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# D.2 Report on System Requirements & Analysis

 **Credibly**

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# Partnership

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# List of Abbreviations

The following table presents the acronyms used in the deliverable in alphabetical order.

Abbreviations	Description
Application Programming Interface	API
European Digital Credentials Infrastructure	EDCI
European Skills, Competences, and Occupations	ESCO
Extensible Markup Language	XML

# Executive Summary

The aim of Activity 2 (A2) is software development, thus the Report on System Requirements and Analysis (Deliverable 2, D2) is the outcome of a process that entails identifying system requirements and analysing the elements needed to implement the software. Specifically, the report includes the collection and analysis of functional and non-functional requirements deemed indispensable for developing the Credibly system. The requirements and analysis of this report will feed into the software development of the project prototype, in line with the Credibly proposal.

## 1. Introduction

### 1.1 Purpose of the report

The D2 - "Report on System Requirements & Analysis" defines the Credibly user requirements and technical specifications, ultimately culminating in the definition of the Credibly High-Level Architecture. Moreover, it elaborates on the foundational Credibly building blocks and defines the code development principles to be adhered to throughout the system's development process, ensuring a proper technical implementation, following an incremental approach to add features in the Credibly system. This work builds upon the BrevApp system, developed within the ErasmusPlus project Brevet (2022-1-LI01-KA220-VET000085149). BrevApp is a digital accreditation tool (at prototype level) that aligns skill gains to the terminology and categorisation of skills throughout the EU, thus leveraging the use of micro-credentials across the VET sector.

Structure of the report:

- **Section 1:** Provides an introduction to the report, declaring its purpose.
- **Section 2:** This summary encapsulates the functionalities and features of the Credibly system.
- **Section 3:** It illustrates the architecture of the Credibly system (prototype), elaborating on its fundamental building blocks and defining the interactions among them.
- **Section 4:** It defines the next steps and connections with future project deliverables.

## 2. Functional & System Requirements

### 2.1 Credibly prototype high-level description and scope

The **Credibly prototype** acts as a bridge between the European Digital Credentials for Learning (EDCI) and Youthpass, enabling the seamless issuance and validation of digital credentials that reflect meaningful learning outcomes within youth initiatives. The platform supports compliance with EU standards and promotes the structured recognition of non-formal learning.

This section aims to provide a comprehensive overview of the resulting system functionalities. Defining and documenting these functionalities before development is critical to ensure that the platform effectively supports the goals of youth organisations and participants involved in European youth projects. By outlining these functions, a clearer understanding of user expectations emerges, offering a structured roadmap that guides both the system's design and development. These functions serve as a practical blueprint for the IT team, enabling them to implement features that deliver a user experience aligned with the needs of youth learning and credential verification.

Thus, **the Credibly prototype enables the issuance of verifiable credentials, particularly those enriched with recognised EU frameworks such as Youthpass's 8 Key Competences and the Europass framework.** These credentials serve not only as formal records of learning experiences but also as tools to support personal development, employability, and mobility within the European education and training space.

Unlike systems structured around rigid data entities, Credibly operates with a simplified yet powerful logic. At its core, it facilitates Institutions (typically a youth organisation or project coordinator) to issue a Credential to a Recipient (a young person), which can then be easily verified by third parties. This minimalist but effective structure supports wide interoperability and enhances usability.

In this context, the Credibly prototype supports youth-driven input, as recipients can articulate and document their gained competences directly within the platform, particularly in reference to the Youthpass framework. This participatory model aligns with the core values of non-formal learning, promoting reflection, self-assessment, and ownership of youth's learning journey.

## 2.2 Functions

### Function 1 - Compliance with EU Standards

The Credibly prototype will provide essential functionalities for youth organisations acting as credential issuers, enabling them to ensure that the digital credentials they generate are aligned with relevant European standards for competence recognition and digital certification. These include:

- a) the European Digital Credentials for Learning (EDCI) framework,
- b) the ESCO (European Skills, Competences, Qualifications and Occupations) classification, and
- c) the Youthpass Key Competences for Lifelong Learning.

This functionality is particularly valuable in ensuring that digital credentials created by youth organisations are **interoperable, recognizable, and transferable** across Europe, enhancing both the credibility of the issuing body and the visibility of the youth recipient's learning achievements.

