Co-funded by the Erasmus+ Programme of the European Union

Project:	Boosting the telecommunications engineer profile to meet modern society and industry needs [BENEFIT]
Project ID:	585716-EPP-1-2017-1-AT-EPPKA2-CBHE-JP
Work Package WP6 **Deliverable D6.1:**	Central project web platform linked to the e-platforms developed in the other WPs
Title:	**Report on developed central project web platform**
Leading organizations:	FERIT
Participating organizations:	UNI-KLU, UL, UBL, UNSA, UNTZ, UB, UNI, UNS, ENT, BICOM, BIT, CISCO, NiCAT, RT-RK
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Expected Deliverable/Results/ Outcomes	Work Package and Outcome ref. no.	**6.1**	
	Title	**Central project web platform linked to the e-platforms developed in the other WPs**	
	Type	☐ Teaching material ☐ Learning material ☐ Training material	☐ Event ☒ Report ☒ Service/Product
	Description	An integrated web platform linking the one developed in WP2 (Web industry catalogue and study programmes portal), in WP3 (teaching material repository), in WP4 (internships and job offers). The deliverables will be described in a report that will provide description of the web platform designed to provide all information about the project activities. The platform will be linked to e-platforms defined in other WPs such as those providing web repository of developed courses, web catalogue of industry in WB region, etc.	
	Due date	14-10-2020	
	Languages	English and Bosnian/Croatian/Serbian	
Target groups	☒ Teaching staff ☒ Students ☒ Trainees ☒ Administrative staff ☒ Technical staff ☐ Librarians ☒ Other		
	Industry representatives, Higher education authorities, Universities management and coordinators, Chambers of commerce.		
Dissemination level	☐ Department / Faculty ☐ Institution	☐ Local ☐ Regional	☐ National ☒ International

Revision History				
Version	Date	Author(s)	Organization(s)	Brief description of change
1	15/12/2018	Drago Žagar, Snježana Rimac-Drlje, Višnja Križanović, Dario Došen, Ivica Lukić, Zdravko Krpić, Mario Miloloža	FERIT	Release 1
2	12/09/2020	S. Rimac-Drlje	FERIT	Editing Release 2

3	22/09/2020	Nataša Maleš-Ilić	UNI	Reviewing
4	23/09/2020	S. Rimac-Drlje	FERIT	Corrections according to review Release 3
5	13/10/2020.	Zdravko Krpić	FERIT	Updating list of courses
6	14/10/2020	S Rimac-Drlje	FERIT	Release 4
7	6/11/2020	Dušanka Bošković	UNSA	QB evaluation
8	10/11/2020	S. Rimac-Drlje	FERIT	Corrections according to QB evaluation Release 5 (for web)
9	22/01/2021		Sinonim d.o.o	Proofreading

Content

1. Introduction

The BENEFIT project outcomes are set to improve the quality and attractiveness of study programmes in telecommunications engineering domain which is currently facing many challenges. The main project goals are set to modernize and harmonize the study programmes in telecommunication engineering, and to renew traditional course of studies by developing modernized classes that will integrate topics from emerging telecommunications domain.

The process of harmonization of ICT study programmes facilitates the cooperation between the universities, i.e., the higher education institutions (HEIs) in the West Balkan (WB) region, as well as their cooperation with other universities where higher education reforms are supported by EU. The project consortium gathers nine universities: three EU universities (UNI-KLU, UL, FERIT), and six WB universities (UBL, UNSA, UNTZ, UB, UNI, UNS). Since industry in the WB region requires graduates with a modern and skilled profile but faces significant drain of engineers, the modernization of telecommunication engineering study programmes is conducted for the HEIs within the region. In order to achieve that graduates' profile better match the requirements of the labour market, the project requires the cooperation of HEIs and industry in the ICT domain. The aim of WB HEIs is to improve their study programmes and the teaching methodologies through collaboration with regional and international ICT industry partners. The universities and companies should strengthen their relations, inducing a better understanding of the fast job-market evolution.

