DELIVERABLE: D24 - D4.4

E-learning Courses for Technicians

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Network for Using BIM to Increase the Energy Performance

Grant Agreement Number: 754016
Net-UBIEP H2020

August 2019

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement *No.754016*

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A. Deliverable Details	
Document Reference #:	D24 - D4.4
Title:	E-learning Courses for Technicians
Version Number:	4
Preparation Date:	
Delivery Date:	
Author(s):	University of Zagreb, Faculty of Civil Engineering
Contributors:	All the partners
Work Package	WP 4
Type of deliverable	Websites, patents filling, etc.
Format	Report
Dissemination Level:	Public

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B. Short description

The goal of this report is to provide an overview of the **E-learning Courses for Technicians**.
Nowadays it is possible to visualize the BIM model on a tablet. The installers and workers will need to learn how to use the BIM viewer instead of the 2D design and need also to learn how to point out the inconsistencies between the "as built" and the "as planned".
Validation of BIM Qualification Models and training materials was implemented in each partner country by the partners with more experience in training activities such as Universities and Training Centres. Mainly one partner per country organised and performed training, and these were as follows: ENEA (IT), FLC (ES), TUT (EE), FCE (HR), Dig.Con. (LT), ISSO (NL), ViaEU (SK).
E-learning contents was uploaded on the e-learning platforms (Moodle and ENEA e-learn) and were developed in national languages Croatian, Dutch, Estonian, Italian, Latvian, Slovak, Spanish. Validation of training material and assessment for **Installers and Workers** on how to use BIM for the energy performance was realised through an E-learning course.

Good quality practices of education are based on these three pillars:

- clear definitions of learning outcomes,
- design and structure of the programme course,
- evaluation and monitoring of the learning outcomes

The main goal of this report is to provide information for future activities, based on the experience during the Net-UBIEP project. Therefore, this report will present the overview of the developed e-learning courses and will set guidelines for the learning outcomes (also project deliverable *D4.8 Review of the three dimensional matrix*), the evaluation of the courses, and finally will also enable experience exchange between the different training institutions.

The report does not contain sensitive information and the collected data is being treated confidentially following the rules of General Data Protection Regulation 2016/679.

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1. Learning outcomes and training programme

Both learning outcomes and training programme were explored and defined in details in previous project activities. All the partners followed the learning outcomes defined in deliverables *D14 - D3.1 Three-dimensional Matrix* and *D15 - D3.2 Requirement for learning outcomes* as well as the training materials developed as deliverables *D20 - D3.7 E-contents for Technicians on how to read BIM models*.
Therefore, in this chapter a summary of the main information is presented, as detailed information can be found in the respective Deliverables.
The e-learning courses followed somewhat different structure in every partner country but as mentioned before have always included all the learning outcomes and training content defined in respective deliverables. Additionally, each respective partner developed their e-learning courses at different levels of interactivity which then followed their course structure.

1.1 E-learning

The term "E-learning" does not indicate that a new form of learning takes place, but rather that digital technologies are used to develop new educational practices as well as enhancing traditional educational practices.
The term can denote both the digital tools and technologies used in the student's learning process and the new practices of the teachers and students that are brought about from using these tools.

Digital tools/technologies used in E-learning may be software programs, web pages/portals/services, voting devices, etc. The new practices may be remote teaching via online conferencing, online collaboration and group work, digital exams, etc.
Whereas E-learning can refer to tools and technologies, "online teaching" refers solely to the teacher's practices of teaching using web based tools and technologies. Similarly, "online learning" means the learning process that goes on using E-learning tools on the web.
Web technologies such as blogs, forums, and wikis allow people to interact online, to exchange information, ask questions, and share knowledge with their peers. In recent years many platforms and services have sprung up that build on social interaction between the users. These are collectively known as "social media".

Some of these features, such as blog or forum functionalities, are often included in standard learning management systems to a higher or lower extend to harness the possibilities of social interaction in the learning process. Features like blogs and forums are also taken advantage of in different online learning platforms, where learners benefit from the diversity of each other's knowledge by asking and answering questions as part of their studying as described above.

Another form of online teaching activities are live webcasts, i.e. streaming video and interaction between teacher and students at different locations. This form of synchronous online learning potentially has the advantage of providing a rich and engaging learning experience. The disadvantage is that a slight disturbance in sound or image can disturb the learning process. Synchronous as well as asynchronous online learning requires of the teacher a new set of skills to function as a moderator in the online classroom. Similarly, online teaching often requires a rethinking of the pedagogical design that must be considered, alongside the choice of technology and platform, when institutions and teachers begin the endeavour into online teaching.

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The benefits of E-learning programmes and courses would be that knowledge of excellence can be distributed from a small number of education institutions to a wider learning community. This learning community is not necessarily restricted to academic organizations but may also include partners from the industry. E-learning programmes and courses might be used as building blocks for continuous education and life-long learning.
The flexibility turns out to be limited when workers, installers and technicians try to fit physical courses, which take place at fixed times of the day and week, into their busy working schedule. Many E-learning applications offer a new degree of flexibility where workers and installers can learn anytime and anywhere.

An e-learning course has a few levels of interactivity. These levels are characterized by the degree of intelligence created in the e-learning course. There are 4 levels of interactivities that can be used in online courses.

Level 1: Passive e-learning with no interactivities

- This is similar to listening to a lecture where the speaker goes on speaking and learners just sit there and listen. In an online environment, this would be a course with largely text and static images. Navigation would be limited to simple Play/Pause and Next/Back buttons. It is a one-way communication with the objective of passing essential information for consumption of learners.
- However, it would not be an ideal format for training that impacts decision making on the job. According to some sources, 49% of e-learning courses are still developed at this level and it is unlikely that all of them are meant for the purpose of passing simple information.

Level 2: Limited interactivities

- Level 2 e-learning consists of limited interactivities. Something like the instructor posing a few questions to the audience now and then just to check for understanding and comprehension. In an online setting, this would be in the form of simple quiz questions that learners have to respond to before moving to the next segment. It could also be simple puzzles with drag and drop interactivity, animations, click on images, etc.
- If the intention is more than just knowledge transfer to learners (such as performance improvement or skill development), this is something one needs to consider in online courses.

Level 3: More complex interactivities

- At this level, the interactivities get more complex and require a detailed Instructional Design approach. This level is like having a hands-on workshop, team games, etc. that involve a great deal of learner engagement. Online courses with level 3 interactions would be typically rich in audio and video elements, customized visuals, interactions, games, or quizzes.
- This level of interactivity is a must for teaching a new software application where learners have an opportunity to work in a simulated environment. Compliance courses with story-based learning strategy, gamification, or real-life scenarios also could be created with this level of interactivity to a certain extent.

Level 4: Highly simulated environment

- In an online training, level 4 interactions may have high-end graphics, Virtual Reality, and 3D simulations which may be costly and also require the expertise of animators and coding specialists.

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Table 1 Overview of e-learning courses setup across partner countries

Partners country	Level of interactivity	e-learning platform	Online teaching content	Type of material produced
Croatia	Level 3	MoD Moodle	Asynchronous	Pdf presentations; Recorded video lessons; Videos; Dictionary; Database of test questions; Tests; Interactive games; Chat rooms; Forum
Estonia	Level 2	TalTech Moodle	Asynchronous	Pdf presentations; Videos; web links; Tests; Forum
Italy	Level 3	ENEA e-Learn	Asynchronous	Lessons; Recorded video lessons; PPT presentations; Videos; BIM glossary; Links to external web sites and documents; Tests
Lithuania	Level 2	Moodle	Asynchronous	Pdf presentations; web links; Tasks; Forum
Slovakia	Level 1 + in-class demonstrations	Net-Ubiep Moodle	Asynchronous	Pdf presentations, Video demonstrations on using applications based on BIM in construction and maintenance, Tutorial with BIM glossary
Spain	Level 3	Campus Fundacion	Synchronous	Video conferences, Video tutorials; Exercises; Practical test
The Netherlands	Level 2	Isso leerplatform	Asynchronous	Lessons, Videos, Tests

The current report describes the functionalities and main features of the relevant e-facilities developed in each partner country, while it identifies the courses that are available on the e-learning platform.

2. e-learning courses

2.1 Croatia

2.1.1 E-course description

Providing online education can mean a number of different things from streaming content (e.g. screencasts or lectures on video) to offering complete online courses with online learning objects and synchronous and asynchronous online teaching and learning activities.

The Croatian E-learning course is designed to be freely **available for all interested parties (with a mandatory free registration)** and was designed with a total **estimated workload of 24 hours** for the learners.

The **Croatian partners** opted to develop **asynchronous online teaching content** with the goal to provide learners the opportunity to follow the lessons independently of teachers (e-learning administrator's) activities at any time they wish, and as many times they need to do it to gain knowledge and skills.

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Additionally, the content of such education is designed to be scalable and support an unlimited number of students in contrast to synchronous online teaching where inevitably there is a need to limit the group size to be manageable for the teacher.
Learners can study and learn at their own pace, test their knowledge, and reinforce concepts through further reading or other online material such as models or simulations.

The main limitations associated with free online education as opposed to regular classroom educations include (medium related differences aside) the limited ability of working directly with a tutor or teacher.

The Croatian Net-UBIEP e-learning course is characterised by extensive use of E-learning tools such as recorded lectures, short quizzes (tests and games) where learners can perform self-evaluation as well as video demonstrations and chat rooms and forums where learners can communicate with their peers and teachers (instructors). The modules contain a number of E-lessons where learners listen to recorded presentations, can follow recorded step by step video demonstrations on BIM tools for different applications related to energy efficiency and NZEB in order to perform hands-on exercises with different BIM software, and discuss the related issues in online forum.

The "**Moodle MoD**" e-learning system provided by University Computing Centre (SRCE) of the University of Zagreb has been chosen as the learning platform for the course because it supports all of these activities. The E-learning system MoD (Moodle Community) (http://mod.srce.hr/) is established for e-learning projects in the community primarily to those started and initiated in the academic community.

The main objectives of the e-courses are:

- To disseminate Net-UBIEP project results.
- To educate workers, installers but also students, young professionals and practitioners.
- To support stakeholders, policy and decision-makers by offering them e-learning on BIM and energy efficiency.
- To provide online training facilities to the owners, tenants and building managers on BIM application in energy efficiency during the building's life cycle.
- To foster the uptake of BIM in energy efficiency related applications.
- To exploit future potential of creating a complete specialised programme/seminar on BIM and energy efficiency.

2.1.2 Functionalities and features of the e-learning platform

The Net-UBIEP website has been extended with a new functionality, the e-learning platform http://www.net-ubiep.eu/hr/platforma-za-e-ucenje-projekta-net-ubiep/.
The e-learning platform is a public area of the website, accessed by all interested users (mandatory registration for free access), and provides online training and educational material, structured under specific topics. The instructors of the course have editing privileges and can create lessons and topics, upload training material etc.

