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D 4.6 Platform including gamification

DEVELOPMENT OF THE ARISE PLATFORM

Issue Date January 2024

Version: 1



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101033864. The contents of this report reflect only the author's view and the Agency, and the Commission are not responsible for any use that may be made of the information it contains.



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DEVELOPMENT OF THE ARISE PLATFORM

Lead partner	IST, ISSO
Issue Date	November 2023
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Version	VI
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Dissemination level	PUBLIC

Colophon

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Revision and history chart

Version	Date	Editors	Comment Description
0.1	November 2023	Lilibeth Juárez	First raw draft
0.2	December 2023	Lilibeth Juárez	Additions
0.3	January 2024	Jan Cromwijk	Feedback
0.4	January 2024	Lilibeth Juárez	Document structure improvements and documentation of proofs
0.5	January 2024	Jan Cromwijk	Feedback
1.0	January 2024	Lilibeth Juárez	Additions and improvements



Publishable executive summary

This deliverable documents the ARISE platform's pilot implementation, focusing on Platform deployment utilizing a dataset which contains the links between resources available and the unit of learning outcomes including Gamification.

Building on previous ARISE reports, it illustrates how users can access modules, and earn Open Badges linked to ULOs from the ARISE qualification. It also highlights the gamification principles applied to guide, nudge and reward the learner.

This to bring the learner a personal learning pathway that involves a combination of methodologies and materials to deliver training content related to BIM and sustainability in the construction industry.



List of acronyms and abbreviations

BUS: Build Up Skills

GSL: Guided Self Learning

LMS: Learning Management System

LTI: Learning Tools Interoperability

LO: Learning Outcomes

OB: Open Badges

PBL: Project/Problem-Based Learning

QF: Qualification Framework

ULO: Unit of Learning Outcomes



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1. Introduction

This report serves as a proof of the final stage of the ARISE platform development, employing a dataset that includes the connections between available resources and the ULOs, incorporating gamification.

Building on the groundwork laid by other work packages in the ARISE project as documented in reports, such as [D3.4 Map of available resources](#) and [D5.2 Design of a selection of learning materials](#), which mapped available resources to the qualification framework and provided recommendations for learning materials, this report delves into the practical integration within the ARISE platform.

As the ARISE project advances into the piloting phase, this report sets the stage for a comprehensive understanding of the platform's functionalities, ensuring alignment with project objectives and paving the way for informed decisions on upskilling pathways and future learning material development.

2. ARISE platform architecture - refresher

In order to place the content of this report in the proper context the ARISE platform architecture is summarized in the picture below.

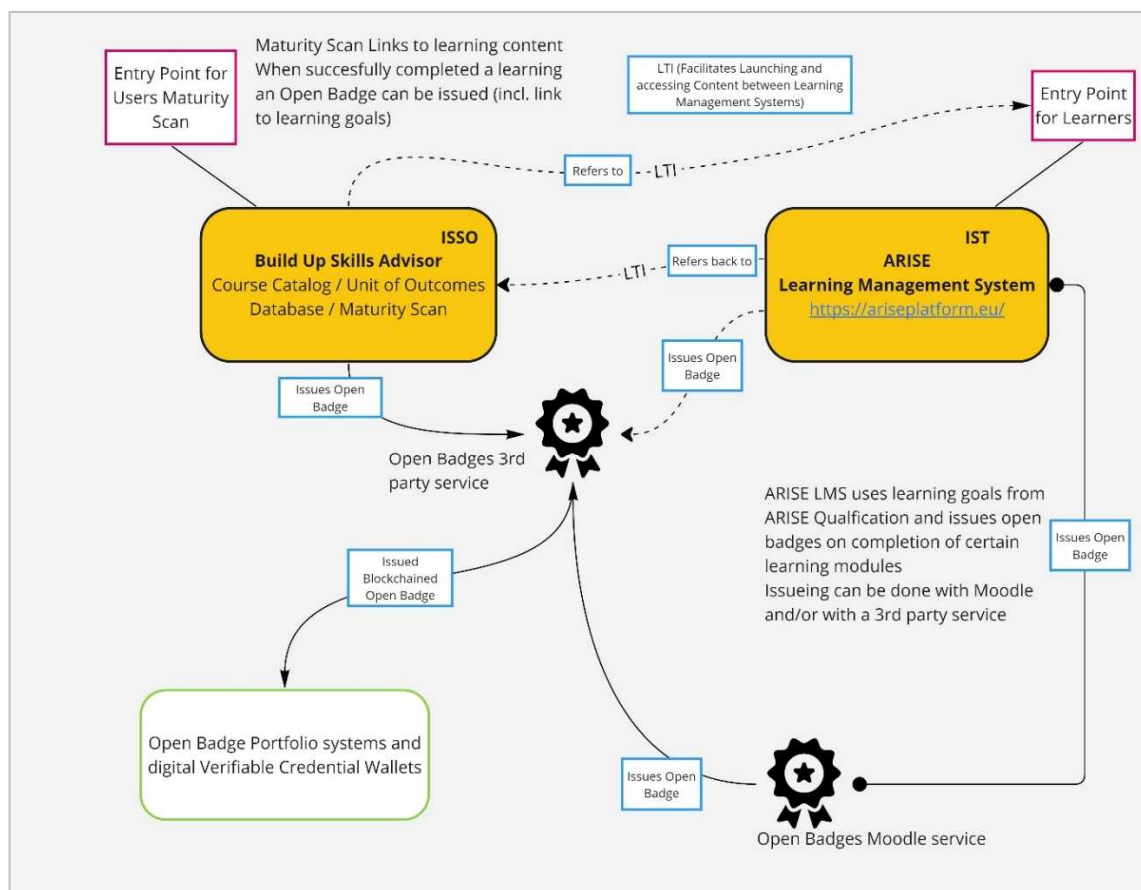


Figure 1: ARISE platform architecture

The BUILD UP Skills Advisor-App and the ARISE Moodle LMS are the point of entrance for users. Within the BUS-app, there is a functionality to [perform maturity scans](#) that are linked with learning content in the ARISE LMS.

The ARISE LMS uses learning goals from the ARISE Qualification Framework, and when a user completed a learning, an Open Badge can be issued. Open badges are issued by [Open Badge Factory](#) and the Open Badges Moodle service. The LTI facilitates launching and accessing content between the BUS app and the ARISE LMS.



In the following chapters it is documented how we implemented the ARISE modules to earn Open Badges and a Skill Card linked to the ARISE ULOs, as well as how we implemented the Skills Maturity Assessment as a stepping stone (and applied gamification principle) to find suitable training modules.