The project gathers universities and their associated industry partners. The consortium has been created by four companies in the ICT domain (ENT, BICOM, CISCO, RT-RK), a technology park (BIT), a cluster (NiCAT), as well as four other companies as associated partners (AN, ZM, SE-DMS, and VOICT technology park). To provide concrete information and promote available telecommunications study programmes, internship opportunities and job opportunities to a wider community, the central project web platform is created. It gathers all information related to the achieved project goals set by partner universities that aim to improve study programmes and enhance student mobility, introduce new interdisciplinary programmes, and start actions of joined education and training in conjunction with associated industry partners. This central project web platform is a starting point for all others created within different WPs. The activities related to development and implementation of the central project web platform are assigned to FERIT.

2. Central project web platform

The **central project web platform** is available at: https://www.project-benefit.eu/eplatform/. The tasks related to the platform development and implementation are assigned to project team members from FERIT. The platform is aimed to promote achieved project results and to provide all relevant information related to available modernized ICT study programmes, as well as existing internship, training and job opportunities to a wider community. The platform should be used for the promotion of all necessary skills, as well as existing needs and opportunities within the telecommunications domain. Within the defined timelines, the following steps related to the development and implementation processes of the central web platform are included:

- the central project web platform is designed (FERIT) and approved by the project coordinator (UNI-KLU)
- the central project web platform is released
- the central project web platform is linked with all other e-platforms created in different WPs.

The integrated central project web platform includes information related to:

- the modernized ICT study programmes of the involved HEIs
- the ICT companies in the region
- the prepared knowledge resources

and also available information regarding:

- the training opportunities
- the internship opportunities
- the job offers
- all other relevant events.

Therefore, this integrated central project web platform connects all other e-platforms developed in the following WPs:

- in the WP1:
  OFFICIAL PROJECT WEBSITE: (I.) a website for all relevant information about project activities
- in the WP2:
  STUDY PROGRAMMES WEB PORTAL: (II.) a web portal of HEIs' modernized ICT study programmes
  INDUSTRY WEB CATALOGUE: (IV.) a web catalogue of industry capacities and companies
- in the WP3:
  TEACHING MATERIAL REPOSITORY: (III.) a web repository for class and lab sessions material
- in the WP4:
  INDUSTRY INFORMATION PORTAL: (V.) an information portal for training, internship and job opportunities.

Within this document the following classification of the terminology related to the individual parts of the central web platform (i.e. the e-platforms) is used.

The website:

- The website presents a collection of related digital content, identified with a common domain name, and published on a web server.
- The website is accessible via network by referencing a uniform resource locator (URL) that identifies the site.

The web portal:

- The web portal represents a specially designed website that brings information from diverse sources together in a uniform way.
- Each information source gets its dedicated area on the page for displaying information.
- The users logged through their user accounts may determine which content can be added to the portal or deleted from the portal configuration.

The web repository:

- The web repository is used for data collection and digital content storage.
- The access to the stored content may be restricted, depending on whether access is allowed only to authorized and authenticated users, or to any anonymous website visitor.

The web catalogue:

- The web catalogue may deliver the content such as information, news or updates.
- The delivered content can be related to any specific topic, providing information on a social network or providing links to outside content that may help users beyond existing service.

The web platform:

- The web platform presents a collection of technologies developed as open standards by the World Wide Web Consortium and other standardization bodies.
- It includes technologies such as computer languages and APIs that were originally created in relation to the publication of Web pages.
- The web platform allows updates of published data and co-operation among multiple users while addressing privacy risks.

