom-up (based on your institution's own current plans). A template for adding potential solutions for piloting is made ready on Teams through in WP4.2 can be accessed through this link.
2. Notify TAU in Teams, WP7.5 space that you are planning to run a pilot
3. Coordinate with TAU on the timeline (online excel provided in Section 5.1) and actions
4. Engage key stakeholders for the pilot (e.g., learners), TAU will find out which ECIU University modules and challenges can provide a potential testbed to maximize the potential of the pilot
5. Share the plan with the provider of the solution
6. Run the pilot together with the provider and end-users
7. Capture key lessons learnt by group or individual interviews with participants of the pilot (see sample questions in Section 4.1)
8. Report the key lessons learnt by (1) summarizing the findings in the online excel (reporting sheet) and (2) report the detailed interview findings in a Word document. Please upload the word document to WP7 Teams in 7.5 files.

3.2.3 Large-scale pilots (stage Beta)

This will be one the key development step of the ECIU University and the realization of the conceptual vision of the Learner's Wallet. The objective is to adjust the best fitting platform used on the initial pilots for large-scale use. The large-scale pilots expand to more comprehensive use cases, such as cross-institutional recognition of soft skills and competences and management of Micro-credentials. The large-scale pilots will run from M15 onwards. The customized solution(s) is referred to as a beta version of the ECIU micro-credential platform. The upgraded platform will include new features and support more complicated use cases.

Semi-structured interview will be also used for evaluation purposes in the large-scale pilots to find out whether further needs arise to carry on developing the Learner's Wallet in the future. For example,

the integration of solutions between various institutional databases and information systems are beyond the scope the ECIU University pilots.

The plan for the large-scale pilots will be described in M15 depending on the progress and opportunities from Walkthrough and Stage Alpha pilots). The large-scale pilot includes at minimum the evaluation of 1 customized Learner's Wallet solution and will include piloting in all 11 partner universities.

Overall, we aim that minimum of 3600 students have been exposed to the pilots and/or verified their learning as micro- credentials stored in the Learner's Wallet.

4 Piloting tools and templates

4.1 Tools and templates for the pilots

We expect that multiple partners of ECIU University have ongoing and upcoming pilots of certain micro-credential solutions that may fit the initial concept of the Learner's Wallet (described in D4.2). The following sample questions can be used when validating the feasibility of the potential solutions.

How to report?

Please copy paste the questions you addressed and key findings for each point in a separate word file. Please upload the report to WP7 Teams space under Task 7.5 files.

Sample questions for learners (if applicable):

Let the learner try the system first. Interview them on the following points

- What was good about the solution
- What could be improved about the solution
- Do they identify situations where such a solution could be helpful, please explain
- Would they consider using such a system in the future? Why or why not?
- Does such a system add value to them in comparison to current way how learning is recognized (e.g., via ECTS and degree)

Sample questions for developers (if applicable):

- How micro-credentials are issued in the proposed solution?
- Who handles the micro-credentials issuing?
- What metadata is captured by the micro-credential issuer about the learning activity or the stakeholders involved, is the information manually entered or automatically retrieved (e.g., via APIs)?
- Who are the users of the proposed system and how the use of the system differs based on the different user types?
- Does the solution enable profiles for the learners?
- How the solution displays the earned micro-credentials?
- What features are offered for each user group of the system?
- Does the solution capture the skills and competences the learner has achieved, if yes, how?
- Is the solution proprietary or free to use by ECIU University?
- Is the solution GDPR compliant?
- Does the solution support the import of credentials from other platforms such as LinkedIN or MOOCs?

- How is information shared between the solution provider and the ECIU University? What is the degree of transparency regarding information exchange?
- Can the solution be customized for ECIU University, and if yes, to which extent and by who?
- How is the solution developed further in the near future, is there a chance to join the piloting of the solution if it is a good fit to ECIU University vision of a Learner's Wallet?

Sample questions for learners (if applicable):

- What was good about the solution?
- What could be improved about the solution?
- Do they identify situations where such a solution could be helpful? Please explain.
- Would they consider using such a system in the future? Why or why not?
- Where they able to share their earned credentials through the system? How would they describe that process?
- Does such a system add value to them in comparison to current way how learning is recognized (e.g., via ECTS and degree)
- Did the solution affect their view of the learning process ? If yes, how did it affect it?

Sample questions for teachers (if applicable):

- What was good about the solution
- What could be improved about the solution
- Was the solution easy or difficult to use? Do they need training for using it?
- Describe the additional workload that could arise from incorporating such solution
- Considering that the information on learning and its assessment is mainly with the teacher, who should issue such micro-credentials in your opinion?
  If it's not the responsibility of the teacher, how to ensure capturing sufficient information on the learning (e.g,. specific competences addressed).
  If it's partly the responsibility of the teacher, wow would you like to issue information about the learning experience (e.g, learning outcomes) in a solution like this?
- What value do they see that this solution adds to learners?
- What value does this solution add to them?

Sample questions for administrative/managerial personnel (if applicable):

- What was good about the solution?
- What could be improved about the solution?
- Is the solution applicable in their organization?
- What kind of issues/obstacles can arise from applying such solution in their organization?
- What information is available in existing information systems about learning that could be used to automatize the issuing of micro-credentials to learners?
- What are the incentives from the national HE funding frameworks for universities to use this solution?
- Describe the additional workload that could arise from incorporating such solution

Sample questions for employers (if applicable):

- What was good about the solution?
- What could be improved about the solution?
- How do they perceive this solution as a tool for job application when compared to other traditional tools (C.V, Transcripts)?