## Function 2 – Issuing Credentials

The Credibly prototype enables issuing organisations – primarily youth organisations – to create and issue digital credentials enriched with all necessary attributes to accurately describe the skills, competences, and learning outcomes acquired by youth learners.

These credentials can showcase experiences gained through non-formal education, volunteering, training activities, or youth exchanges, and can be customised to incorporate key information aligned with EU standards.

The prototype supports the inclusion of:

- Competence descriptions based on the Youthpass Key Competences for Lifelong Learning;
- Skills references using the ESCO classification;
- Structured metadata compliant with the European Digital Credentials for Learning (EDCI) specification.

Through an intuitive interface, issuing organisations can input:

- The identity of the recipient;
- The learning activity or project context;
- Validation and authenticity information (e.g., issuer identity, signature, issuance date).

The resulting digital credential is machine-readable, verifiable, and portable, ensuring that the participant's learning achievements can be understood and recognised across various educational and professional contexts.

## Function 3 – Issuing Credentials Containing Skills

The Credibly prototype will provide issuing organisations the necessary functionality to integrate both standardised and customised-skills definitions into the digital credentials they generate. This ensures that the competences represented in the credentials are both accurate and aligned with recognised EUn typologies, when applicable.

Specifically, the prototype will enable organisations to:

- Browse and select from the ESCO skill tree, the official multilingual classification of European Skills, Competences, Qualifications and Occupations;
- Define and include custom skills, allowing flexibility for contexts and learning experiences that are not covered by ESCO, such as youth-specific or informal competencies.

The ESCO will be fully integrated and available to users, as it supports issuing organisations in ensuring that their credentials maintain terminological coherence with EU labour market standards, thus increasing their visibility, clarity, and acceptance by employers and educational institutions.

The prototype's dual support for standardised and custom skills ensures that youth organisations remain true to their context-specific learning objectives, while still promoting interoperability and recognition at a broader European level.

## Functionality 4 - Youthpass and EDCI Bridging

The Credibly prototype provides integrated support for mapping learning outcomes to both the Youthpass Key Competences for Lifelong Learning and the European Digital Credentials for Learning (EDCI) standard. This functionality enables issuing organisations and youth learners to structure and express competences in a way that is both meaningful for their learning journey and compatible with EU-wide digital recognition frameworks.

Within the prototype, youth recipients are empowered to:

- Reflect on and select learning outcomes gained during a youth activity or non-formal education experience;
- Align these outcomes with the 8 Youthpass Key Competences, ensuring coherence with widely used educational frameworks;
- Embed this information into a digitally-signed credential that is fully compatible with the EDCI format.

This dual alignment ensures that credentials created in Credibly are learner-centered while remaining technically interoperable and machine-readable. It bridges personal reflection and institutional validation, empowering recipients to own, share, and reuse their learning experiences across borders and systems.