3. Learning pathway for piloting

The ARISE consortium has adopted a diverse and comprehensive approach that involves a combination of methodologies and materials to deliver training content related to BIM and sustainability in the construction industry.

Main methodologies previously analysed in [D.5.1 Exploration of existing methodologies](#) included Project/Problem-Based Learning (PBL) , Guided Self-Learning (GSL) , and Active Learning as effective pedagogical approaches to encourage students to interact with the material.

PBL is recognised as an effective pedagogical approach, fostering student interaction with the material through active learning. According to the analysis in [D.5.1 Exploration of existing methodologies](#), PBL is considered a potent facilitator of students' learning outcomes, encouraging interaction with material related to BIM, EPA projects, digital construction, sustainability, and the blockchain sectors. PBL contributes to both mastery and scaffolding levels by prompting students to engage with the curriculum and interact with the lecturer to discuss their findings.

Guided Self-Learning (GSL) is another approach previously analysed. GSL allows students to explore and learn independently, a crucial aspect of mastery learning, particularly when digital badging is utilized. In this scenario, students must master different levels before progressing to the next, fostering an active learning space between the lecturer and the student.

Active Learning is an additional significant component, showcasing the flexibility and accessibility of digital education. The terms active learning and experiential learning describe instances where students actively engage with presented information and personalize it by linking it to their existing knowledge (Hammer,



2005). Methodologies such as individual-based, paired, and group activities, in the form of collaborative discussions, are crucial features of active learning. Adopting an active learning approach enables students to benefit from collaboration with classmates, teachers, and available online and book resources.

With respect to material development, the learning path involves the development of ULOs from the ARISE QF, serving as a foundation for learning content. The developed ULOs are mapped to Tasks and Subtasks identified in [D.5.2 Design of a selection materials](#).

The ULOs are linked to the micro-size training modules for specific knowledge needs. Open Badges are awarded upon completion of modules creating pathways to higher awards and block chained for verification and recognition. In order to reward and nudge the learner the Moodle LMS rewards the learner also with internal progress badges and earning of experience points.

From [D.5.2 Design of a selection materials](#) an overview is given below.

The following ULOs within specific units have been chosen for development and pilot testing. The consortium selected these because they demonstrate the ability of ARISE to deliver for our partners and industry in relation to improving energy efficiency in construction across the EU:

- Introduction to BIM Fundamentals
- BIM Terms & Definitions
- What are BIM (Maturity Levels)
- Energy system thinking - Key principles (divided into micro modules)
- Intro to BIM implementation: Impacts
- 3D BIM Modelling
- Parametric BIM Objects
- Introduction to Low Energy Building Construction – Details (divided into micro modules)
- Digital Skills
- Digital Skills – Accessing Information through the cloud
- Digital Skills – Accessing Information through portable devices

- Digital Skills & Collaboration – CDE & File Structure
- Digital Skills & Collaboration – Review BIM Models

Figure 2 shows these an example as part of ARISE’s learning pathways through a selected module (Introduction to BIM Fundamentals). At a conceptual level, the aim is to produce shared learning outcomes across all roles where suitable. These learning outcomes -developed in Deliverable 3.3- are linked to the modules of learning content on the ARISE platform. Users would be awarded with digital badges for completion of these modules thus providing the bridge to the blockchain element of ARISE as developed by WP 4 & WP 7.

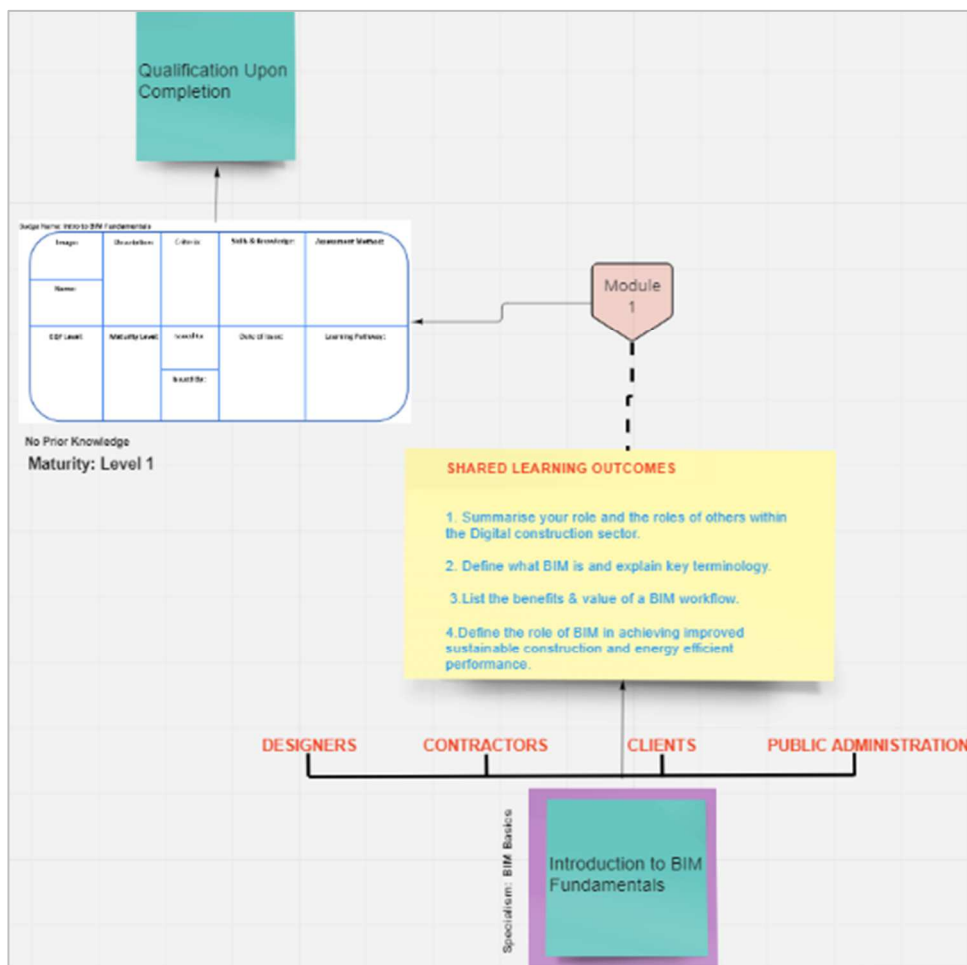


Figure 2. Learning pathway of Introduction to BIM Fundamentals

4. The modules in the learning pathway

In [D.5.2 Design of a selection materials](#) it is described how the module selection for the learning pathway took place.

