



IO2-A3: DESIGN THE ECO-SYSTEM FOR THE IMPLEMENTATION OF THE OPEN BADGES - OPEN BADGES REPORT



3D2ACT

3D2ACT:

FOSTERING INDUSTRY 4.0 AND 3D TECHNOLOGIES
THROUGH SOCIAL ENTREPRENEURSHIP: AN INNOVATIVE
PROGRAMME FOR A SUSTAINABLE FUTURE

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OPEN BADGES REPORT

PROJECT INFORMATION

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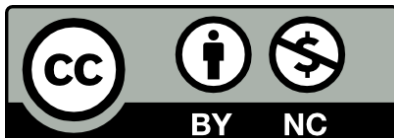
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WEBSITE:

<https://3d2act.eu/>

CONSORTIUM: PARTNER LIST

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- EUROPEAN DIGITAL LEARNING NETWORK (Italy)
- POLITEKNIKA IKASTEGIA TXORIERRI S.COOP (Spain)
- A & A EMPHASYS INTERACTIVE SOLUTIONS Ltd (Cyprus)
- STICHTING INCUBATOR (Netherlands)
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1. Introduction

1.1 Aims and Activities of Intellectual Output 2 - Activity 3

The Intellectual Output 2 of the “3D2ACT” project aims to define the benchmarks and indicators of the 3D Technologies Competence Framework against which VET students’ digital competences will be monitored, assessed and validated through the Open Badges system to be developed fully in IO4 (online).

IO2/A1: 3D TECHNOLOGIES (DESIGN, MODELING AND PRINTING) COMPETENCE FRAMEWORK

This activity focuses on the conceptual mapping of the 3D Competence Framework (Syllabus) to be acquired by VET-I and VET-C students for the specific context. It will include inbuilt benchmarks (aims & objectives for the trainers) and indicators (level of acquisition of competences for the learner). The topics were selected based on the results of IO1 (mapping & peer review), the needs of the labour markets (mapping of good practices), proposed ideas by the partners based on their expertise and experience.

IO2/A2: DUAL EDUCATIONAL PACK

Partners are responsible to develop the content of the training material for the 3D2ACT project. Based on the topics decided, the Competence Framework developed in IO2/A2 and the guidelines agreed upon the consortium, a DUAL Educational Pack will be created (entrepreneurial and digital).

IO2/A3: DESIGN THE ECO-SYSTEM FOR THE IMPLEMENTATION OF THE OPEN BADGES

This activity is highly linked with the results of the previous activities, as it will work on creating a motivation and a recognition of achievement for the IO2 A2’s completion of activities.

This report will provide more information on the following:

- Theoretical background of the methodology used.
- Description of the Open Badges’ ecosystem in relation to the structure, criteria and description for issuers, graphic design, technical integration with the e-platform and endorsement procedure.



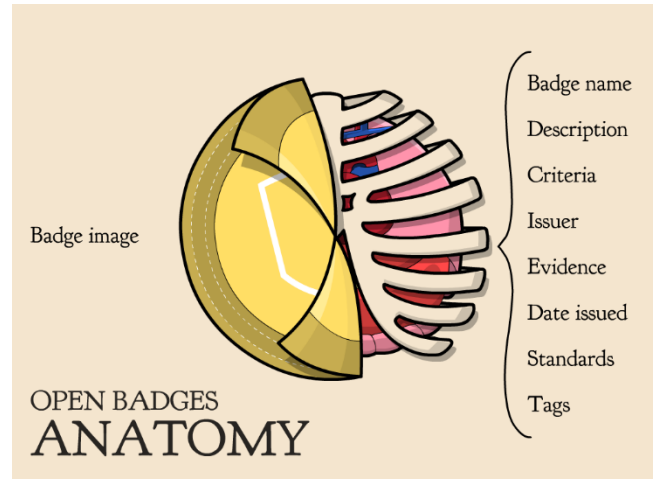
- Practical guidelines for issuing an Open Badge by using the platform that will be developed in Intellectual Output 4.

2. Open Badges

2.1. What is an Open Badge?

The Open Badges are a digital representation of skills, learning outcomes, achievements or experience such as:

- Hard skills: knowledge, competences, etc.
- Soft skills: critical thinking, communication, etc.
- Participation and community involvement
- Official certification
- Authorization



An Open Badge is an innovative system that was created in the USA and it is now used worldwide for the validation and recognition of learning, as it is offered as an open educational resource. It is a technology which promotes open access and participation of all stakeholders involved in badges process, while allowing the creation of synergies between the learners-earners, the issuers (i.e. schools, stakeholders, enterprises, NGOs including trainers/ volunteers as facilitators) and the badge consumers (i.e. formal education, public authorities, official bodies, (potential) employers). This will lead to the endorsement process leading to a transparent, transferable, valid and credible validation of a body of skills and knowledge related to a set of competences.