### 3. CrediblyY System Architecture

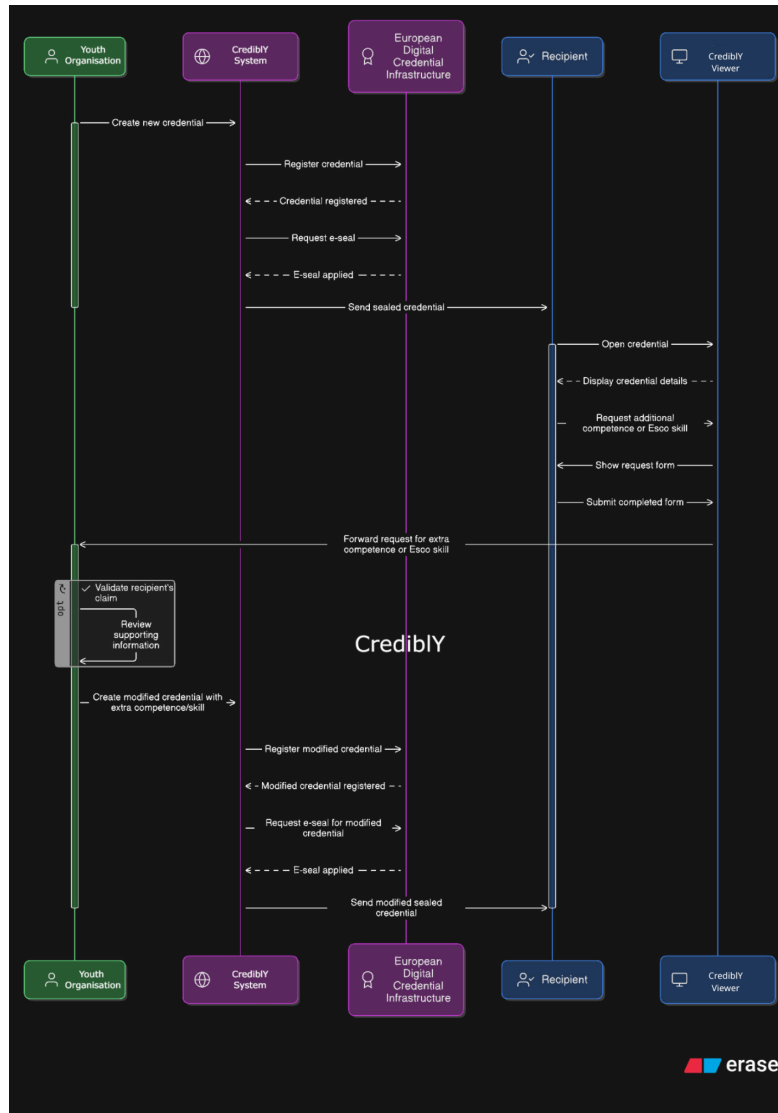


Figure 1: CrediblyY System Architecture

Figure 1 shows the complete Unified Modeling Language (UML) sequence diagram representing the logic framework for the digital credential issuance process. It outlines the interactions between the Youth Organisation, the CrediblyY prototype, the European Digital Credential Infrastructure (EDCI), and the final recipient. This diagram provides a high-level overview of how a credential is created, registered, sealed, and delivered. In the following sections, we will break down each step of this process in detail to better understand the flow and responsibilities of each actor involved.

The following Activity Diagram (Figure 2) presents in the UML the flow an Issuer has to follow to create a credential for a recipient. The credential is then sent to the recipient either by email.