The fundamental structure of the platform is the following:

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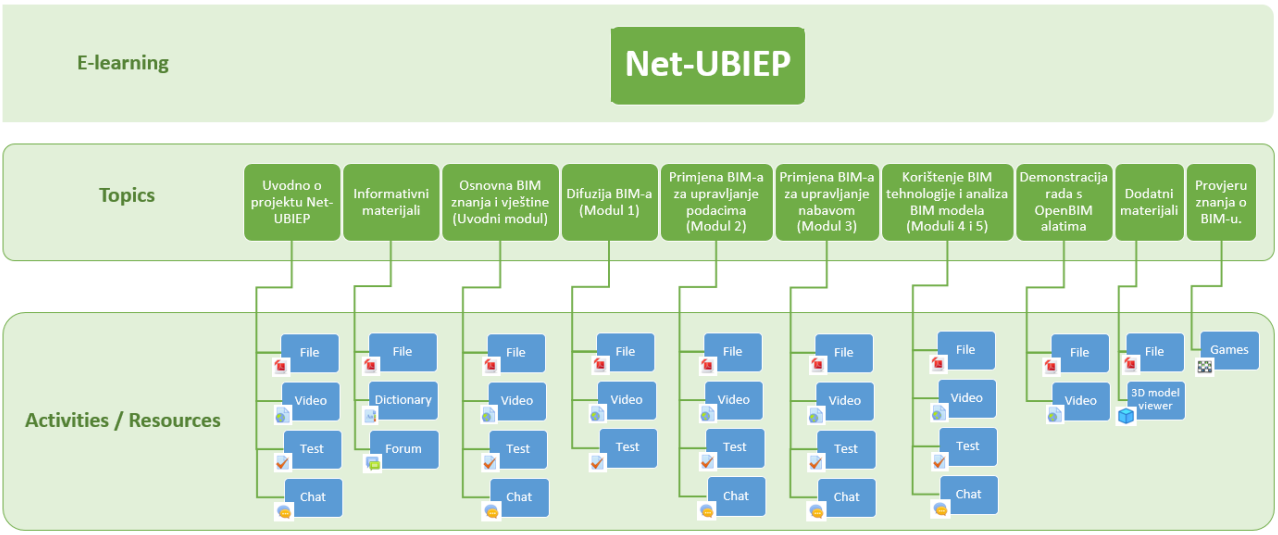

Key features of the developed Net-UBIEP e-learning course:

- The instructor can easily create an unlimited number of Lessons, and Topics, and upload educational material.
- The publishing of each lesson can be scheduled for a specific date/time.
- The instructor can upload videos and e-learning files to supplement the course material.
- The instructor can create quizzes to be taken after the completion of the lessons. There are several types of quizzes to choose from.
- Learners have the option to download all training material whenever they wish.
- Learners have a possibility to provide feedback or ask questions at the end of each topic in a form of a chat with instructors.
- Private or public forums connected to the information materials developed within the Net-UBIEP project are available.
- Instructors can run reports on the users' activity.

Analysis of the training results, problems and solutions together with lessons learned during the courses are as follows:

- Learning material is presented in a different way online, which gives course participants time to reflect and discuss course topics in depth
- difficulties with the hands-on exercises in BIM software. It is difficult for the teachers and fellow course participants to provide the necessary guidance when they could not see the participants' screen.
- it was hard for learners to contribute with new information to the group discussions once a few participants had answered a given question from the teachers. Some questions were thus revised or replaced with a quick multiple-choice questionnaire or short games for self-testing, which also made the course material more varied.
- The completion rate is not necessarily representative for future Net-UBIEP e-learning courses because the participants attended the Net-UBIEP e-learning course for free and they use it to learn basics of BIM and energy efficiency in buildings. The payment of a fee (by industry clients) is expected to be an important motivation factor when it comes to completing the course. The other motivation

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for completing the full course would be the certification system which would recognise the developed e-learning course as relevant for gaining BIM and NZEB competences.

- The learning material should have at least the same quality as material taught in regular classes, thus empowering learners who would otherwise not be able to seek classroom courses on BIM

The main page of the Croatian Net-UBIEP E-learning platform http://www.net-ubiep.eu/hr/platforma-za-e-ucenje-projekta-net-ubiep/

The main page of a course (content and features) is shown in the figures below:

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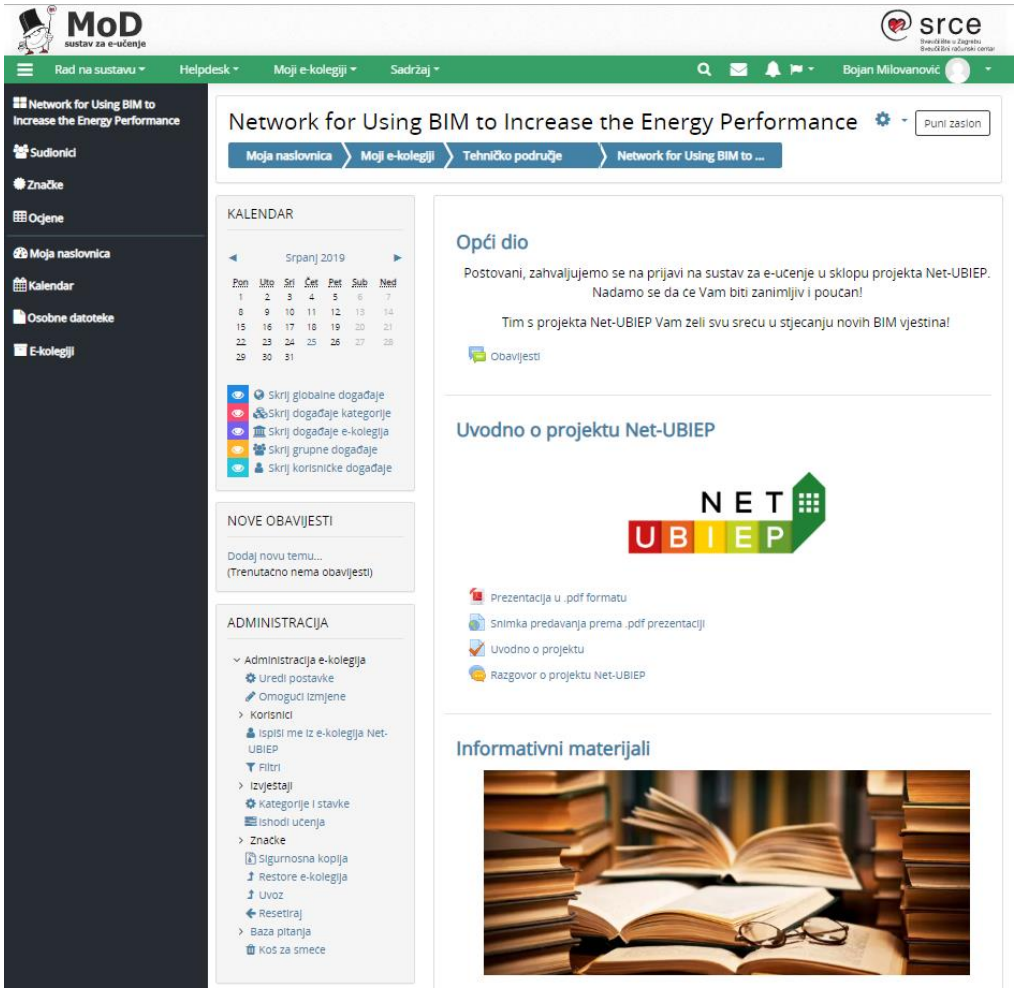

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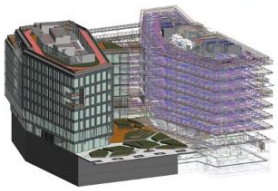
PRISTUPAČNOST

KORISNICI ONLINE

1 korisnika online (u posljednjih 5 minuta)
Bojan Milovanovic

Trening materijali za profesionalce
Trening materijali za djelatnike javne uprave
Trening materijali za vlasnike i upravitelje zgradama
Trening materijali za instalatere (obrtnike)
BIM rječnik
Forum o razvijenim trening materijalima

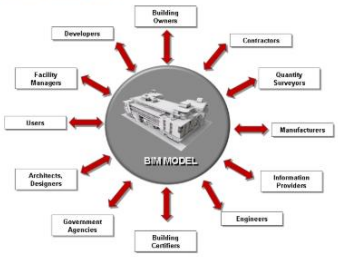
Osnovna BIM znanja i vještine (Uvodni modul)



Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji
Osnovna BIM znanja i vještine
Razgovor uvodnom modulu

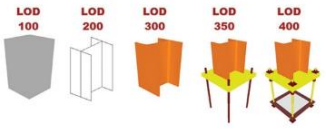
1

Difuzija BIM-a (Modul 1)



Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji
Difuzija BIM-a
Razgovor o Modulu 1

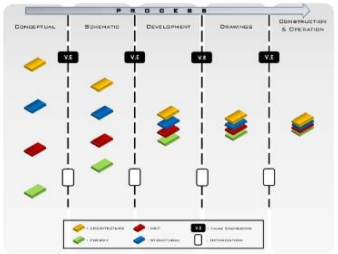
Primjena BIM-a za upravljanje podacima (Modul 2)



Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji
Primjena BIM-a za upravljanje podacima
Razgovor o Modulu 2

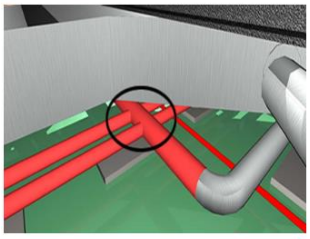
2

Primjena BIM-a za upravljanje nabavom (Modul 3)



Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji
Primjena BIM-a za upravljanje nabavom
Razgovor o Modulu 3

Korištenje BIM tehnologije i analiza BIM modela (Moduli 4 i 5)



Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji
Korištenje BIM tehnologije i analiza BIM modela
Razgovor o Mudulima 4 i 5

3

Demonstracija rada s OpenBIM alatima

Prezentacija u .pdf formatu
Snimka predavanja prema .pdf prezentaciji

Dodatni materijali

Praktični rad u BIM programskom paketu Allplan (radionica 9. ožujka 2019.)
Praktični rad u BIM programskom paketu Allplan - AX3000 (radionica 9. ožujka 2019.)
Jednostavni prikaz modela bez informacija izvezen iz BIM okruženja

Provjerite koliko ste naučili o BIM-u

Križaljka
Sudoku
Vješalo

4

Moodle Docs za ovu stranicu

Helpdesk

Za sva pitanja javite se Centru za e-učenje:
Online upit
E-mail: moodle@srce.hr
01/616 5171 (radnim danom od 8 do 16)
Najčešće postavljena pitanja