The Open Badges system is a very inclusive solution: it enables anyone to get actively involved in designing, testing, implementing and promoting learning outcomes and achievements. This is what major European documents on Recognition are calling for, as well as Erasmus+ which emphasizes on the “transparency and recognition of skills and qualifications to facilitate learning, employability and labour mobility: priority will be given to actions promoting permeability across education, training and youth fields as well as the simplification and rationalization of tools for transparency, validation and recognition of learning outcomes. This includes promoting innovative solutions for the recognition and validation of competences acquired through informal, non-formal, digital and open learning” (Horizontal Priorities).

The concept comes from the badges that scouts receive for skills they acquire or activities that they have taken part in and are then displayed on the sleeve of their uniform or on their backpacks. Therefore, an Open Badge is a visual verified evidence of achievement. In addition to the visual part (image) that a typical badge also has, it includes also meta-data, which is encoded in the image. Each digital badge must comply with the required standard data fields in order to be valid, such as: issuer, date of issue, description of the badge, link to assessment criteria, link to evidence of what a badge owner is claiming, link to a specific competence framework and tags, which puts an Open Badge in relation to specific context.

2.2. What are the benefits of an Open Badge?

Open Badges have various benefits:

- Badges can demonstrate a wider range of skills and achievements of a learner acquired through formal, non-formal and informal learning methods and activities.
- Badges are portable and verifiable digital objects. All this information may be packaged within a badge image file that can be displayed via online CVs and social networks.
- Each Badge includes the description of the achievement: i.e., it describes the particular path a learner undertook for his or her achievement, accompanied by the evidence to support the badge award.
- Each Badge includes information about the earner’s identity, a link to information about the issuer and a link to a description of what a badge represents.



- Badges can be used to unlock learning and career pathways. They can be used to support individuals to achieve learning goals, to provide routes into employment; and to nurture and progress talent within organizations.
- Badges can represent personal attributes that matter to employers (such as digital literacy)
- Badges can be used in a professional or educational context. Thousands of organizations, including non-profit organizations, major employers or educational institutions, issue badges in accordance with the Open Badges Specification.

2.3. Key Elements of an Open Badge

2.3.1. The Issuer

The issuer is responsible for defining a competence that could be acquired by a user, for designing the learning material for it and for assessing the users with regards to the acquisition of the competence. The issuer then creates a relevant badge and makes it available for earning by any user. For each badge, the issuer should make available details of the criteria that an earner must meet in order to be awarded the specific badge. The reviewer of an assessment compares the evidence provided by the earner against the specific badge criteria.

Any individual or organization can create an Issuer profile and begin defining and issuing Open Badges. This is done by a diverse range of organizations and communities, including:

- Schools and universities
- Employers
- Community and non-profit organizations
- Government agencies
- Libraries and museums
- Event organizers and science fairs
- Companies and groups focused on personal and professional development (such as the 3D2ACT consortium)



2.3.2. The Badge Issuing Platforms

Many companies have badge issuing platforms, compliant with the Open Badges Specification. They provide a wide range of services which allow non-technical users to issue Open Badges credentials. The platforms used for issuing Open Badges offer a variety of custom services including online badge designers, badge discovery, issuing, assessment workflow, display, user profiles, social sharing and tools to integrate with existing learning systems. All Open Badges issuing platforms allow recipients to export their badges to other online options. This allows users to stack and share their badges earned on different platforms and to choose their own spaces to establish their identity on the web.

2.3.3. The Earner (Badge Recipient)

Open Badges help recognize skills gained through a variety of experiences, regardless of the age or background of the learner. They allow earners to have a motivation to go through the acquisition of a new skill, competence etc., to get awards for following their interests and passions, and to unlock opportunities in life and work by standing out from the crowd. Earners have to register on the organization's platform and can claim a badge when the pre-defined criteria have been met during the evaluation phase.

2.3.4. The Assessment Process

There are different options for the assessment process:

- Asynchronous assessment: learners seek out the assessment when it is convenient for them instead of being required to take an exam at a pre-determined time.
- Stealth assessment: assessment and awarding badges can happen automatically and provide immediate feedback.
- Portfolio assessment: work samples, projects and other artefacts the learner has produced can be used as evidence for claiming a badge.