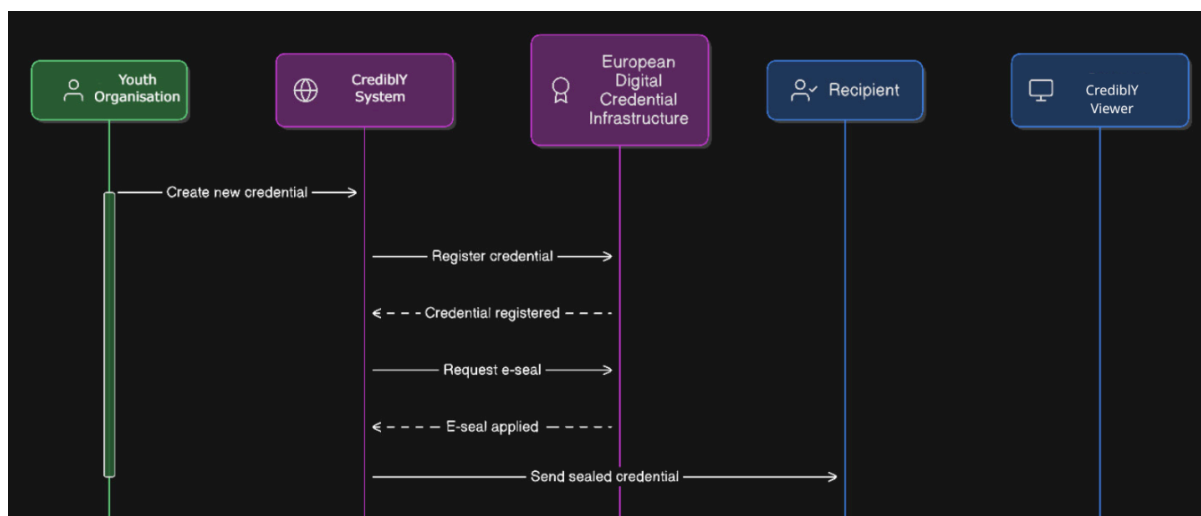


Figure 2: Diagram issuing a credential

Figure 3 below illustrates the process through which a recipient can request the addition of extra competences or ESCO skills to an existing credential. The flow begins with the recipient accessing their credential via the Credibly Viewer, which displays the credential details. If the recipient identifies a missing competence or skill, they can initiate a request directly through the viewer interface. The system then presents a request form, which the recipient fills out and submits for review. Once the form is submitted, the Credibly prototype forwards the request to the issuer, initiating the process of verifying and handling the new competence claim. The Youth Organisation then steps in to validate the recipient’s claim by reviewing the supporting evidence. If the claim is accepted, the Youth Organisation proceeds to create a modified version of the credential that includes the additional competence or ESCO skill. This sequence ensures a secure and validated process for updating credentials, maintaining the integrity of the system while allowing recipients to enhance their qualifications.

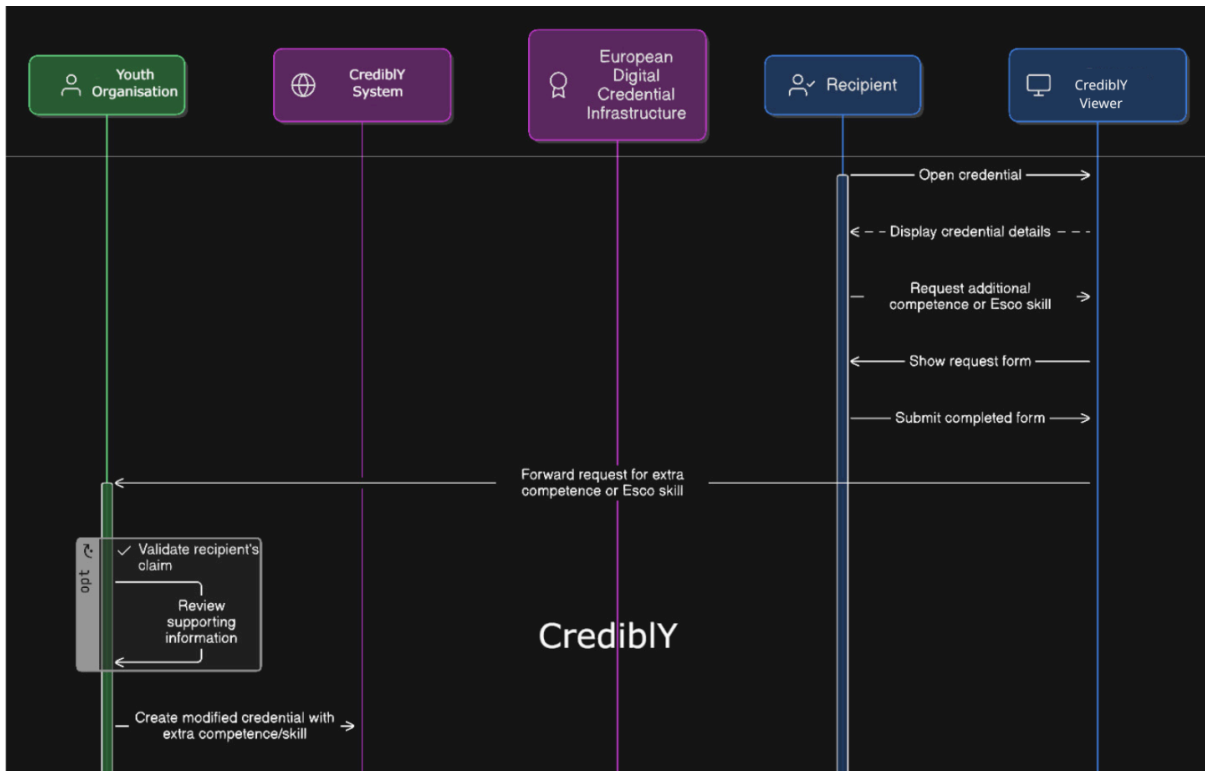


Figure 3: Request for extra Competencies or ESCO skill

Finally, figure 4 captures the concluding phase of the credential modification process, where the newly updated credential—now containing additional competences or ESCO skills—is officially registered, sealed, and delivered to the recipient. The process begins with the Youth Organisation, which, after validating and modifying the credential, instructs the Credibly prototype to register this updated version. The Credibly prototype then sends a registration request to the EDCI. Once EDCI confirms that the modified credential is successfully registered, the next step involves applying an electronic seal (e-seal) to ensure authenticity and integrity. The Credibly prototype requests this e-seal from EDCI, which applies the seal and returns the verified, sealed version of the credential. Finally, the sealed, modified credential is sent back to the recipient, completing the process. This ensures that the final credential version is not only accurate and reflective of the recipient’s skills but also securely verified and tamper-proof.