The ARISE consortium has undertaken a process of mapping existing BIMCert learning modules to the ULO of the QF, narrowing down the modules to 13 organized into the BIM specialism (Figure 3).

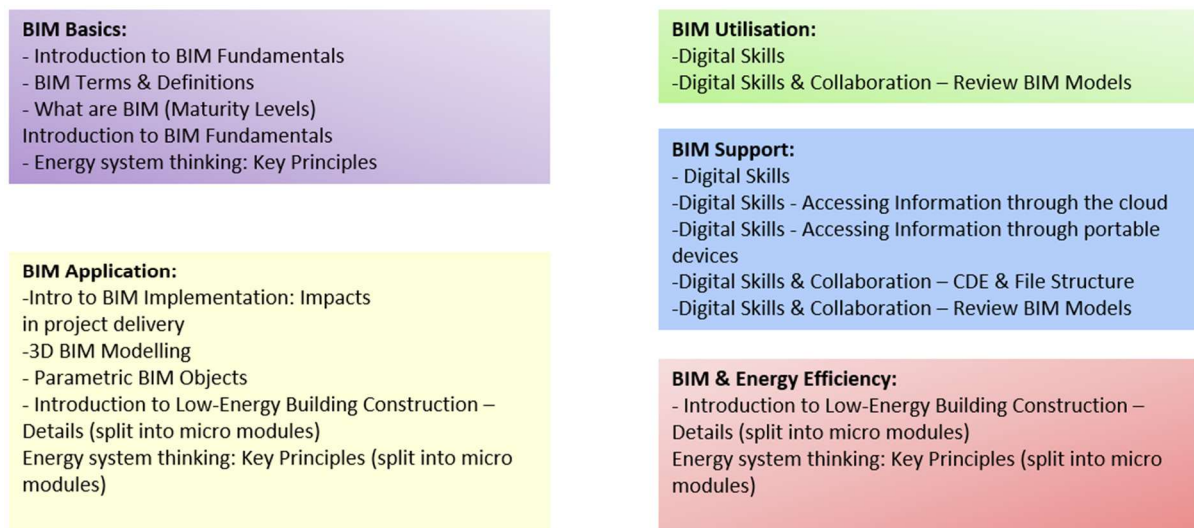


Figure 3. BIM Modules

The BIM Basics modules are highlighted as critical for establishing a foundational understanding of BIM before progressing to advanced content.

For the pilot a section is made as follows:

- BIM Basics (Consisting of BIM Terms & Definitions – Intro, Overview of BIM Benefits – Intro, and BIM Dimensions Intro)
- BIM & Digitisation Tools for Energy Efficiency – Intro (Consisting of a module titled the same) To note this module and content are subject to be updated soon.

Below is the list of BIM courses within the ARISE platform, including how XP's starts and badges are integrated:

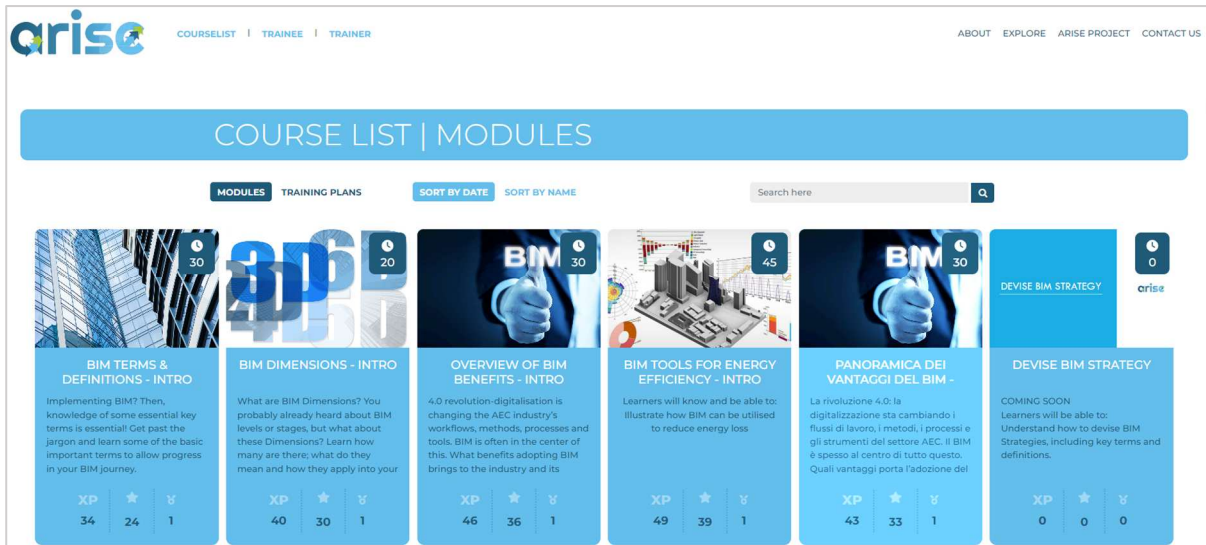


Figure 4. BIM courses within the ARISE platform

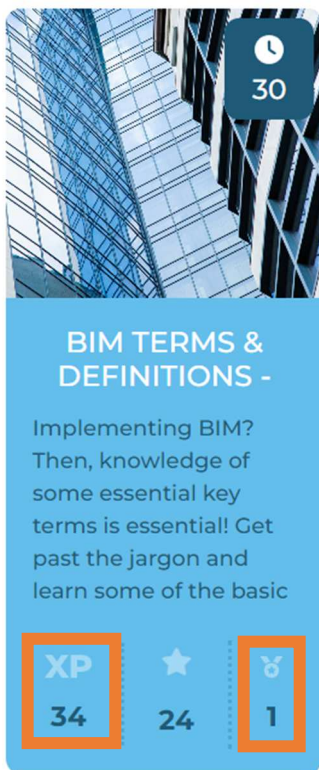


Figure 5. E.g. 'BIM Terms & Definitions' module has 34 XP and 1 Open Badge

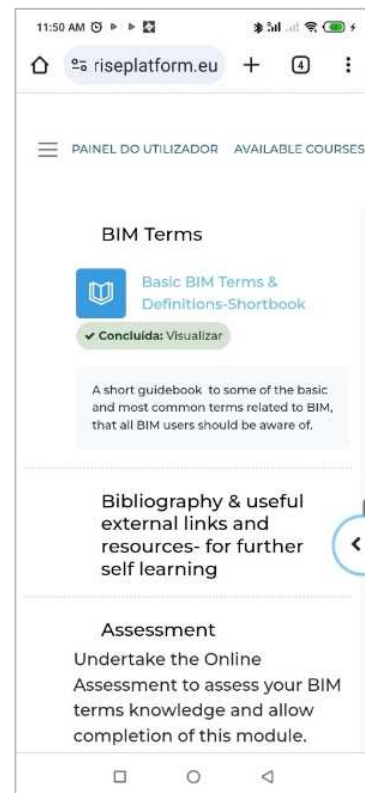
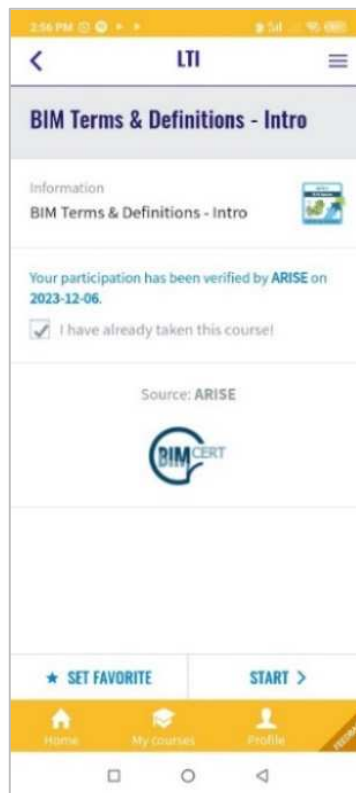


Figure 6. Starting the module 'BIM Terms & Definitions' from the BUS-app

From D3.4:

To visualize the learning contents relationship to the BIM specialisms, a diagram has been provided to demonstrate how the materials connect to the tasks and subtasks (Figure 7). This also shows where digital badges would be awarded for completion of the micromodules. The distribution of digital badges is recommended to be rewarded following completion of tasks and subsequent specialisms.



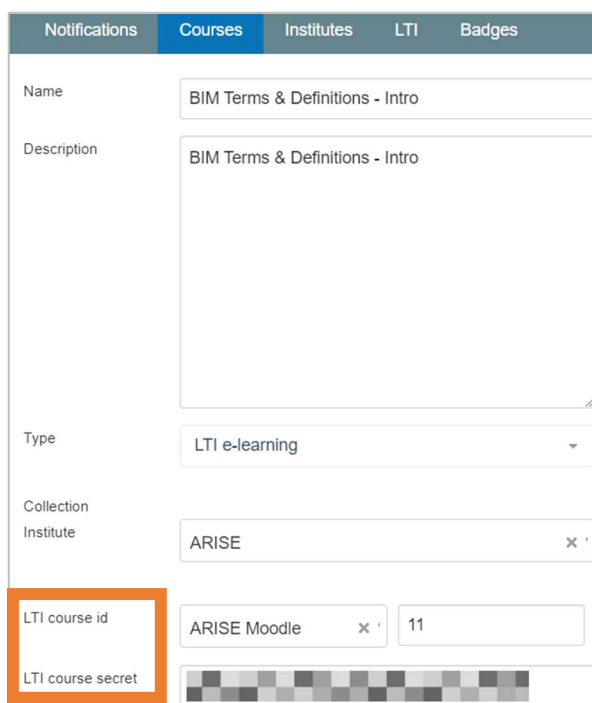
Figure 7. Modules from BIMCert and BIMzeED aligned to BIM Basics Specialism

5. How the BUS-app connects to the modules

In this chapter it is explained how the BUS-app connects to the ARISE modules in order to get learners start their upskilling pathway.

5.1 The modules are added as LTI e—learnings in the BUS-app repository

In the BUS-app platform the ARISE e-learnings are added as LTI- eLearning. With application of the standard Learning Tools Interoperability (LTI) it is possible to board a learning directly from the BUS-app into the chosen module. The following figure shows how this is administrated in the BUS-app backend:



The screenshot shows a web interface with a navigation bar containing 'Notifications', 'Courses', 'Institutes', 'LTI', and 'Badges'. The 'Courses' tab is active. The form contains the following fields:

- Name:** BIM Terms & Definitions - Intro
- Description:** BIM Terms & Definitions - Intro
- Type:** LTI e-learning
- Collection Institute:** ARISE
- LTI course id:** ARISE Moodle 11
- LTI course secret:** [Redacted]

Figure 8. Use of LTI in the BUS-app maintenance environment

As can be seen in this example, the 'BIM Terms & Definitions' module is linked to the ARISE platform through the LTI.

5.2 The modules are linked with relevant LO from the ARISE QF

In the following figures, it can be seen how the modules are linked to the relevant learning outcomes of the ARISE qualification framework and this is done by:

A. Adding the ARISE qualification to the BUS-app Unit of Learning Outcomes database:

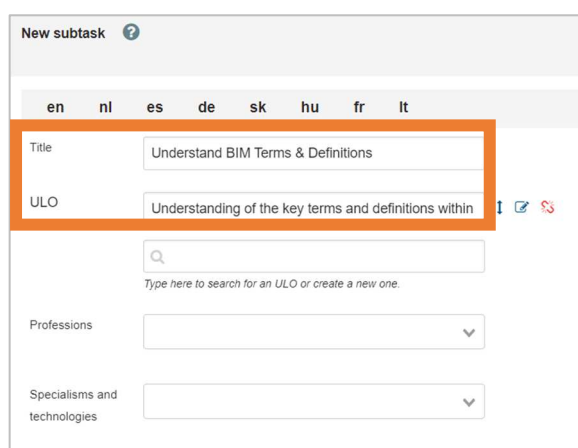


Figure 9. The ULO related with the subtask “Understand BIM Terms & Definitions”

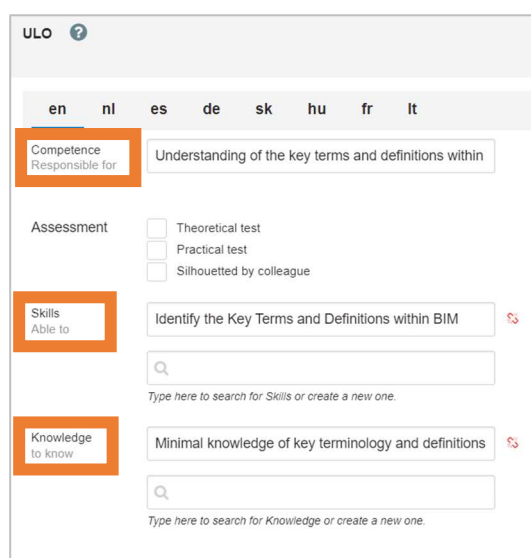


Figure 10. The ULO details: Competence, Skills and Knowledge

B. Publishing the ARISE qualification as a snapshot

The tasks and associated ULOs linked to the modules are the following:

Task - Understand BIM Basics

Sub Task: Understand BIM Terms & Definitions – ULO 2

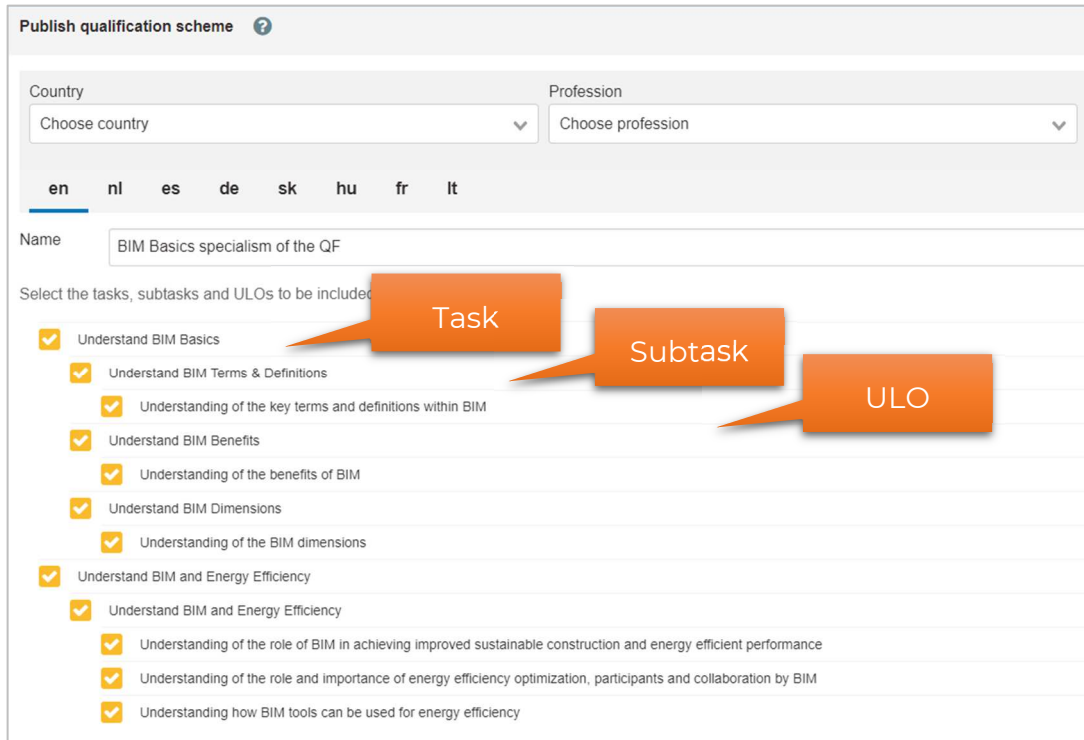
Sub Task: Understand BIM Benefits – ULO 118

Sub Task: Understand BIM Dimensions – ULO 117

Task – Understand BIM and Energy Efficiency

Sub Task – Understand BIM and Energy Efficiency – 4, 119

Those tasks, subtasks, and ULOs were entered into the BUS-app database. The following figure shows what the QF looks like before it is published:



Publish qualification scheme

Country: Choose country | Profession: Choose profession

en | nl | es | de | sk | hu | fr | it

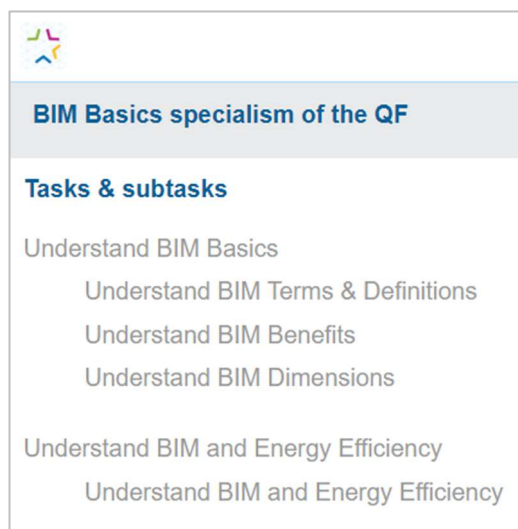
Name: BIM Basics specialism of the QF

Select the tasks, subtasks and ULOs to be included:

- Understand BIM Basics (Task)
- Understand BIM Terms & Definitions (Subtask)
 - Understanding of the key terms and definitions within BIM (ULO)
- Understand BIM Benefits (Subtask)
 - Understanding of the benefits of BIM (ULO)
- Understand BIM Dimensions (Subtask)
 - Understanding of the BIM dimensions (ULO)
- Understand BIM and Energy Efficiency (Task)
 - Understand BIM and Energy Efficiency (Subtask)
 - Understanding of the role of BIM in achieving improved sustainable construction and energy efficient performance (ULO)
 - Understanding of the role and importance of energy efficiency optimization, participants and collaboration by BIM (ULO)
 - Understanding how BIM tools can be used for energy efficiency (ULO)

Figure 11: BIM Basics QF

The BUS-app database has the option to take snapshots and view the tasks and subtasks of the QF:



BIM Basics specialism of the QF

Tasks & subtasks

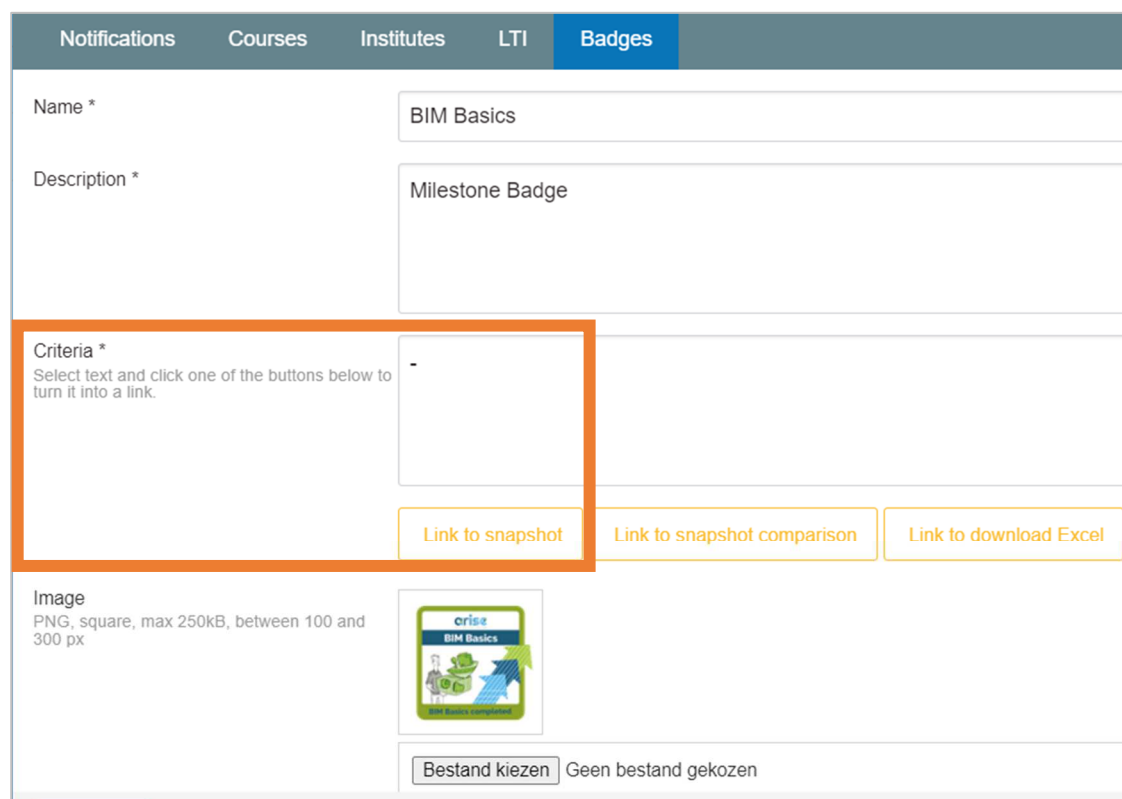
- Understand BIM Basics
 - Understand BIM Terms & Definitions
 - Understand BIM Benefits
 - Understand BIM Dimensions
- Understand BIM and Energy Efficiency
 - Understand BIM and Energy Efficiency

Figure 12: BIM Basics snapshot

5.3 Linking of the snapshot in the Open Badges for verification of proof

The following figure shows how a published snapshot can be linked to an Open Badge as a Criteria in the BUS-app database. This means that to obtain that OB, the user must accredit the subtasks that conform the task or module.

In this case to obtain the milestone of 'BIM Basics', the learner must first accredit the modules of 'Understand BIM Terms & Definitions', 'Understand BIM Benefits', and 'Understand BIM Dimensions'.



The screenshot shows a web interface for creating or editing an Open Badge. The navigation bar includes 'Notifications', 'Courses', 'Institutes', 'LTI', and 'Badges'. The 'Badges' section is active. The form contains the following elements:





- Name ***: BIM Basics
- Description ***: Milestone Badge
- Criteria ***: A text area with instructions: "Select text and click one of the buttons below to turn it into a link." This area is highlighted with an orange border.
- Image**: A section for uploading a badge image. It includes a preview of a badge with the 'arise' logo and the text 'BIM Basics'. Below the preview is a button labeled 'Bestand kiezen' and the text 'Geen bestand gekozen'.

Below the 'Criteria' field, there are three buttons: 'Link to snapshot', 'Link to snapshot comparison', and 'Link to download Excel'.

Figure 13. How to link a published snapshot to an Open Badge

5.4 The modules are linked with the relevant Open Badges

This figure shows the Open Badges linked with the BIM Basics module:

Notifications	Courses	Institutes	LTI	Badges
Badge	Name			
	BIM Terms & Definitions			
	BIM Benefits			
	BIM Dimensions			
	BIM Tools for Energy Efficiency			

For big achievements so called milestone badges are added in OBF:

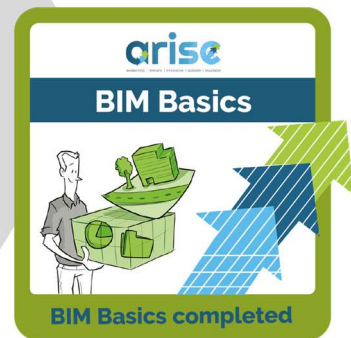
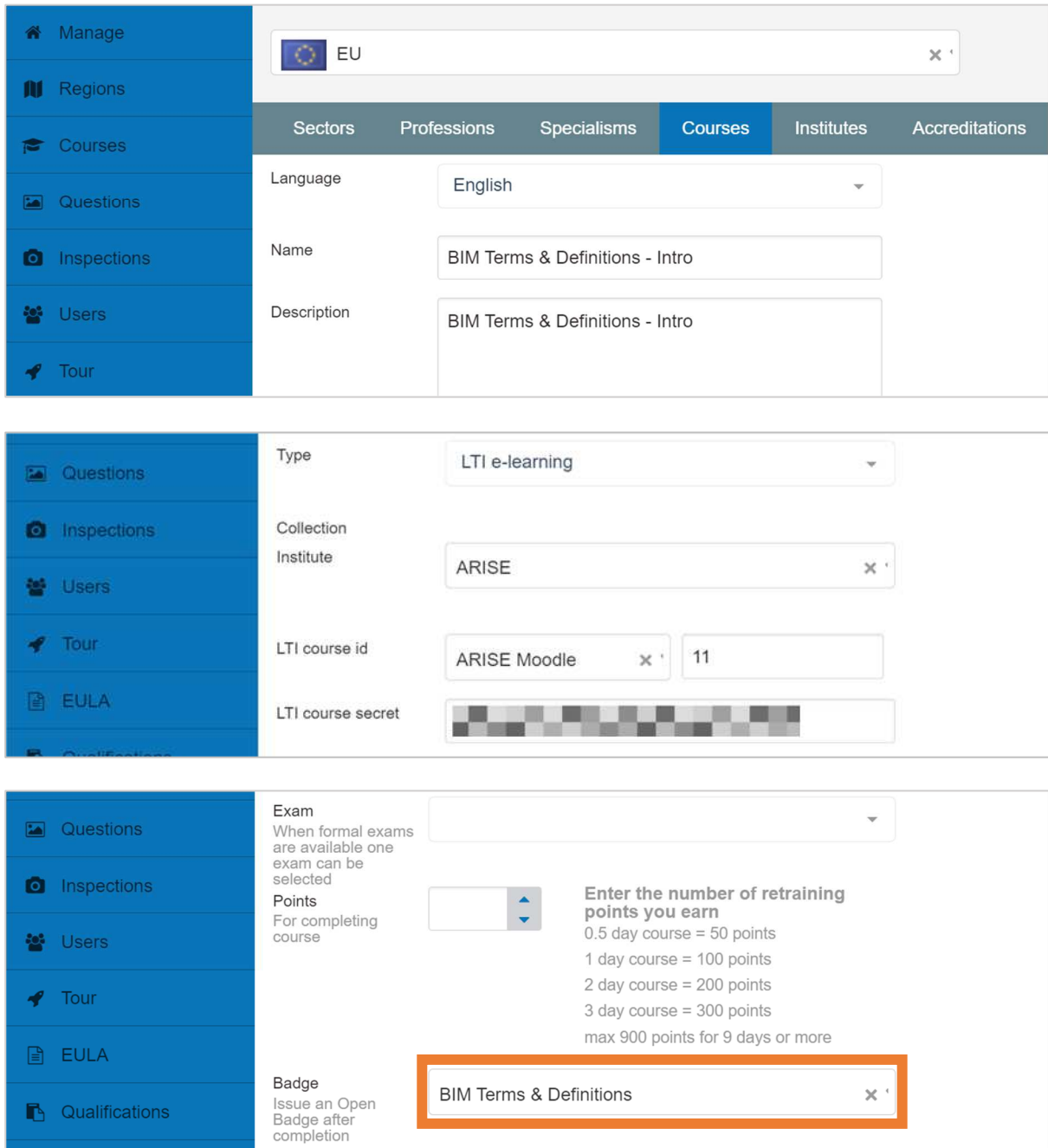