Centar za e-učenje

CENTAR ZA e-UČENJE 10 godina s vama
Web stranica Centra za e-učenje

srce

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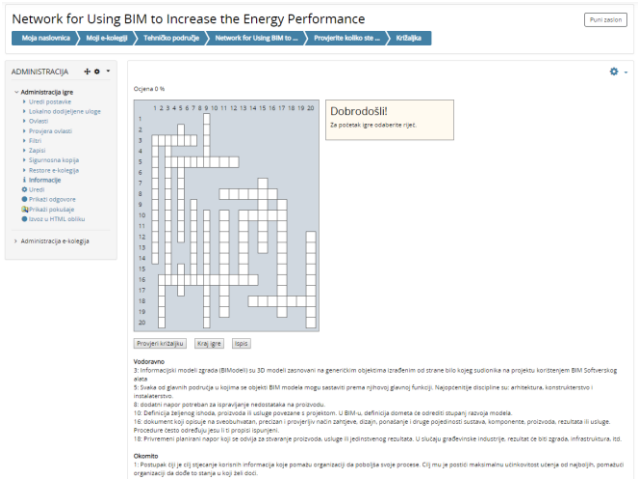
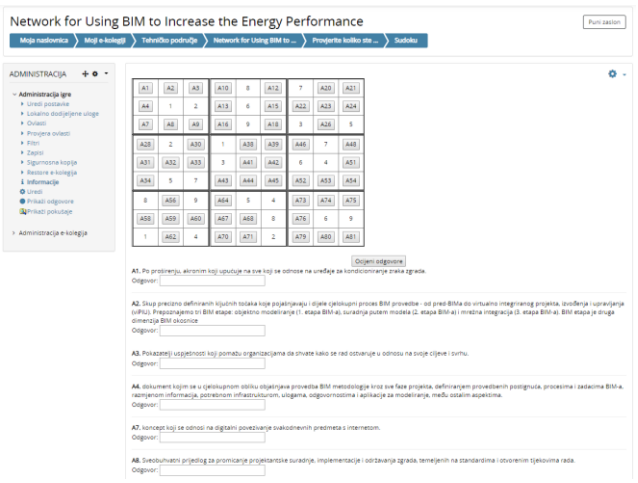
Screen capture of the short quizzes (games) in Croatia language is shown below:





2.2 Estonia

2.2.1 E-course description

The e-learning platform is a public area of the website, accessed by all interested users (content can be accessed by everyone, but to solve tests and quizzes, one needs to register), and provides online training and educational material, structured under specific topics. The instructors of the course have editing privileges and can create lessons and topics, upload training material etc.

Estonian partners have developed Net-UBIEP e-learning course using the TalTech Moodle (https://moodle.taltech.ee/course/view.php?id=22410&lang=en), where self-learning materials, videos and tests are available for learners to use them.

In total 5 modules of Net-UBIEP course were developed in Estonia as follows:

- Introduction
- Module: Public Administration
- Module: Specialists
- Module: Technicians
- Module: Owners

If one wants to enrol in a Module for a specific target group, he/she must firstly finish the Introduction module to learn about Net-UBIEP project as well as the basis of BIM and energy efficiency in buildings. Currently, the module for technicians is filled with content, while other modules are under development.

The main page of the Estonian Net-UBIEP E-learning platform is available on the following link https://moodle.taltech.ee/course/view.php?id=22410&lang=en

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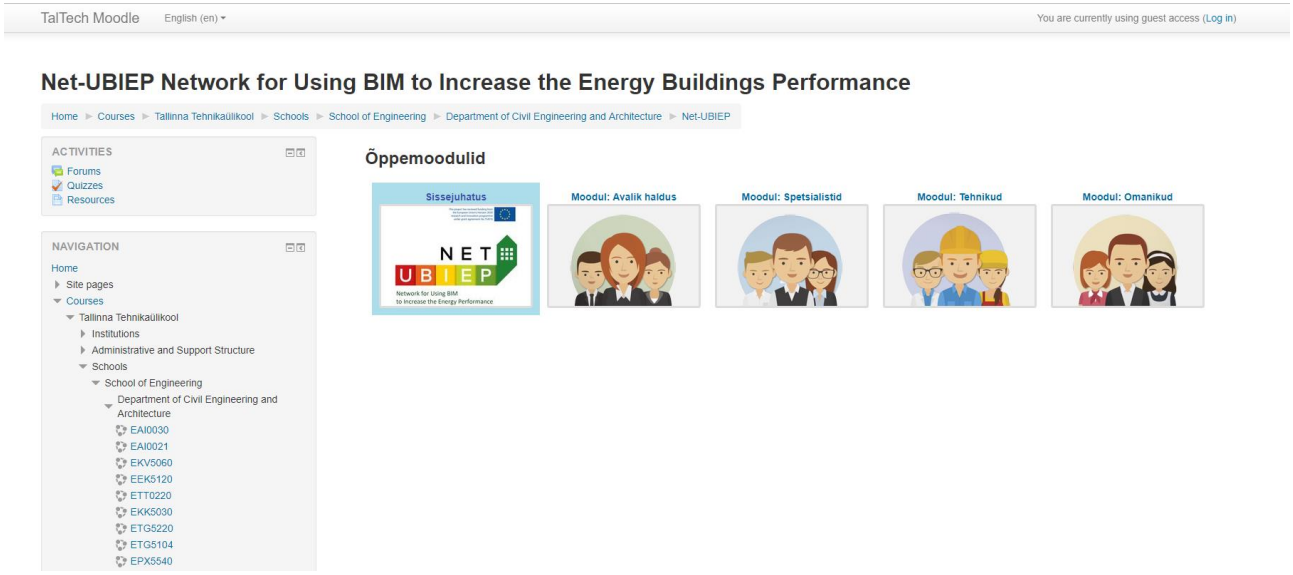

The Estonian E-learning course is designed to be freely **available for all interested parties (with a mandatory registration to be able to access tests)** and was designed with a total **estimated workload of 24 hours** for the learners.

The **Estonian partners** opted to develop **asynchronous online teaching content** with the goal to provide learners the opportunity to follow the lessons independently of teachers (e-learning administrator's) activities at any time they wish, and as many times they need to do it to gain knowledge and skills.
The Estonian Net-UBIEP e-learning course is characterised by extensive use of pdf presentations on BIM, energy efficiency and NZEB.
The Estonian partners developed a Multiple Choice Test - A test of the ability to find information from a model. The test requires the download of sample files (IFC) and the use of an optional IFC viewer software (from the recommended list). All questions have one correct answer. After completing the test, it is possible to see the overall result, including which questions were answered correctly. The correct answer is not displayed. Learners can take the test any number of times. The test is time limited (3 h). After the time has elapsed, the test performance is submitted to an automatic check, where unanswered questions are not analysed. Learners need at least 81% correct answers to complete the test.

The fundamental structure of the platform of the Module for technicians is the following:

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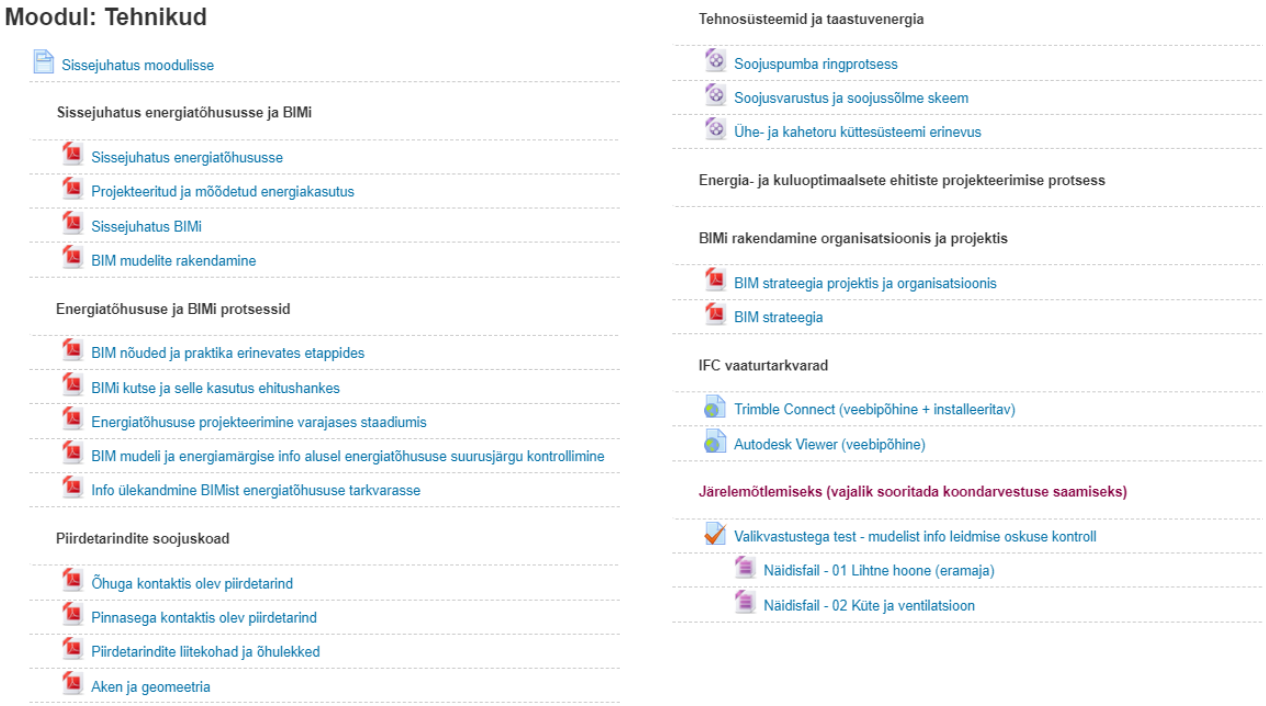

2.2.2 Events for technicians

In addition to the developed e-learning course, Estonian partners have decided to organize the events for technicians and related to e-learning courses. These courses were titled “Ensuring energy efficiency in buildings with BIM training for Vocational Education Teachers and Skilled Workers (BIM Viewer Competent)”.

Events for VET teachers and skilled workers were organized on:

- **February 5th 2019** (4 hours) [10 participants] – purely theoretical course, with the following topics
  - Ventilation & BIM
  - BIM-based modern utility systems in the renovated building.
  - Renovation & BIM
  - What do you know, what to learn and how to build better?
  - How BIM can help improve energy efficiency

- **April 22nd 2019** (6 hours) [17 participants] - theoretical and practical training, with the following topics
  - Introduction to Energy Efficiency and Humidity risk
    - Energy efficiency indicators
    - Heat loss and moisture damage to the building envelope
    - Energy efficiency planning in building construction
    - Humidity prevention solutions in construction
  - Introduction to BIM
    - Terms, principles, process description
    - BIM vs. CAD

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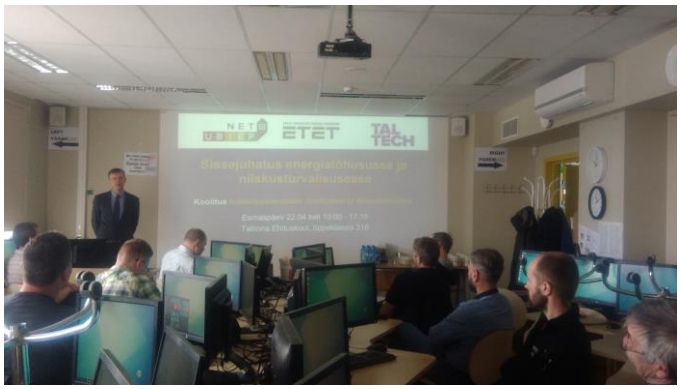
- BIM standards and guidelines BIM project and construction objectives and uses,
- Examples of best / worst theory and best / worst practice

- Computer class
  - Model opening, navigation
  - Surfing the model and looking for material properties
  - Exercise tasks according to the skill of the construction worker
- Computer class
  - Measuring dimensions and volumes
  - View material properties
  - Exercise tasks according to the skill of the construction worker

In total, **27 participants** attended the VET teachers and skilled workers' events in Estonia within the framework of the Net-UBIEP project.