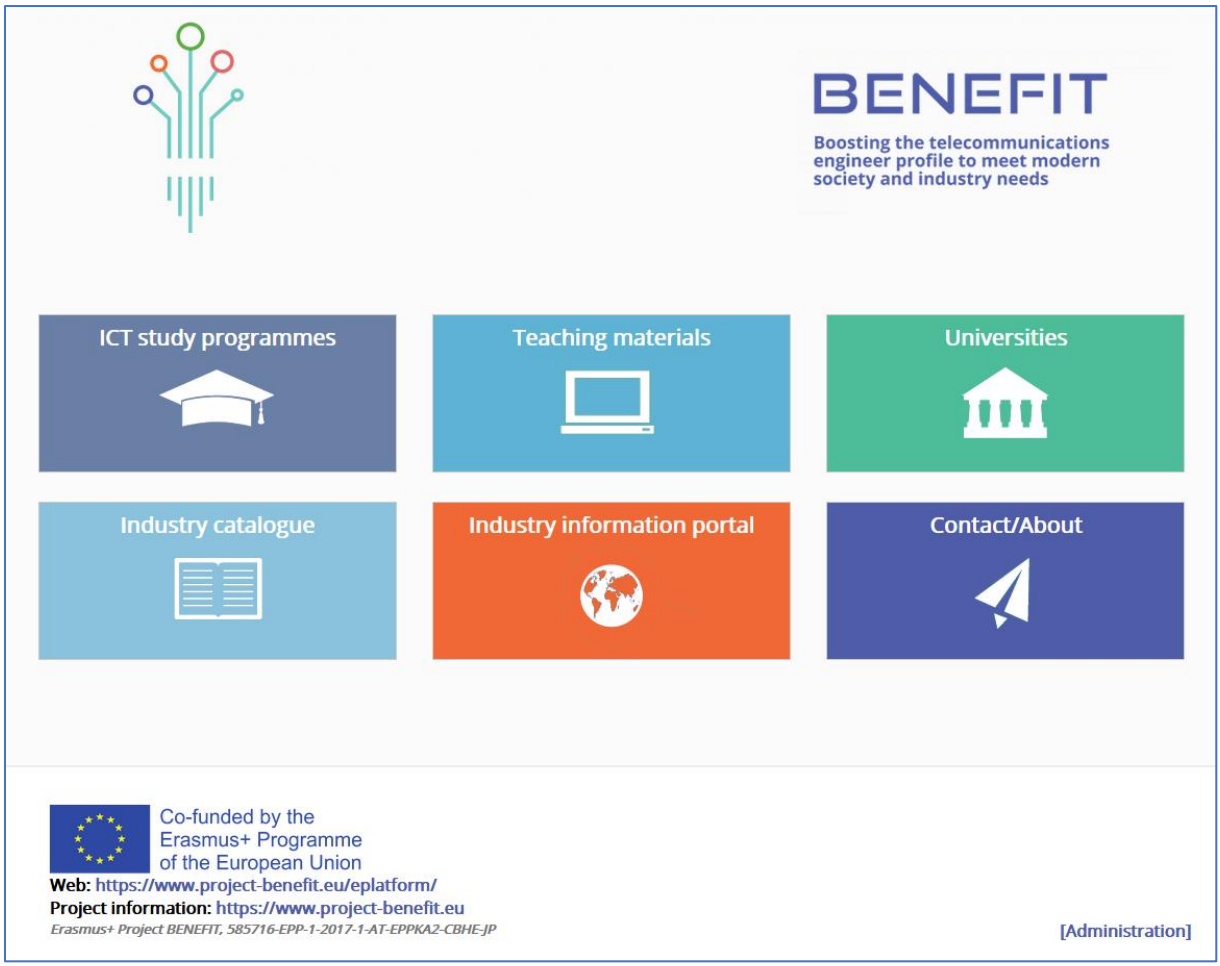

Figure 1. *The screenshot of the central project web platform*

The objective of the central web platform, as presented in Fig. 1, is set to provide all relevant information about the project activities, the partner HEIs, their study programmes and industry information in the WB region. Thus, this web platform links together:

(I.) the **website** - official project Internet site comprising information about the project activities, ICT study programmes, enrolment procedures across all EU and WB HEI partners, as well as important documentation and contact data;

(II.) the **web portal** - to make modernized ICT study programmes of involved WB HEIs' more visible and accessible to students in both WB region and EU;

(III.) the **web repository** - to store all developed or enhanced class and lab material;

(IV.) the **web catalogue** - to promote associated partner companies in WB region, and

(V.) the **information portal** - to inform about available training and internship opportunities, job offers, seminars and all other relevant events in WB region and wider

(VI.) all other important official information.