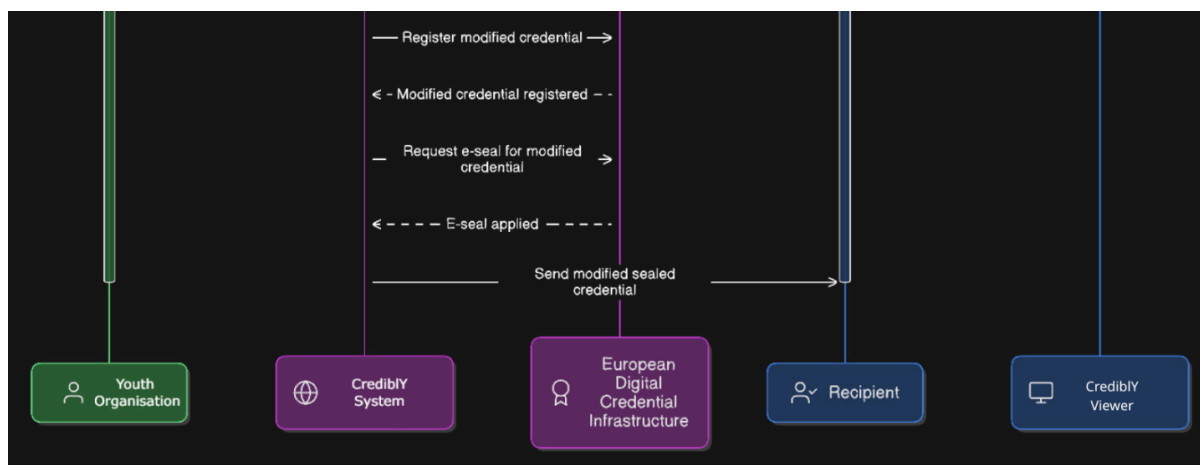


Figure 4: Final validation

## 4. Non-Functional Requirements

### 4.1 Technical Requirements

#### Authentication and authorisation

The **Credibly prototype** can be accessed only by authenticated users. All users should log in to it, creating a profile within the platform. Once logged in, users can access different parts and functionalities of the prototype based on their authorisation level. Different options are available for **Credential Subjects (Cred\_Sbj)** and for **youth organisations acting as Issuers**. These options are defined according to the Credibly prototype's core functions, which reflect the alignment with the **EDCI ecosystem**, as well as youth-specific frameworks such as **Youthpass** and the **ESCO taxonomy**.

The system supports standard roles and procedures, including:

#### Issuer Core Functions:

- Upload XML credential data
- Manage Credential Templates
- Manage Recipients
- Process credential issuance
- Seal credentials (digital signing)
  - Email attachment distribution
- Bulk credential creation

### Viewer Core Functions:

- Map credentials and verifiable presentations for visualization
- Visualise uploaded XML credentials
- Verify uploaded XML credentials
- Visualise credentials stored in wallet
- Verify credentials stored in wallet
- Export credentials
- Implement security constraints and identity propagation

### External Interfaces

Credibly's user interface is designed to provide **smooth navigation** across different system modules, maintaining consistency and ease of use.

The prototype leverages interfaces provided by the **EDCI ecosystem** for core credential functionalities and integrates youth-specific taxonomies such as **ESCO** through backend APIs. Since ESCO does not provide a front-end, it is incorporated within the **EDCI Issuer Code Library** component to be accessible within the system.

### System Qualities

The Credibly prototype is developed following best practices in software engineering and software-as-a-service (SaaS) delivery. It must be reliable, with minimal downtime.

The prototype is designed for **serviceability**, allowing future updates and expansions in functionality based on user feedback and evolving requirements. Comprehensive **documentation and tutorial videos** will be provided upon delivery to facilitate onboarding and user support.

Security is a fundamental priority, enforced through robust authentication, authorization mechanisms, and embedded security protocols aligned with the **EDCI platform** standards.