Several images from the events for VET teachers and skilled workers conducted by the **TUT** can be found bellow. Left - event on February 5th 2019; right - event on April 22nd 2019.



2.2.3 Agenda

Agenda for the event for VET teachers and skilled workers organized on **February 5th 2019** (left) and event organized on **April 22nd 2019** (right).

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Hoonete energiatõhususe tagamine BIM'i abil **koolitus**
kutseõppeasutuste õpetajatele ja oskustöölistele
(BIM vaataja kompetent)

Ajakava

Sissejuhatus teemasse		
Kuupäev ja aeg: 5.02.2019 kell 10:00 - 14:00 **Asukoht:** Tallinna Tehnikaülikool		
Aeg	Koolitaja	Teema
10:00-11:15	Alo Mikola	**Ventilatsioon & BIM** **Mektory**
11:15-11:50	Alo Mikola	**BIMi alusel paigaldatud kaasaegsed tehnosüsteemid renoveeritud hoones.**
11:50-12:30	Peep Pihelo	**Renoveerimine & BIM** **St. üks võimalus, kuidas muuta vana ühiselamu kaasaegseks ja energiatõhusaks**
12:30-13:30	Targo Kalamees	**Mida teada, mida õppida ja kuidas ehitada paremini?** **Kuidas BIMi kasutamine aitab parandada energiatõhusust**
13:30 – 14:00		**Arutelu**

Hoonete energiatõhususe tagamine BIM'i abil **koolitus**
kutseõppeasutuste õpetajatele ja ehitustöölistele

Ajakava

Sissejuhatus teemasse		
Kuupäev ja aeg: Esmaspäev 22.04 kell 10:00 - 17:00 **Asukoht:** Tallinna Ehituskool		
Aeg	Koolitaja	Teema
10:00-11:30	Targo Kalamees	**Sissejuhatus energiatõhususse ja niiskusturvalisusesse** • Energiatõhususe indikaatorid • Piirdetarindite soojuskaod ja niiskuskahjustused • Energiatõhususe kavandamine hoone ehitamisel • Niiskushajustuste vältimise lahendused ehitamisel
11:30-11:45		**Paus 15 minutit**
11:15-13:15	Raido Puust Ergo Pikas	**Sissejuhatus BIM-i** • Terminid, printsiibid, protsessi kirjeldus • BIM versus CAD • BIM standardid ja juhendid BIM projekti ja ehituse eesmärgid ja kasutusalad, • Näited parimast/halvimast teooriast ja parimast/halvimast praktikast
13:15-14:15		**Lõuna 1 tund**
	Raido Puust Ergo Pikas Anti Hamburg	**Arvutiklassis** • Mudeli avamine, navigeerimine • Mudelis surfamine ja materjaliomaduste otsimine • Harjutusülesanded vastavalt ehitustöölise kutseoskustele (vt. lk 2-4)
15:45 – 16:00		**Paus 15 minutit**
	Raido Puust Ergo Pikas Anti Hamburg	**Arvutiklassis** • Mõõtude ja mahtude mõõtmine • Materjaliomaduste vaatamine • Harjutusülesanded vastavalt ehitustöölise kutseoskustele (vt. lk 2-4)
16:00 – 17:00		**Arutelu**

2.3 Italy

2.3.1 E-course description

The Italian E-learning course is designed to be freely **available for all interested parties (with a mandatory free registration)** and was designed with a total **estimated workload of 24 hours** for the learners.

The **Italian partners** opted to develop **asynchronous online teaching content** with the goal to provide learners the opportunity to follow the lessons independently of teachers (e-learning administrator's) activities at any time they wish, and as many times they need to do it to gain knowledge and skills.
Learners can study and learn at their own pace, test their knowledge, and reinforce concepts through further reading or other online material such as models or simulations.
The Net-UBIEP website has been extended with a new functionality, the e-learning platform http://www.net-ubiep.eu/it/e-learning-5/.
The e-learning platform is a public area of the website, accessed by all interested users (mandatory registration for free access), and provides online training and educational material, structured under specific topics. The instructors of the course have editing privileges and can create lessons and topics, upload training material etc. The main page of the Italian Net-UBIEP E-learning platform

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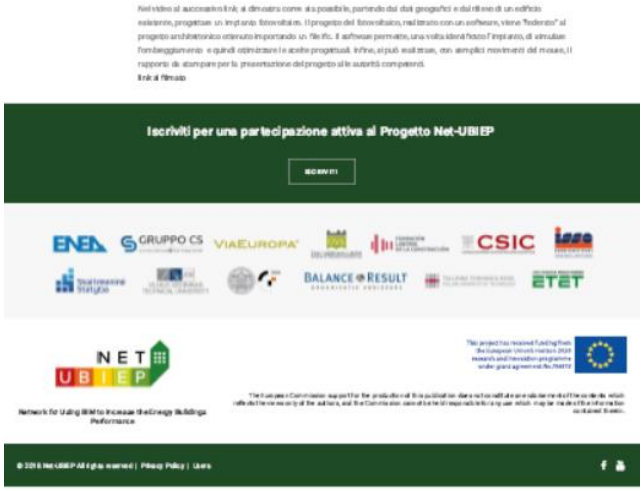

The first e-learning course on the use of BIM to improve the energy performance of buildings was published on the www.formazione.enea.it platform.
Although the course is designed specifically for technicians, it can be useful for anyone who wants to learn about this use of Building Information Modelling. To view the course, learners must perform a free registration. The title of the course is BIM, training for technicians.
The first video lesson of the course on BIM and its diffusion is available on-line to get an improvement in the energy performance of buildings. During the first lesson the issues related to the strategies to be adopted to implement BIM within a public or private company are being addressed.

2.3.2 Functionalities and features of the e-learning platform

To access the ENEA E-learn platform click here: http://www.net-ubiep.eu/it/iframe-test/
The Italian Net-UBIEP e-learning course is characterised by extensive use of E-learning tools such as recorded lectures, lessons, links to external web sites and documents useful for learners. Additionally, short quizzes (tests) are available, where learners can perform self-evaluation. The modules contain a number of E-lessons where learners can read materials developed on BIM for different applications related to energy efficiency and NZEB.

Educational objectives of the developed e-learning course in Italy are:

- The usefulness of BIM
- The different uses of the BIM model

On the e-learning web page http://www.net-ubiep.eu/it/e-learning-5/, a video was also uploaded showing how it is possible to design a photovoltaic system, starting from the geographical data and the survey of an existing building. The photovoltaic project, made with BIM software, is "federated" to the architectural project obtained by importing an ifc file. The software allows, once the system has been identified, to simulate shading and therefore optimize the design choices. Finally, the report to be printed for the presentation of the project to the competent authorities can be created with simple mouse movements.

The main page of a course (content and features) is shown in the figures below:

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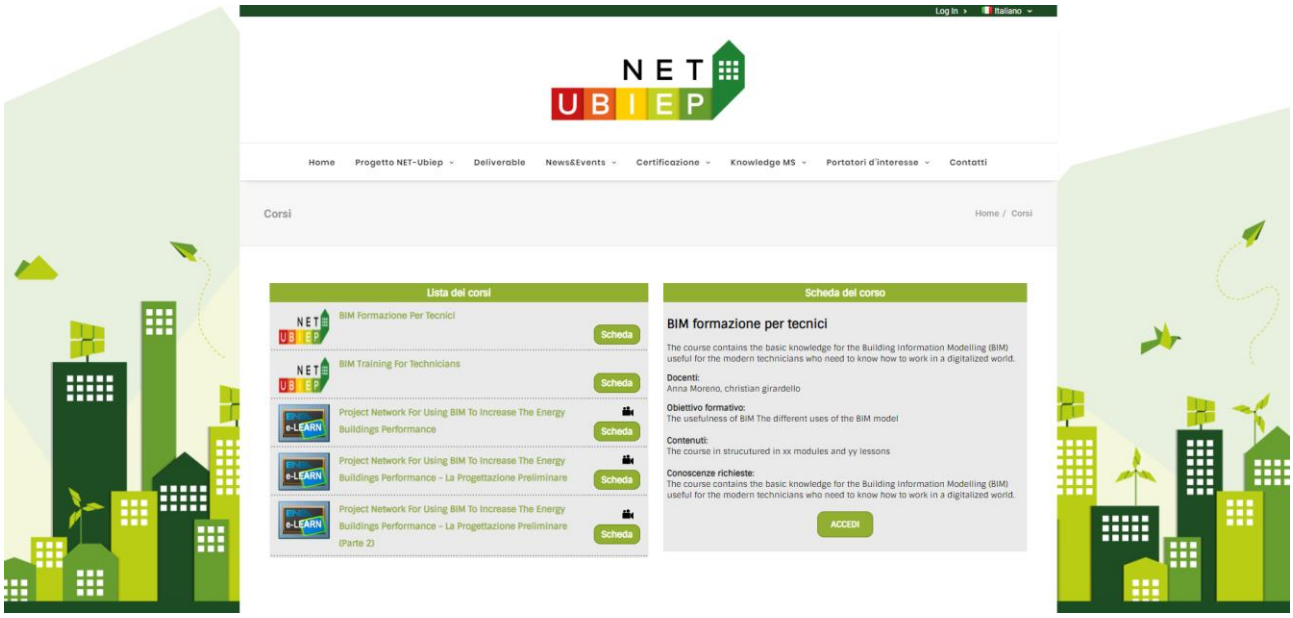
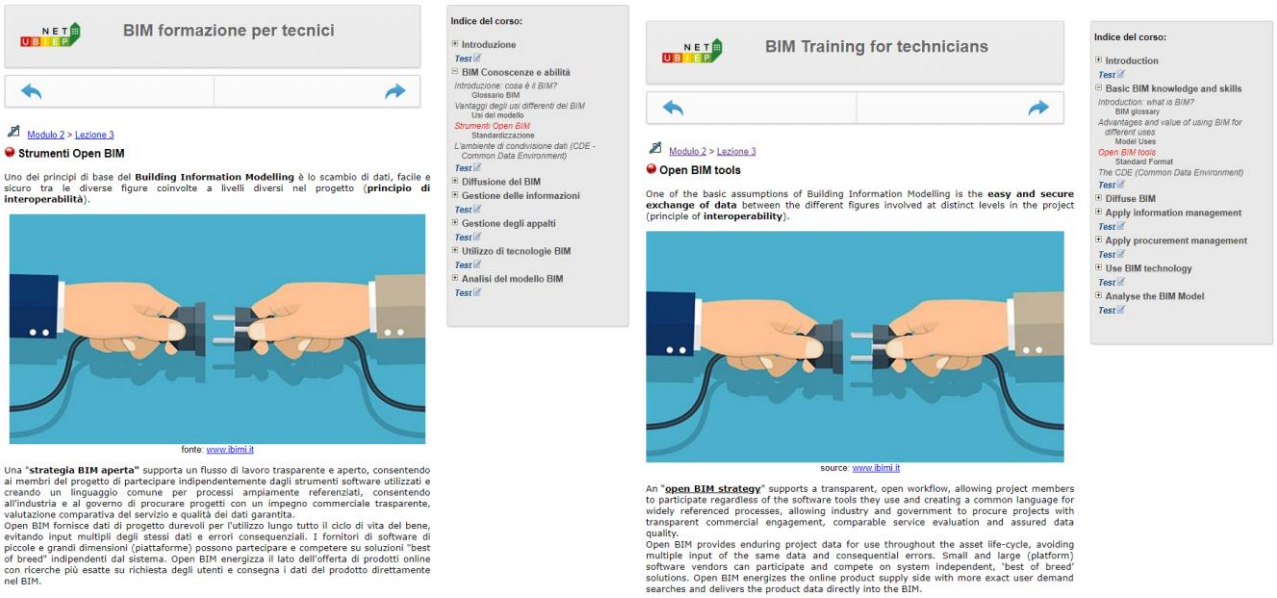


Here, learners can choose to take the lessons developed in Italian or English languages as well as recorded video lessons in Italian language.