The drafted design and description of the whole central web platform and its structure is conducted by the FERIT team members from the Department of Communications Engineering: D. Žagar (Full Prof.), S. Rimac-Drlje (Full Prof.), V. Križanović (Assist. Prof.).

The implementation and description of individual parts of the platform is conducted by the FERIT team members from the Department of Computer Engineering: Z. Krpić (Assist. Professor), I. Lukić (Assist. Professor), and D. Došen (Senior Lab. Techn.).

This deliverable, i.e. D6.1 describes the structure of the whole platform and the way in which it is connected to all other e-platforms created in different WPs.

Individual parts of created central platform, i.e. other e-platforms will be also documented within the following deliverables - D2.3: ICT study programmes web portal, D2.4: Industry catalogue, D3.5: Teaching material web repository, and D4.1: Industry portal.

The platform content update will be facilitated by the WB HEIs' in cooperation with the ICT companies and clusters in the WB region. They will offer information on the study programmes, internship opportunities, company catalogues and employment opportunities for the years to come.

In order to enable the content on the web platform to be maintained by the partner universities, one person is delegated from every university for activities related to administration of the central web platform in order to input and edit the following:

- institution profile information;
- description of the modernized ICT study programmes;
- description of companies to be listed within catalogue;
- all related linkable content.

Also, upload of teaching material in the repository can be conducted by the same delegated persons from the universities or the teachers that have their created accounts. They should be able to:

- input and edit description of the modernized and new courses;
- upload and store class material within repository.

Moreover, the persons delegated for the web platform content editing should enable their industrial partners to upload information related to training and internship opportunities, job offers, seminars and all other relevant events.

2.1 Official project website

The central project web platform is intended to enhance visibility of achieved project results in conjunction with an interactive **official project website** developed in WP1.

Therefore, within the home page of the central project web platform, the following link to the official website is shown: https://www.project-benefit.eu/, as presented in Fig. 2.

Figure 2. *The link to the official project website*

This official project website presents constantly updated relevant information about the current, past, and planned project activities, and includes some additional important links.

The created website combines important information and enrolment procedures relevant for both EU and WB HEI partners.

This official project website display is presented in Fig. 3.