2.3.5. The Displayer

Open Badges are designed to be shared. By sharing them, individuals exhibit their achievements to others and turn them into a valuable currency to unlock new opportunities. Most issuing platforms provide users with the ability to connect and store their badges to an external Backpack such as Badgr. When retrieving badges from the earner's Badgr (using the account connected to the email address), the displayer will only be able to access those badges that the earner has chosen to be public.

Badges can also be shared:

- On blogs, websites, e-Portfolios, and professional networks
- In job applications
- On social media sites - Twitter, Instagram, Facebook, LinkedIn
- In an e-mail signature

2.4. The Technical Aspects

An earnable badge is defined as a badge class, using a variety of data items including descriptions, criteria and information about the issuing organization. When an issuer decides to award that badge to a specific earner, he or she creates a badge assertion. A badge assertion describes the data for an awarded badge. It includes the earner's identity and a link to the generic badge class, which in turn is linked to information about the badge issuer.

The image for a badge should be a square PNG (or SVG). The file size should be a maximum of 256KB and should not be smaller than 90 px square.

Things you can verify and explore in a badge:

- Details about the organisation issuing the badge
- What the individual has done to earn the badge
- The criteria that the badge has been assessed against
- That the badge was issued to the expected recipient
- The badge earner's unique evidence (optionally included)
- When the badge was issued and whether it expires



2.5. Institutional Endorsements

Badges are like commercial products that have to be endorsed by a certain celebrity or institution in order to be promoted in a wider sphere and to gain the support of the consumer. In this section, institutions from public and private sectors, which are endorsing open badges as a recognition tool, will be highlighted as will the importance of endorsing a badge within the ecosystem.

2.5.1. Governmental Institutions

The Council of the European Union is one of the intergovernmental institutions which have expressed their support to the open badges as one of the nonconventional approaches to recognize someone's work.

Within the EU, the Lithuanian National Commission for UNESCO together with the Lithuanian Association of Non-Formal Education recommend the use of open badges to other UNESCO affiliated schools in the country (Lithuanian National Commission for UNESCO, 2016).

Aside from these EU bodies, in 2013 the U.S. Department of Education's Office of Vocational and Adult Education (OVAE), funded a study which "explores the feasibility of developing and implementing a system of digital badges for adult learners and the implications for policy, practice, and the adult education delivery system" (Finkelstein, Knight, & Manning, 2013).

2.5.2. Private Sector's Endorsement

Aside from Mozilla Foundation which started with the idea of open badges, various entities in the private sector have been using open badges. For instance, the American company Microsoft "developed a badge system for the Partners in Learning Network (PiLN) of educators and school leaders to promote technological competencies and relevant skills in today's digital age." (Chow, 2014).



3. The 3D2ACT Open Badges

3.1. The 3D2ACT Open Badges

Open Badges provide portable and verifiable information about various skills and achievements. The target group of this project, VET students, will follow their personal strategy on specific soft skills and by completing the requested activities and answering the assessment questions and/or the assignments that respond to each activity, they will unlock the corresponding Open Badge. Open Badges represent legitimate, authenticated achievements described within the badge and linked to the 3D2ACT project.

The project's consortium has already designed the Competences Framework and modules have been divided into levels based on the proficiency and the expertise of the learners as well as the difficulty of the modules. In addition, each Open Badge corresponds to one module. Lastly, two additional Open Badges will be developed to be awarded:

1. for the completion of the Social Entrepreneurship module
2. for the completion of the entire educational material (Overall)

➔ More specifically the 3D2ACT consortium has designed and developed the following eleven (11) Open Badges:

3D Course

Level 1: 3D-P-Beginner (Novice Level: Basic Competences)

1. Chapter 1.1: Introduction to 3D Printing
2. Chapter 1.2: Designing and acquiring 3D Models
3. Chapter 1.3: 3D Printer basics and preparation for the first print

Level 2: 3D-P-Competent (Intermediate Level: Mastering the Basics and Beyond)

4. Chapter 2.1: Creating 3D Designs with CAD Software
5. Chapter 2.2: Slicing Software in depth tutorial
6. Chapter 2.3: Hands-on training: customizing and printing simple designs



Level 3: 3D-P-Proficient (Advanced Level: Specialized Competences)

- 7. Chapter 3.1: Advanced 3D design topics
- 8. Chapter 3.2: Post-processing 3D prints
- 9. Chapter 3.3: Working with other materials

Social Entrepreneurship Course

- 10. Social Entrepreneurship

OB - OVERALL

- 11. Overall badge

In the next page, the tree structure of the 3D2ACT Open Badges can be found.