Screen capture of the lessons example in Italian and English language is shown below:



Screen capture of the test questions example in Italian and English language is shown below:

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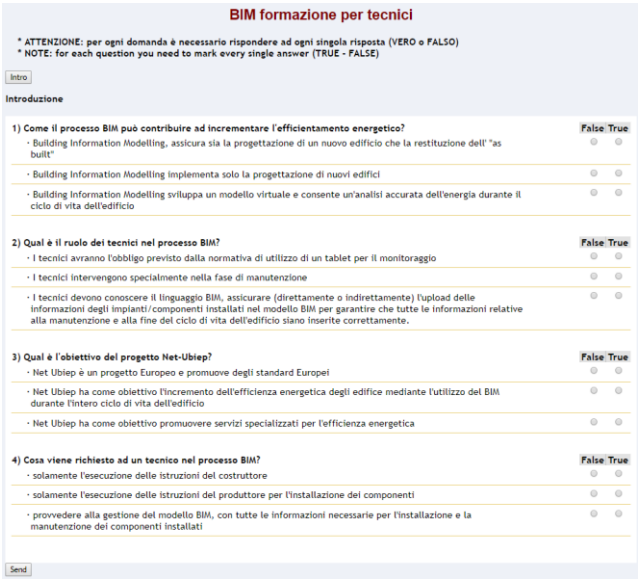
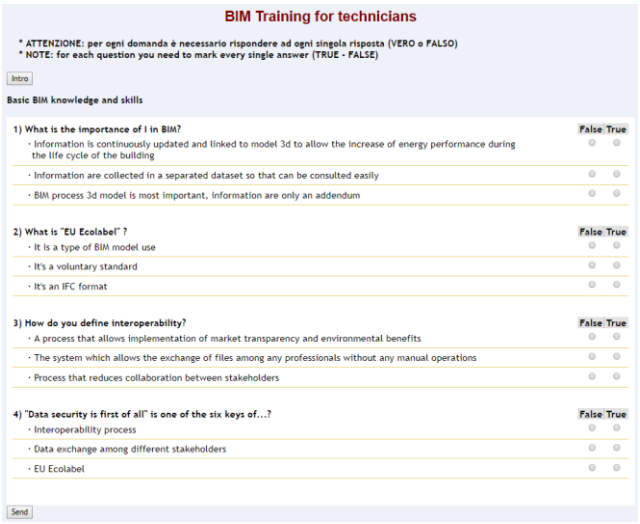
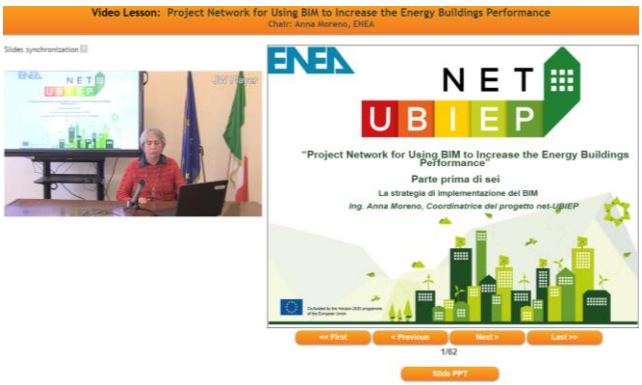




Screen capture of the recorded video lessons in Italian language is shown below:



2.4 Lithuania

2.4.1 E-course description

The Lithuanian E-learning course is designed to be freely **available for all interested parties (with a mandatory free registration)** and was designed with a total **estimated workload of 24 hours** for the learners.

The **Lithuanian partners** opted to develop **asynchronous online teaching content** with the goal to provide learners the opportunity to follow the lessons independently of teachers (e-learning administrator's) activities at any time they wish, and as many times they need to do it to gain knowledge and skills.
Learners can study and learn at their own pace and reinforce concepts through further reading or other online material such as models or simulations.
For E-Learning courses for professionals the Moodle platform was launched in Vilnius Gediminas Technical University (http://skst.vgtu.lt/).

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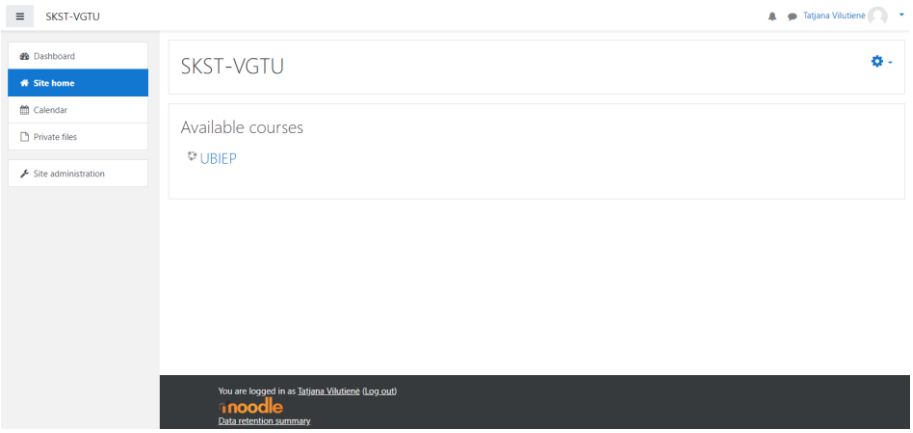
2.3.2 Functionalities and features of the e-learning platform

To access the Lithuanian Net-UBIEP e-learning course click here: http://skst.vgtu.lt/



The Lithuanian Net-UBIEP e-learning course is characterised by extensive use of pdf presentations on BIM, energy efficiency and NZEB with several tasks for learners.

The main page of a course (content and features) is shown in the figures below:

The Moodle course contains six Modules presented in Training material for Technicians and includes real case studies accessed through BIM project management web platform BIMSync.
In total 6 modules of Net-UBIEP course were developed in Lithuania as follows:

- Introductory module - basic BIM knowledge and skills
- Module 1 - BIM Dissemination
- Module 2 - Information Management Applications
- Module 3 - Procurement Management
- Module 4 - Using BIM Technologies
- Module 5 - BIM Model Analysis

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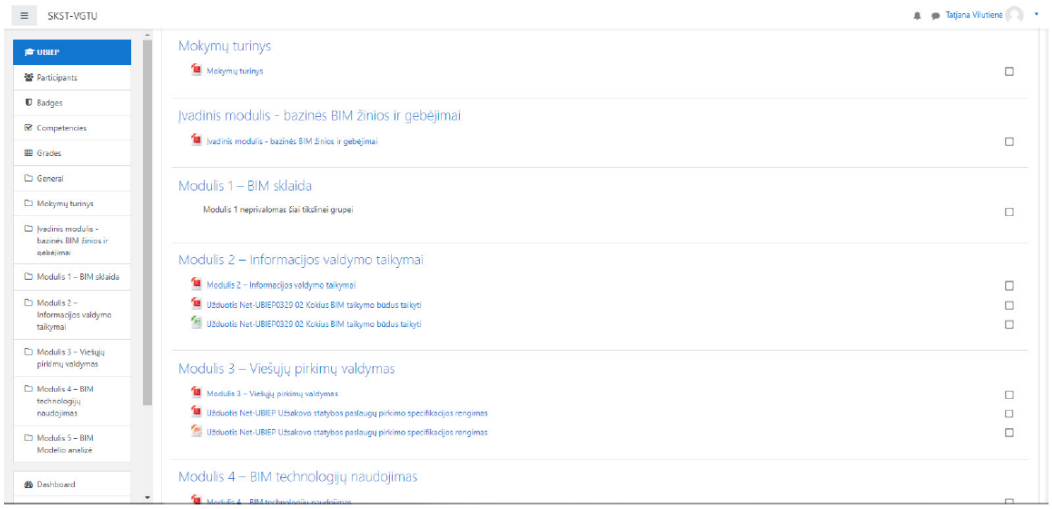
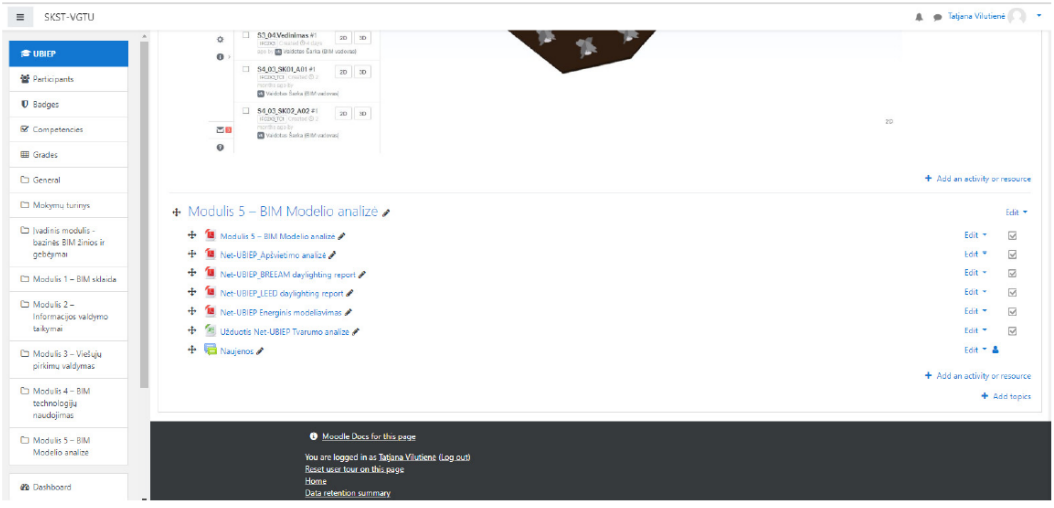
Screen capture of the test questions example in Lithuanian language is shown below:





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2.5 Slovakia

2.5.1 E-course description

E-learning has been available from 1 June 2019 accessible through Net-UBIEP web-site. The e-learning follows the publication Net-UBIEP Training Material for technicians, Net-UBIEP project 2018. The e-learning platform is a public area of the website, accessed by all interested users, and provides online training for technicians and educational material, structured under specific topics.