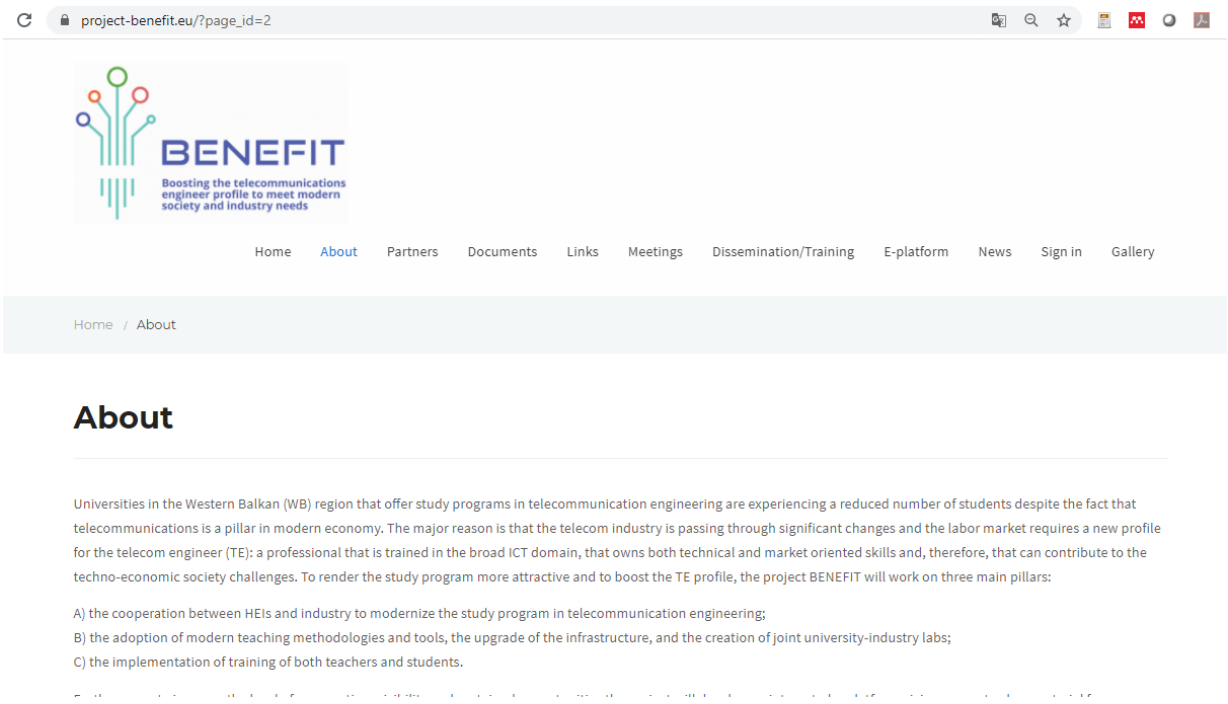

Figure 3. *The official project website*

Preparation of the material to keep the project website up to date with the current activities is conducted by UNI-KLU.

2.2 Study programmes web portal

Within the defined BENEFIT framework, aimed at boosting university-enterprise cooperation and modernization of telecommunications engineering in the WB region, FERIT coordinates tasks related to design of **the central web platform** and **the study programmes web portal,** presented in Fig. 4. The tasks related to the implementation of the web portal linking modernized ICT study programmes, as well as its connection to the central project web platform is also conducted by FERIT.