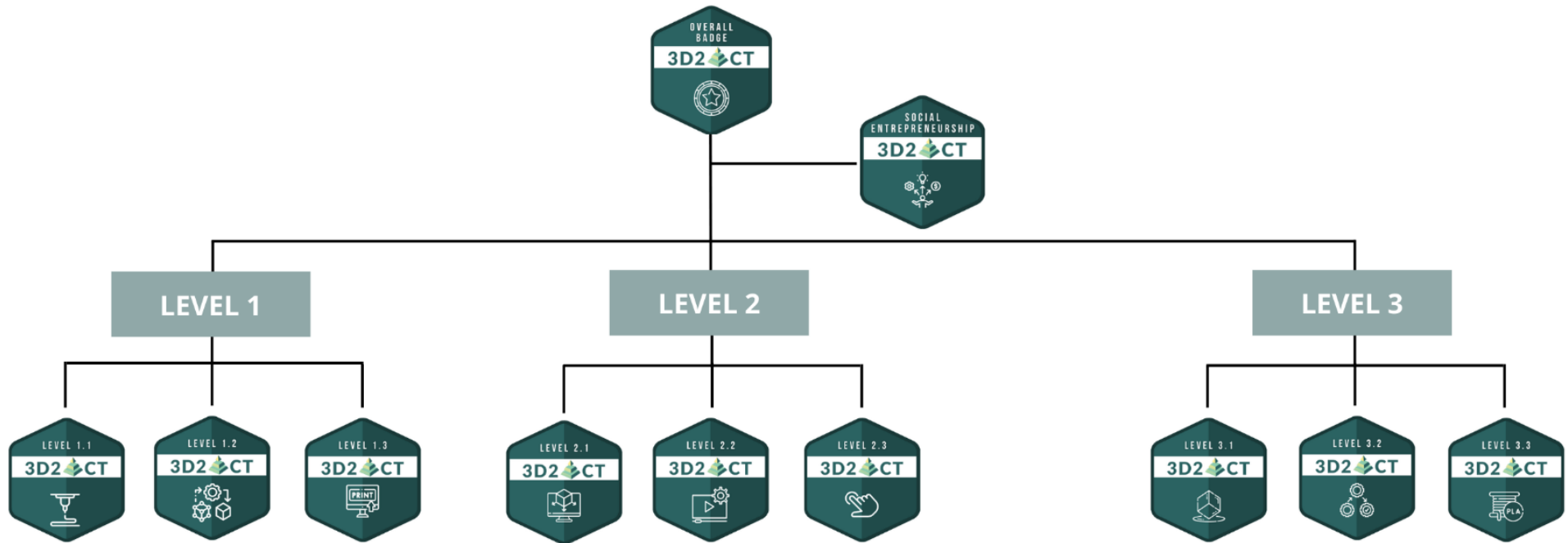


Figure 1: Tree Structure of the 3D2ACT Open Badges



Each Open Badge consists of the below:

1. **Name:** The name of the Open Badge is comprised by the name of the skill or its subskill.
2. **Learning Outcomes:** A list of the learning outcomes to be acquired.
3. **Design of Open Badge:** The Visualization (image) of the Open Badge for each skill (see Figure 1)
4. **Main Objective:** A description of the Open Badge related to the main objectives of each Badge.
5. **Assessment Criteria:** The criteria to be used to assess whether the learning outcomes of all groups have been achieved and whether the set of skills and competences of all groups have been acquired by the learners. *The criteria and the assessment methods that have to be followed in order to receive a badge are described in the following sections.*
6. **Evidence:** The proof and the evidence of the acquired skills i.e. quiz grades, etc.
7. **Issued by:** In this section the issuer of the Open Badge is specified, which in this case is the 3D2ACT Consortium.

3.2. The 3D2ACT Open Badges Awarding Criteria

The learners (VET students) will acquire an open badge based on two different ways:

- **For the 3D Open Badges (level 1, level 2 and level 3):** The Open Badges will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).
- **For the Social Entrepreneurship Open Badge:** The Open Badge will be given automatically to the learner, by the issuing platform based on the successful completion of the quizzes and interactive content. The Social Entrepreneurship badge will be awarded when students have achieved 50% on the gradable post-assessment interactive activities, which will be given only one attempt.
- **For the Overall badge:** The overall badge will be awarded when Level 1, 2 and Social Entrepreneurship badges have been previously awarded. Level's 3 badge will be awarded to the participants of C1 activity in Cyprus.



3.3. Overview of the 3D2ACT Open Badges

3.3.1. 3D Open Badges



LEVEL 1 – 3D-P-Beginner

Chapter 1.1.: Introduction to 3D Printing

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 1.1 chapter “Introduction to 3D Printing”.*

Learning Outcomes:

- Identify the different types and methods of 3D printing
- Understanding of the basic scientific principles behind 3D printing
- Recognize the basic components and functionality of a 3D printer
- Realize the potential impact of 3D-P and the possibilities for entrepreneurship and career opportunities from the acquisition of related skills.