E-learning is freely available only after completing the application form. After completing the application form, learners will then receive an access link to the e-learning page.
Taking into account the experience of UVS, the Slovak partners developed and offer an in-class module for technicians that precedes the use of the e-learning. This is to attract technicians to applications supported by BIM engine through direct demonstration of the tools and providing ability to try them in practice in relevant environments. No online content can offer such experience that would motivate technicians to learn more on tools enabled by digitalisation in the construction sector.

2.5.2 Course description and results

On **28 March 2019**, Net-UBIEP Training course for Technicians was held in Bratislava, Slovakia.
As explained earlier, Slovak partners decided to develop module for technicians (now module MT1 offered by the Net-Ubiep BIM Academy in Slovakia for companies and SMEs) and organised a 5 hours long in-class training for technicians, as reading the information material using e-learning would be not enough for them and Slovak partners were delivering through this session practical demonstrations for augmented reality using phones, tablets and 3D-glasses; and they could personally test working with 3D-glasses (this exercise was prepared by a company affiliated to the school. At this stage, the availability of the equipment for using 3D visualisation technology (e.g. 3D-glasses) are not readily available in Slovakia. Nevertheless, the Slovak partners plan developing online training module with using 3D-glasses for technicians in companies, which are able providing similar training online. This will, however, be subject of another project.

A group of **35 participants** (technicians) had undertaken the classroom course in Slovakia within the framework of the Net-UBIEP project.

The key objectives of the seminar are:

- Present key elements of BIM and train technicians using the relevant applications based on BIM as digital and information engine (VR and AR);
- Explain how to use the available tools in delivery stage and in facility management (installations, servicing, repairs etc.);
- Discuss the barriers in efficient and effective use of BIM by technicians.

Main topics, focus which were discussed in more detail:

- How BIM helps the target group in achieving the targeted energy performance of the building during the relevant (to the target group) phases of the building's life cycle;
- What tools the target groups need to master in order to reap the benefits of BIM;
- Digitalised building model and how to work with it in performing the target groups' duties and responsibilities;

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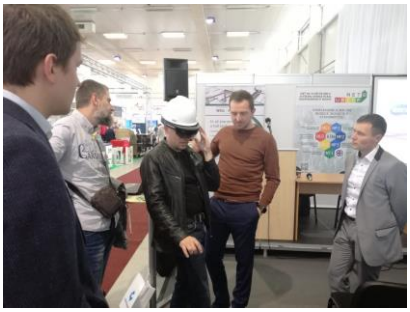
- Infrastructure and training needed for the target groups to perform their duties and responsibilities.

Learning outcomes from the 3D Net-UBIEP competence model

- LO1: Identify the advantages of using BIM during the life cycle of the buildings and evaluate related BIM technologies;
- LO2: List several stakeholders who participate in the sustainable construction project, distinguishing their role and needs;
- LO3: Distinguish between different RES solutions and technologies and select products that fit specifications, avoiding interferences with other technologies installed;
- LO4: Provide maintenance information to preserve the foreseen energy performance, assuring the completeness and correctness of the plan;
- LO5: Evaluate the completeness of the handover strategy and verify the correspondence between the "as built" and the final BIM model of the building.

Several photos from the course for technicians conducted by **ViaEuropa Competence Centre and UVS** can be found bellow.



2.5.3 Agenda

4.1 In-class session

28 March 2019, Coneco/Racioenergia International Fair grounds / Programme Centre D, Bratislava, Slovakia

Time	Agenda Item	Methodology
09:00	**Introduction to the agenda** • ***Marta Minarovičová (UVS)***	Oral presentation
09:20	**Use of BIM by technicians in construction stage and facility management** • ***Frantisek Doktor (ViaEuropa)***	Video presentations with commentary
10:30	**Practical presentation of a digital model of the building** • ***Juraj Gall (UVS)***	Digital model demonstration
11:30	**Using Virtual Reality and Augmented Reality by technicians and craftsmen** • ***Martin Maťašovský (UVS)***	Each participant is provided with possibility to use 3D glasses to see the building (VR) and move in the model and to see and move in the exhibition area (AR) with added installations graphically by specially developed model for the presentation. Participants shared with the others their experiences.
14:00	**End of the training session** • ***Marta Minarovičová (UVS)***	Oral summary

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2.6 Spain

2.6.1 Methodology of the courses

The duration of the courses differs from one course to another, minimum of 15 hours and maximum of 100 hours. The courses contain video tutorials that will develop the theoretical contents of the training action and will be uploaded to the Campus along its duration.
They also content exercises: two practical test activities will be carried out during the duration of the course and teachers will resolve all the doubts in the forum enabled for it.

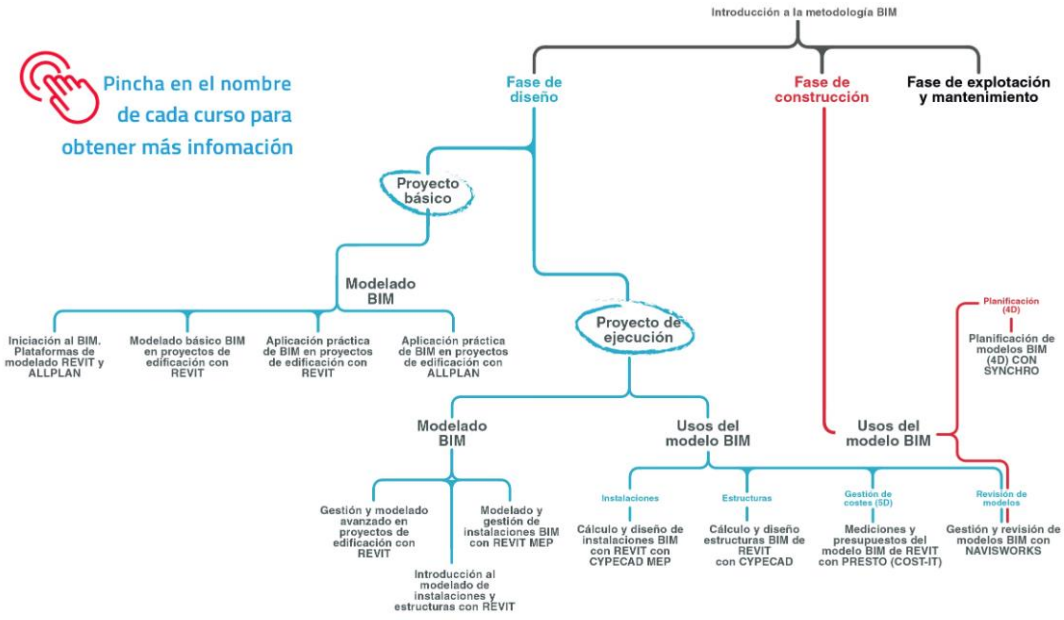
2.6.2 Material of the courses

- Student guide.
- Video-tutorials.
- Summary guide for monitoring each unit.
- Materials of the project NET-UBIEP

2.6.3 Certification

At the end of the training the student will receive by e-mail if he/she has been qualified as PASS a diploma accrediting the training carried out, issued by the Construction Labour Foundation. In the event of not passing the course, the student will receive, also by e-mail, a certificate of participation in the course if the student has satisfied at least 75 % of the evaluation requirements.

Below there is an organigram of all the courses available on the foundation related to BIM



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As an example one of the courses i.e. **Introdution to BIM** will be explained.

Target groups:
Promoters, designers, builders, administrations, qualified professionals and qualified technical personnel: architects, engineers, technical architects and quantity surveyors, technical engineers, senior project technicians, draughtsmen, or any other professional who develops his activity within the construction industry and has interest in acquiring basic introductory knowledge of the BIM methodology.

Objectives:
General objectives:
The main objective of this course is that the student acquires the necessary knowledge to have a global vision and an introduction to the BIM methodology.
Specific objectives:

- Know what BIM is, its basis and advantages, the differences with the traditional CAD and its application on the different areas and phases of the project.
- know about its use in building and civil works and infrastructures, and its use by professionals and companies.
- Be aware of the main BIM modeling programs and some of those that allow to solve other phases. of the project.
- know the possible ways of using BIM standards that favor the interoperability between the diverse software.
- Assess the current BIM scenario in some countries, the current situation of the adoption of the methodology in Spain, and the work of the BIM Commission.
- know some first advices to initiate in the application of BIM.

CONTENTS

UD.1 WHAT IS BIM? Definition of B.I.M. (Building Information Modeling) - BIM Methodology vs. traditional CAD - BIM in the different phases of the project - BIM dimensions - BIM detail levels.
UD.2 POSSIBLE USERS OF BIM. Application of BIM in building, civil works and infrastructure projects - BIM for project professionals -BIM for construction companies and others - BIM for manufacturers.
UD.3 BIM IN THE DESIGN PHASE. Architectural modelling - Energy evaluation and modelling of MEP installations - Structural modelling. Model Review - Measurements and Budgets.
UD.4 BIM IN THE CONSTRUCTION PHASE. Virtual planning of BIM models - Quality control and execution on the model - As built models.
UD.5 BIM IN THE MAINTENANCE PHASE. The BIM model at the service of building management - The BIM as a living model. From BIM to AIM.
UD.6 COLLABORATIVE WORK. Standards: BIM Guides and classification systems - The importance of nomenclature in the parametric world - Processes and workflows - Common Collaborative Environment (CDE).
UD.7 ADVANTAGES AND CHALLENGES TO THE USE OF BIM. Changes in the way we work with BIM - Challenges - Myths - Will the whole sector use BIM?
UD.8 BIM STRATEGY IN THE WORLD. BIM Scenario in some countries - Current situation in Spain - The BIM Commission.
UD.9 WHERE TO START WITH THE BIM? Practical advice.
UD.10 BIM TERMINOLOGY Glossary of BIM specific terms.