Figure 14. Open Badges added to the BUS-app

This is a proof of the module 'BIM Terms & Definitions' in the BUS-app database where the badge is selected:



The screenshot displays the ARISE application interface for editing a course. The left sidebar contains navigation options: Manage, Regions, Courses, Questions, Inspections, Users, and Tour. The main content area is divided into three sections:

- Top Section:** A search bar with 'EU' selected. Below it are tabs for Sectors, Professions, Specialisms, **Courses**, Institutes, and Accreditations. Fields include Language (English), Name (BIM Terms & Definitions - Intro), and Description (BIM Terms & Definitions - Intro).
- Middle Section:** Fields include Type (LTI e-learning), Collection Institute (ARISE), LTI course id (ARISE Moodle | 11), and LTI course secret (masked).
- Bottom Section:** Fields include Exam (dropdown), Points (dropdown with a list of retraining points: 0.5 day course = 50 points, 1 day course = 100 points, 2 day course = 200 points, 3 day course = 300 points, max 900 points for 9 days or more), and Badge (BIM Terms & Definitions, highlighted with an orange box).

Figure 15. Badge selection

6. Skills Maturity Assessment

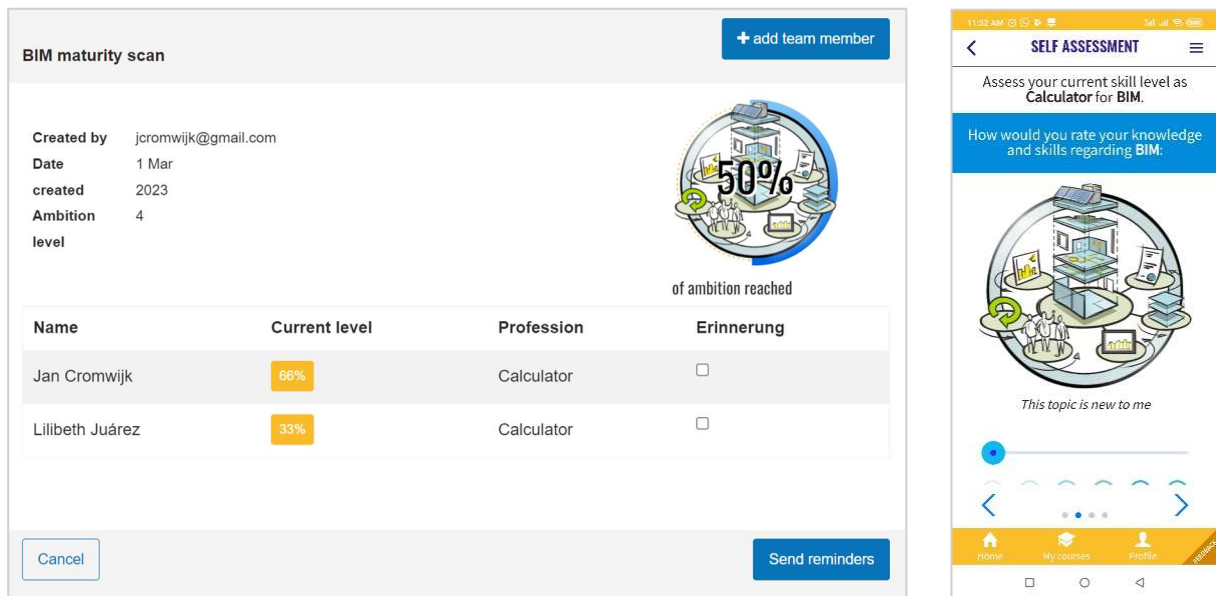
In the BUS-app Skills Maturity Assessments are configured in topics. Once a Topic has been configured within the BUS-app database, it is possible to perform a Skills Maturity assessment on individual and on organisational or team level.



Topic	Ambition level	Created
BIM	4	2023-03-01 19:30
Circular Skills	1	2023-03-04 13:27
Circular Skills	2	2023-03-11 09:11

Figure 16. The option within the BUS-app database to perform a Maturity Scan

The system allows admins to invite participants to perform their skills maturity assessment from the BUS-app:



BIM maturity scan

Created by: jromwijk@gmail.com
 Date: 1 Mar
 created: 2023
 Ambition level: 4

50% of ambition reached

Name	Current level	Profession	Erinnerung
Jan Cromwijk	66%	Calculator	<input type="checkbox"/>
Lilibeth Juárez	33%	Calculator	<input type="checkbox"/>

Cancel | Send reminders

SELF ASSESSMENT

Assess your current skill level as Calculator for BIM.

How would you rate your knowledge and skills regarding BIM.