- Would they consider using such a system in the future (integrate it into their hiring process)? Why or why not?
- Does this system add value to them? Does it save time or money? How?
- Would this solution encourage their involvement with Higher Education institutes? What opportunities of collaboration can they foresee?
- How reliable was the solution for capturing Micro-credentials of candidates? Was the solution trustworthy?
- Does the solution adhere with their security policy?
- Are the languages supported by the solution satisfying for their operations? If no, then what other languages do they wish to see supported by the solution?

5 Initial piloting timeline

5.1 Initial selection of solutions for piloting

The selection process of solutions for the piloting stage is based on drawing the potential solutions against the initial requirements that were identified with the conceptual framework of the Learner's Wallet (D4.2). The following aspects are considered when choosing the technologies for piloting:

1. Does the solution support badges, e-certificates or other forms of visual representation for certifications?
2. What metadata is captured about the micro-credentials?
3. Does the solution represent earned competences or skills? What kind of competences are captured?
4. Does the solution distinguish where the micro-credentials come from?
5. Does the solution document and chart learning pathways?
6. Does the solution support portfolio?
7. How are the badges earned collected through the platform? (FORM OF THE QUESTION?)
8. Is it possible to import badges earned on other platforms such as LinkedIn, Coursera, etc.?
9. Is the solution simple to use and what training would be needed?
10. Is it possible to share micro-credentials on social media platforms and other means?
11. Does the system support all the main European languages?
12. GDPR Compliancy
13. The transparency of the system provider

For the real-life Alpha pilots with learners, Europass will be the most likely solution for the piloting process (initially with minimal or zero customization). Badgr, CIMEA, HeadAI and Credentify will be used in the walkthrough pilot with fictional uses cases and with a limited number of participants testing its feasibility. It is notable to say that other solutions and technologies can be added to the initial list of technologies to be tested along the piloting phase if they have potential for managing and storing Micro-credentials within the ECIU University's vision.

The selection of solution(s) to be piloted in Large-scale pilots (Stage Beta) will be described in the update of this deliverable in M15.

5.2 Initial timeline for piloting

The actual plan and the timeline for piloting is stored in Teams (Link to the timeline of the piloting process). The piloting process of the potential solutions for managing Micro-credentials is in accordance with task 7.5. The process begins with the mapping of potential technologies for facilitating and managing Micro-credentials and the development of the piloting handbook which is this report. Walkthrough pilots are conducted between Month 7 and Month 36 when identifying new potential and promising technologies for managing Micro-credentials. Initial pilots (stage Alpha) is carried out from Month 8 to Month 16, then the process is validated, and adjustments are made for the large-scale pilots. Large-scale pilots (stage Beta) are conducted from M15 onwards to ensure the identification of an optimal solution for storing micro-credentials in a Learner's Wallet.

The piloting timeline and template document will be continuously updated to reflect the timing of the pilots (Figure 7)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	ECIU University Learner's Wallet Piloting timeline												
2			Month No.	1	2	3	4	5	6	7	8	9	10
3			Year	Year 1									
4			Month	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
5	Activity	Task											
6	7.5.1	Mapping of technologies to facilitate Micro-credentials exchange											
12	7.5.2	Piloting handbook (Process and tools)											
13		Walkthrough pilot of Credentify (TAU)											
14		Walkthrough pilot of HeadAI (TAU)											
15		Walkthrough pilot of CIMEA											
16													
17	7.5.3	Europass platform Alpha (preparations during Summer, pilots in Autumn 2020)											
18		Badgr platform Alpha (Aveiro)											
19		BadgeCollect platform for LifeLong Learning (Coinversible of UTwente)											
20		Piloting handbook (Process and tools) Update											
21	7.5.4	Micro-credentials exchange platform Beta											
22	7.5.2	Piloting update and conclusion											
23													

Figure 7 Snapshot of the piloting timeline

Further, the document provides an update on the key points of evaluation from each steps of the piloting (Figure 8)

	A	B	C	D	E	F	G
1	ECIU University Learner's Wallet Piloting reporting sheet						
2	Information on the pilot						
3							
4	Solution	Provider	Partner implementing the pilot	Pilot type (walkthrough, initial, large-scale)	Timeline of piloting (Start date-End date)	Contact person leading the pilot	Piloting intended for
5							
6							
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Figure 8 Snapshot of the evaluation template

6 Conclusion

Achieving the vision of the ECIU University for the Learner's Wallet requires an extensive piloting process. The potential technologies and supporting solutions available for managing and storing Micro-credentials were presented in this report and based on an initial analysis of their features and the requirements of the Learner's Wallet, Europass was initially identified for the initial pilots while Credentify, CIMEA, Badgr and HeadAI are identified for the walkthrough pilots. More solutions can be piloted along the way if relevant solutions that align with the ECIU University's objectives arise.

The piloting process and timeline were presented. Partners are also equipped with a tool kit for the different piloting stages, questionnaires with draft questions concerning the pilot and the performance

of the piloted solutions as well as the perspective of the testing subjects are presented with a guide for data documenting and collection for partners.

This report will be updated in Month 15 with an analysis of the data collected from the initial pilots in order to make the necessary adjustments and customization decisions required for the large-scale pilots.

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