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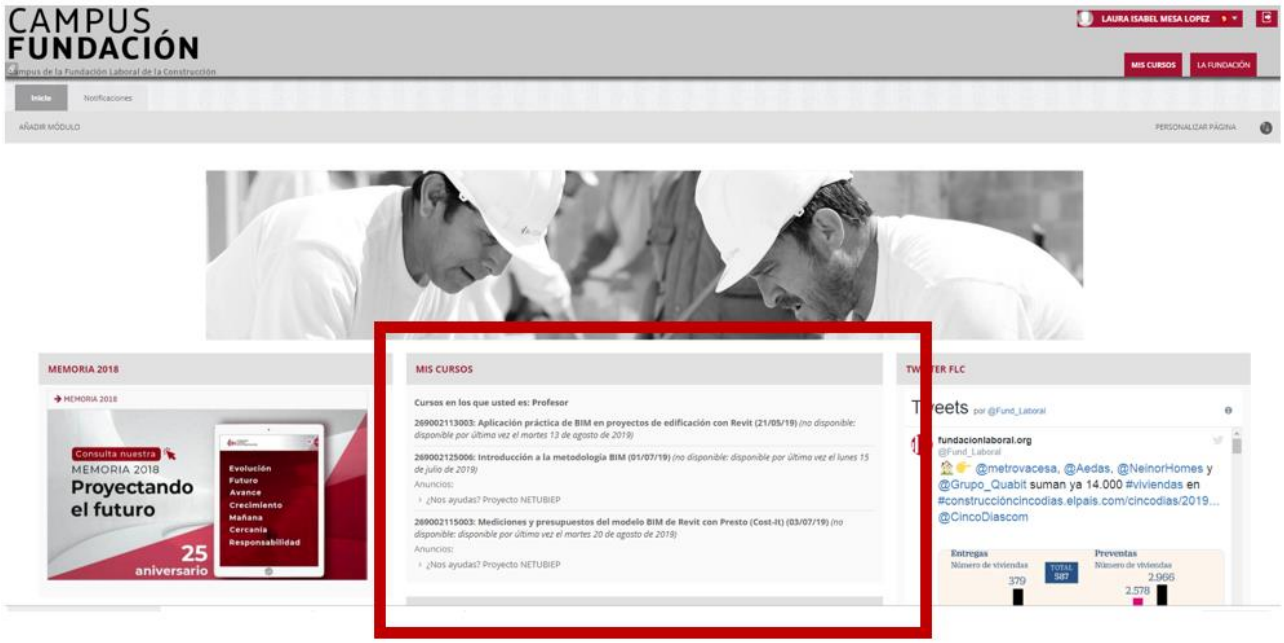
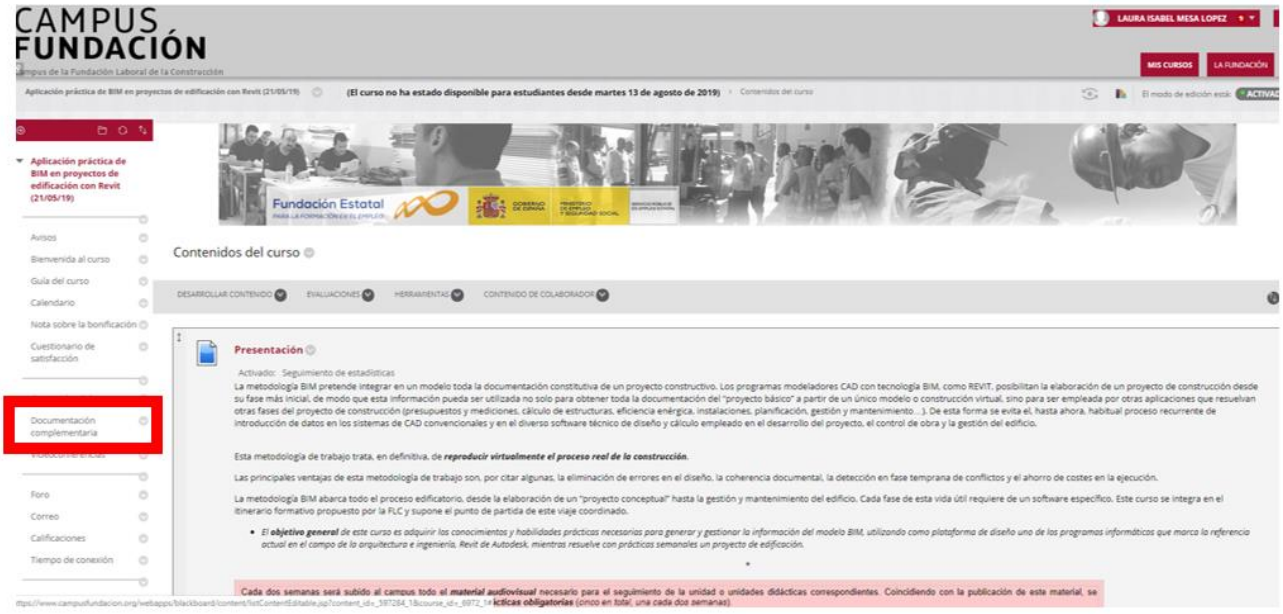
On the same website where you can subscribe for the coruses, there is also a blog where the NET-UBIEP project has been promoted which can be found here.

Once you long in the portal, this will appear on your screen with a couple of the BIM courses where project materials are included (inside the red square) that are still active or just finished. Please, bear in mind, that in summer courses are not running.



If you click on the course this will appear and to see project click on “documentación complementaria” on the left.



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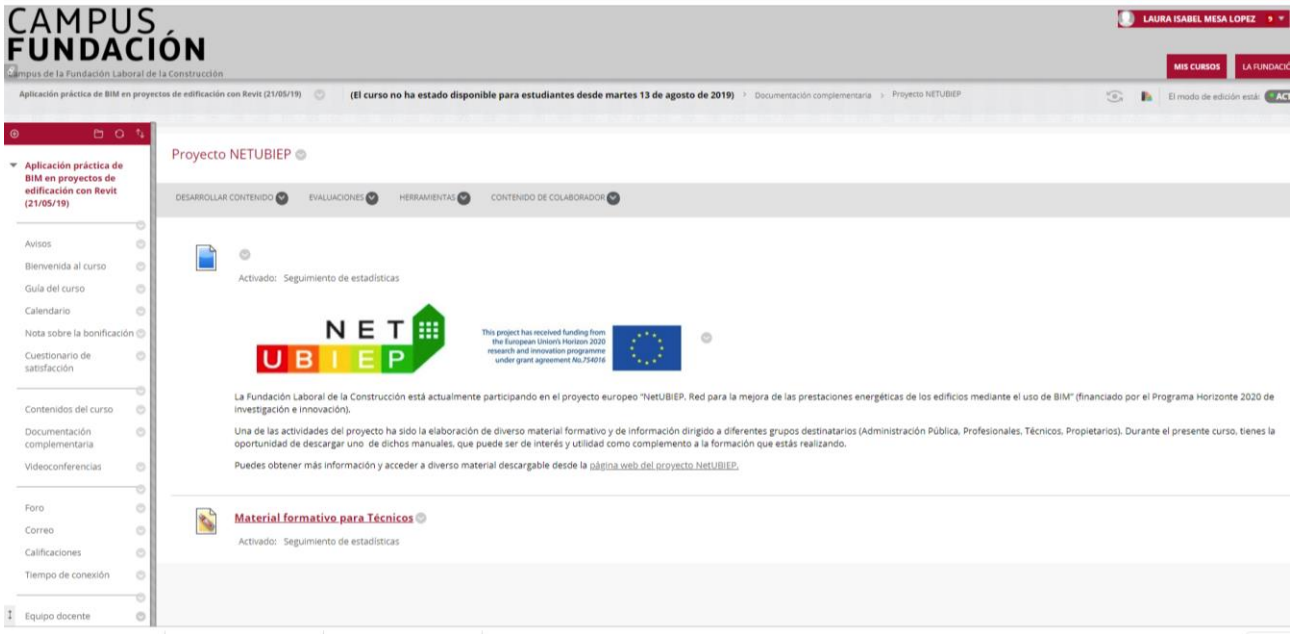
And here the Net-UBIEP courses can be found.



2.7 The Netherlands

2.7.1 E-course description

Technicians are responsible for the proper execution of the design. They often play the role of executor or (managerial) engineer. In addition, technicians play an important role in the management and maintenance of buildings. To achieve this, knowledge of aspects concerning a Building Information Model or a BIM is required. By taking note of what BIM is, BIM concepts, which BIM processes are applicable and how BIM can be used in management and maintenance (asset management). This training offers the participant this knowledge in the form of this e-learning module.
The developed E-learningcourse is freely available for people who are interested. Potential participants can apply on the Net-UBIEP website: http://www.net-ubiep.eu/nl/bim-voor-technici/

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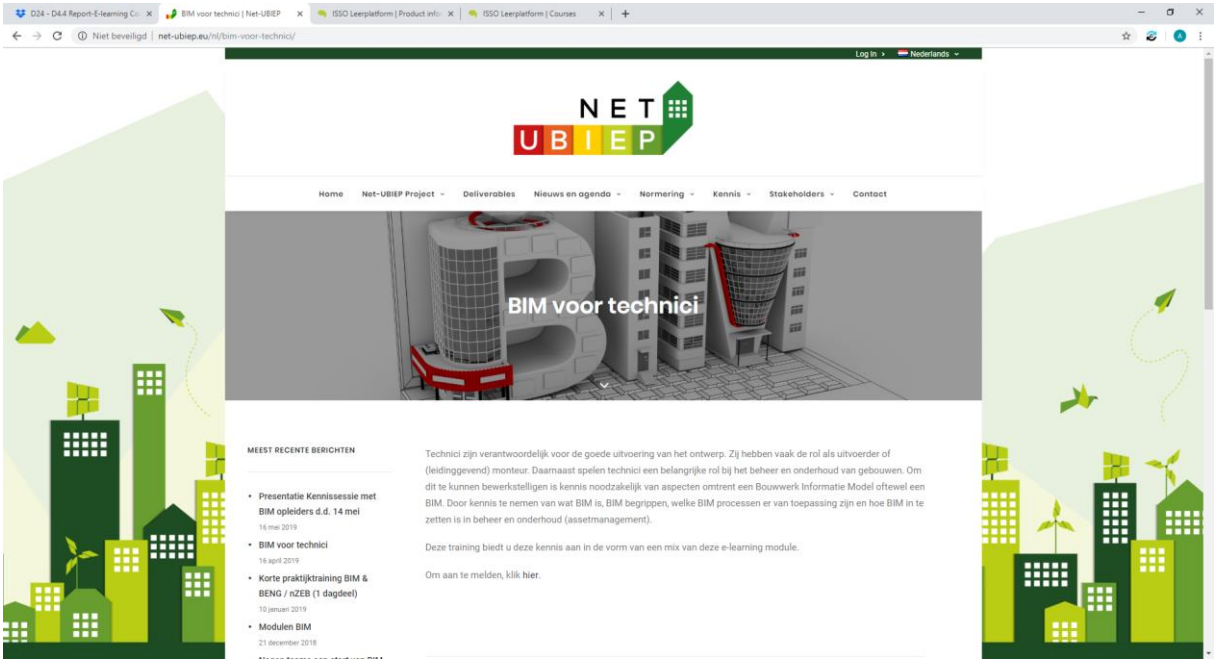
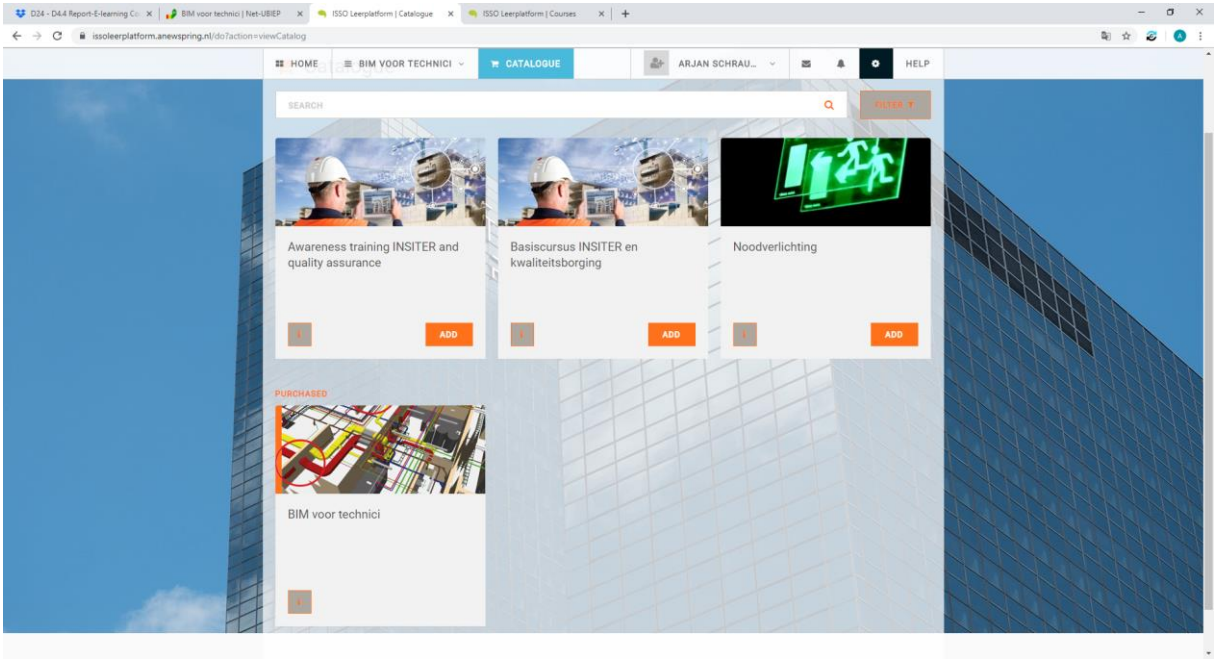