This topic is new to me

Home | My courses | Profile

Figure 17. Sending invitations and the way it looks from the BUS-app

7. Journey in the BUS-app

The following figures show the steps to follow to take a course from the BUS-app, linked to the ARISE platform to obtain XP, OB and rate it:

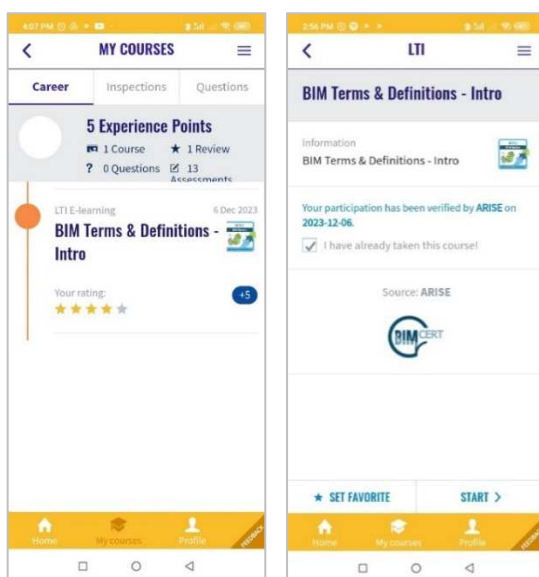
1. Open the BUS-app



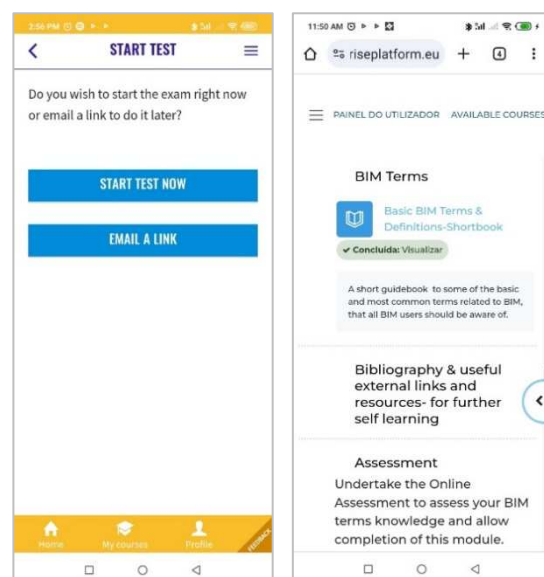
2. Do skills assessment (optional)



3. Find module to start with



4. Follow module in Moodle



5. Get badge at completion of module

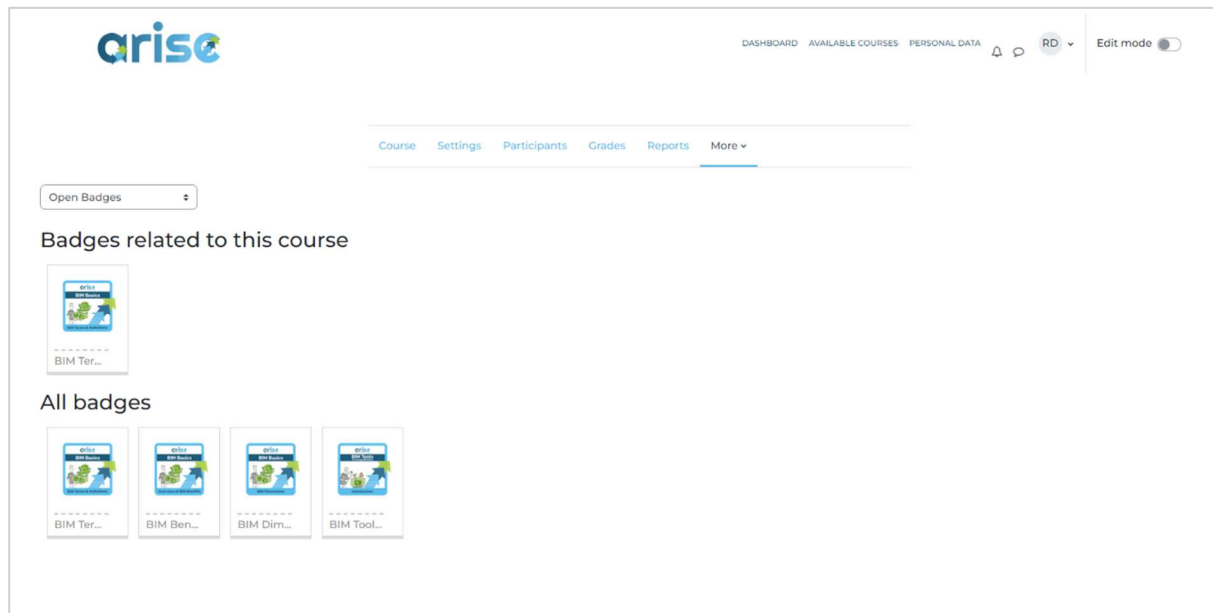


Figure 18. Open Badges within the ARISE Moodle



Figure 19. The Open Badge obtained at OBF

6. Get milestone badge at completion of the pilot modules

Once all modules are completed, it is possible to obtain Milestone Badges*, which are the representation of a set of smaller badges.

**The Milestone Badges will be blockchained when OBF is upgraded from the Open Badge standard 2.0 to the Open Badge standard 3.0. The release is expected in May or June 2024*

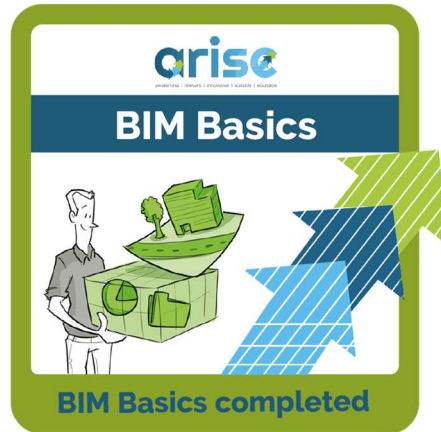


Figure 20. The BIM Basics Milestone Badge

7. Rate module(s)

After completing a module, it is possible to rate it from the BUS-app:

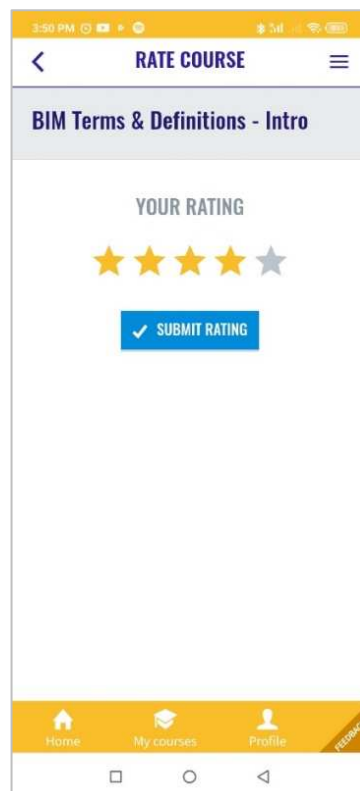


Figure 21. Rating a module



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