LEVEL 1 – 3D-P-Beginner

Chapter 1.2.: Designing and Acquiring 3D Models

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 1.2 chapter “Designing and acquiring 3D Models”.*

Learning Outcomes:

- Follow and complete the tutorial using 1-2 practical examples/exercises Produce 1-2 simple (generic) 3D models as practical example/tutorial.
- Use applications/tools to design models for 3D printing and make their own creations
- Learn to use the online CAD software TinkerCAD
- Understand the principles of photogrammetry and 3D model scanning



LEVEL 1 – 3D-P-Beginner

Chapter 1.3.: 3D Printer Basics and Preparation for the First Print

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 1.3 chapter “3D Printer basics and preparation for the first print”.*

Learning Outcomes:

- Use the open source slicer software Cura to correctly orient a model, identify overhangs and enable support structures, set the printing resolution and infill options
- Generate .gcode files
- Perform bed leveling (manual/automatic)
- Learn about print bed adhesion and the different kinds of printing surfaces
- Understand print speed limitations of FDM printers and operational temperatures
- Identify simple printing problems and search for possible solutions



LEVEL 2 – 3D-P-Competent

Chapter 2.1.: Creating 3D Designs with CAD Software

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 2.1 chapter “Creating 3D Designs with CAD Software”.*

Learning Outcomes:

- Place a shape to add or remove material
- Move, rotate, and adjust shapes freely in space
- Group together a set of shapes to create complex models
- Produce a 3D model from a 2D design



LEVEL 2 – 3D-P-Competent

Chapter 2.2.: Slicing Software in Depth Tutorial

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 2.2 chapter “Slicing Software in depth tutorial”.*

Learning Outcomes:

- Understand when and where to use support material and how to identify critical overhangs
- Produce stronger 3D models using different infill types and wall line count
- Increase the model quality and resolution

**LEVEL 2 – 3D-P-Competent****Chapter 2.3.: Hands-on training: customizing and printing simple designs**

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 2.3 chapter “Hands-on training: customizing and printing simple designs”.*

Learning Outcomes:

- Experiment with rapid prototyping and testing techniques
- Work fluently with 3D design and 3D printing

**LEVEL 3 - 3D-P-Proficient****Chapter 3.1.: Advanced 3D design topics**

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 3.1 chapter “Advanced 3D design topics”.*

Learning Outcomes:

- Calculate and employ tolerances and offsets
- Experiment, generate solutions, and solve problems
- Apply STEM principles

**LEVEL 3 - 3D-P-Proficient****Chapter 3.2.: Post-processing 3D prints**

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 3.2 chapter “Post-processing 3D prints”.*

Learning Outcomes:

- The most common post-processing activities on printed 3D products
- Post-processing tasks on a 3D printed part
- Modify the G-Code in Cura (Pause at height, Filament change for multi-colored prints, Time Lapses, etc.)



LEVEL 3 - 3D-P-Proficient

Chapter 3.3.: Working with other materials

Criteria: *This badge will be awarded manually by the VET teachers, based on in-class performance, reading of the material and successful completion of tasks (worksheets).*

Description: *This badge is awarded for completing the level 3.3 chapter “Working with other materials”.*

Learning Outcomes:

- Necessary changes to the printing process for handling different materials
- Different print temperatures, bed adhesion and speed limitations
- Troubleshooting



3.3.2. Social Entrepreneurship Open Badge



Social Entrepreneurship

Criteria: *The Social Entrepreneurship badge will be awarded when students have achieved 50% on the gradable post-assessment interactive activities, which will be given only one attempt.*

Description: *This badge is awarded for completing the Social Entrepreneurship course.*

Learning Outcomes:

- Basic concepts of social entrepreneurship
- Benefits, challenges and advantages/disadvantages of social entrepreneurship
- Basics of Business Model Canva
- Identification of resources and activities
- Business Model Canva tool
- Familiarity with Entrecomp Framework
- Identification of the Entrecomp skills
- Integrate social impact into the skills
- How to act ethically and sustainably in a business context
- Application of social responsibility in business
- Development of business models in line with circular economy and sustainable practices



3.3.3. Overall Open Badge



Overall

Overall Badge

Criteria: *The overall badge will be awarded when Level 1, 2 and Social Entrepreneurship badges have been previously awarded.*

Description: *This badge is awarded for completing both courses.*

Learning Outcomes:

All the aforementioned learning outcomes.



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