and the course can be found at: https://issoleerplatform.anewspring.nl/do?action=viewCatalog



More specific: https://issoleerplatform.anewspring.nl/do?action=viewProduct&id=151

2.6.2 Functionalities and features of the e-learning platform

The e-learning course consists of different topics:

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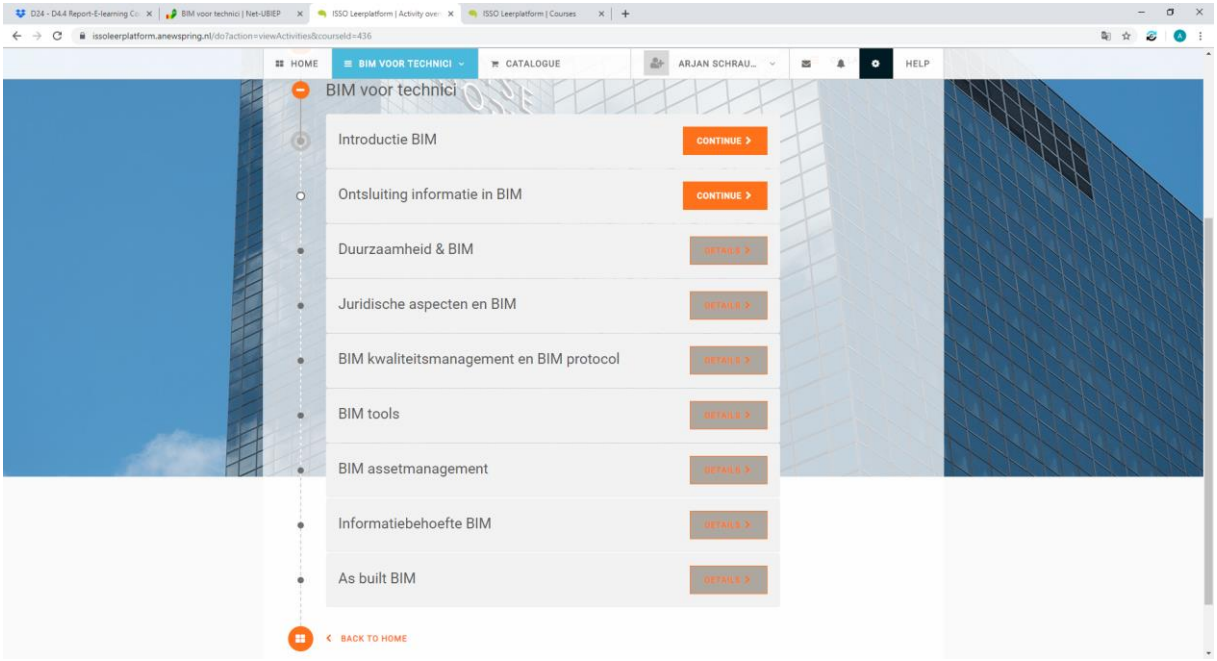
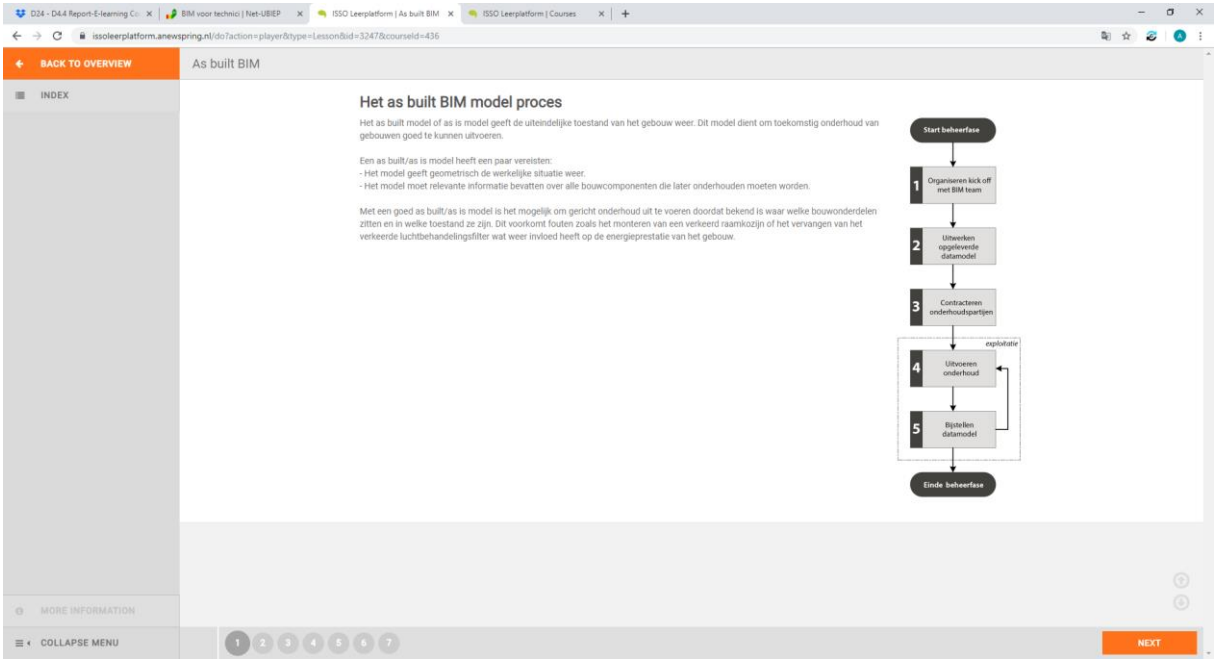


Each of these topics starts with an description of the subject. After this the subject is discussed more indepth.



Where needed the e-learning module is enriched with illustration and scheme's. We are working to add video material to the e-learning material where a fellow worker in the field explains the different parts of the specific subject. However this functionality will be added at the end of 2019 and is therefore not available at this moment.
At the end of each chapter, questions are asked to check if the participant has acquired the knowledge.

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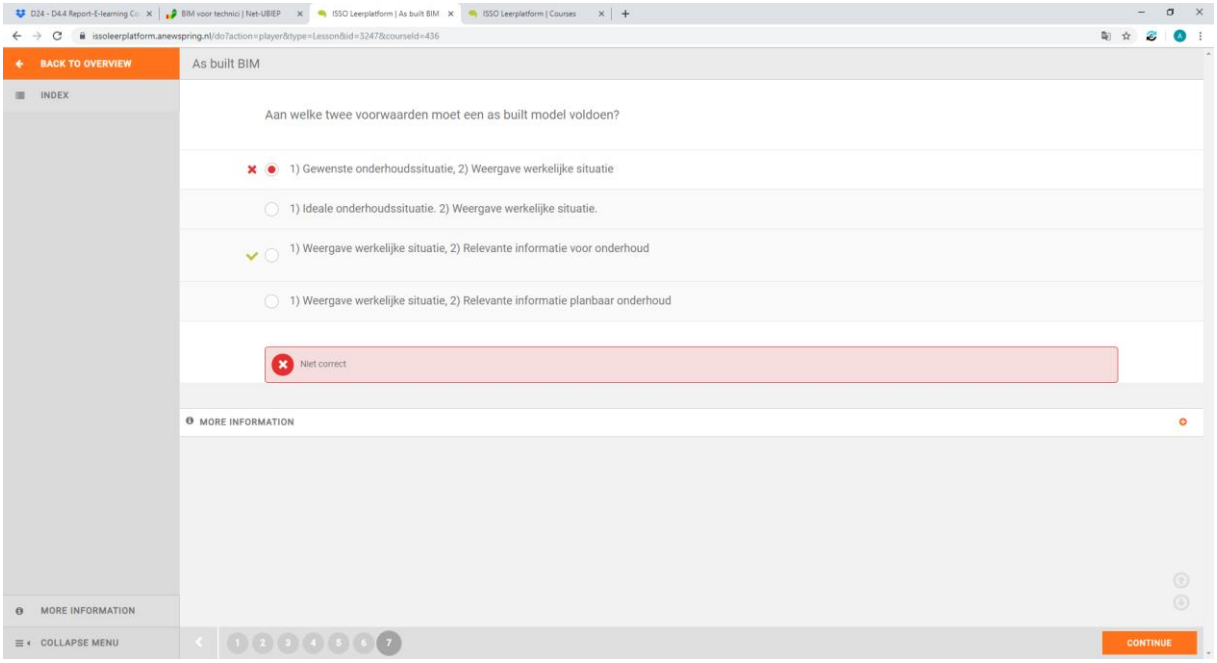

The next step is to develop exams to certify the technician.

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This deliverable reflects only the author's view. The Agency is not responsible for any use that may be made of the information it contains.

The present deliverable will be update during the project in order to align the outcome to the market needs as well as to other BIM related projects realized within Horizon 2020 program.

The updated version of the deliverable will be only available in the website of the project www.net-ubiep.eu.

Some deliverables could also be translated in partners national languages and could be find in the respective national web pages. Click on the flags to open the correspondence pages:

International web page

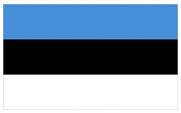
Italian web page

Croatian web page

Slovak web page

Spanish web page

Dutch web page



Estonian web page

Lithuanian web page

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement *No.754016*