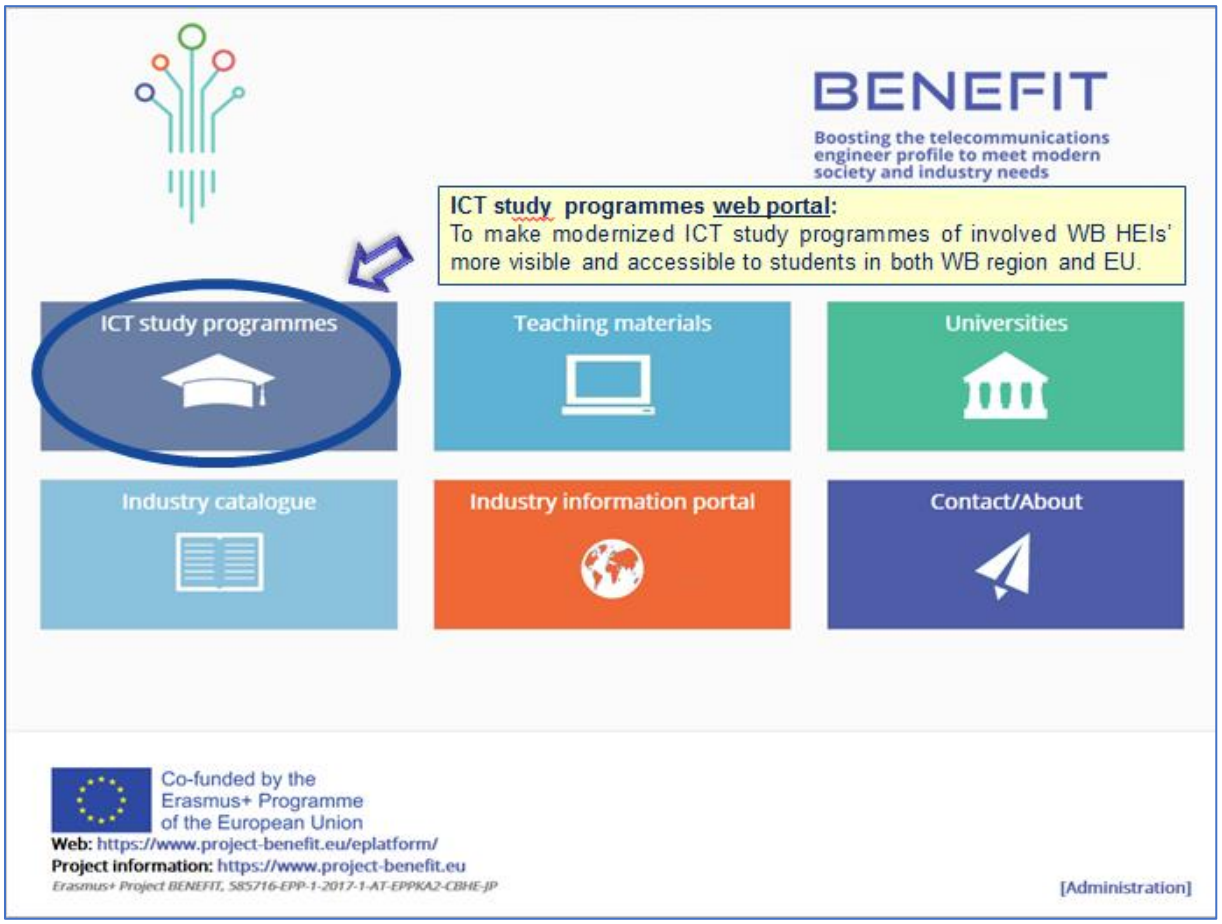

Figure 4. *The link to the ICT study programmes web portal*

Modernization of telecommunications engineering study programmes is planned for both the 1st and 2nd cycles.

Moreover, the selected courses for modernization that focus on the main ICT engineering application areas are classified in the two groups:

- the enhanced selected courses in ongoing study programmes;
- novel specific-knowledge courses.

Therefore, the release of web portal is preceded by the following processes:

- identification of modified existing classes in each WB HEI study programme;
- identification of added specific classes in each WB HEI study programme;
- estimation of necessary storage space for class content and teaching material of modernized classes;
- estimation of necessary storage space for class content and teaching material for new classes.

According to the gathered data, the ICT study programmes portal is designed and implemented so that the description of content, as well as upload of modernized study programmes can be initiated, as presented in Fig. 5. After completion of the study programmes modernization process, study programmes web portal should be updated with modernized programmes.

All modernized study programmes are to be delivered after the accreditation process, i.e. by the defined deadline. The curriculum changes should be implemented through different procedures, depending on whether the accreditation cycle falls in or out of the project's timeline. In a case that accreditation cycle does not exceed the project's timeline, new classes should be developed and introduced. Otherwise, there should only be modernization of already existing classes.

As the main focus of the study programmes web portal is to promote modernized ICT study programmes, the administrators delegated by the WB universities should be able to edit profile information of the institution as well as all related and linkable content.

Therefore, in order to enable access for the university administrators to complete their tasks, a list of university administrators is gathered, containing their names and e-mail addresses to enable the creation of account access data (passwords and recovering procedures of the accounts).

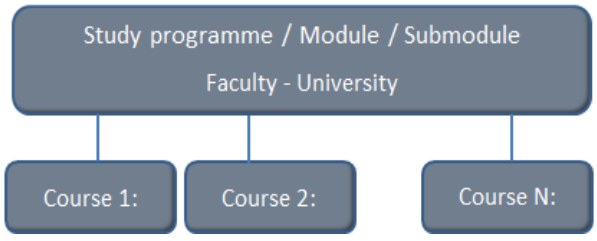

Figure 5. *The structure of the ICT study programmes web portal*

Figure 6. *The list of the modernized ICT study programmes*

An additional focus is set to enable structured overview of courses according to the list of study programmes, as presented in Fig. 6 and Fig. 7.

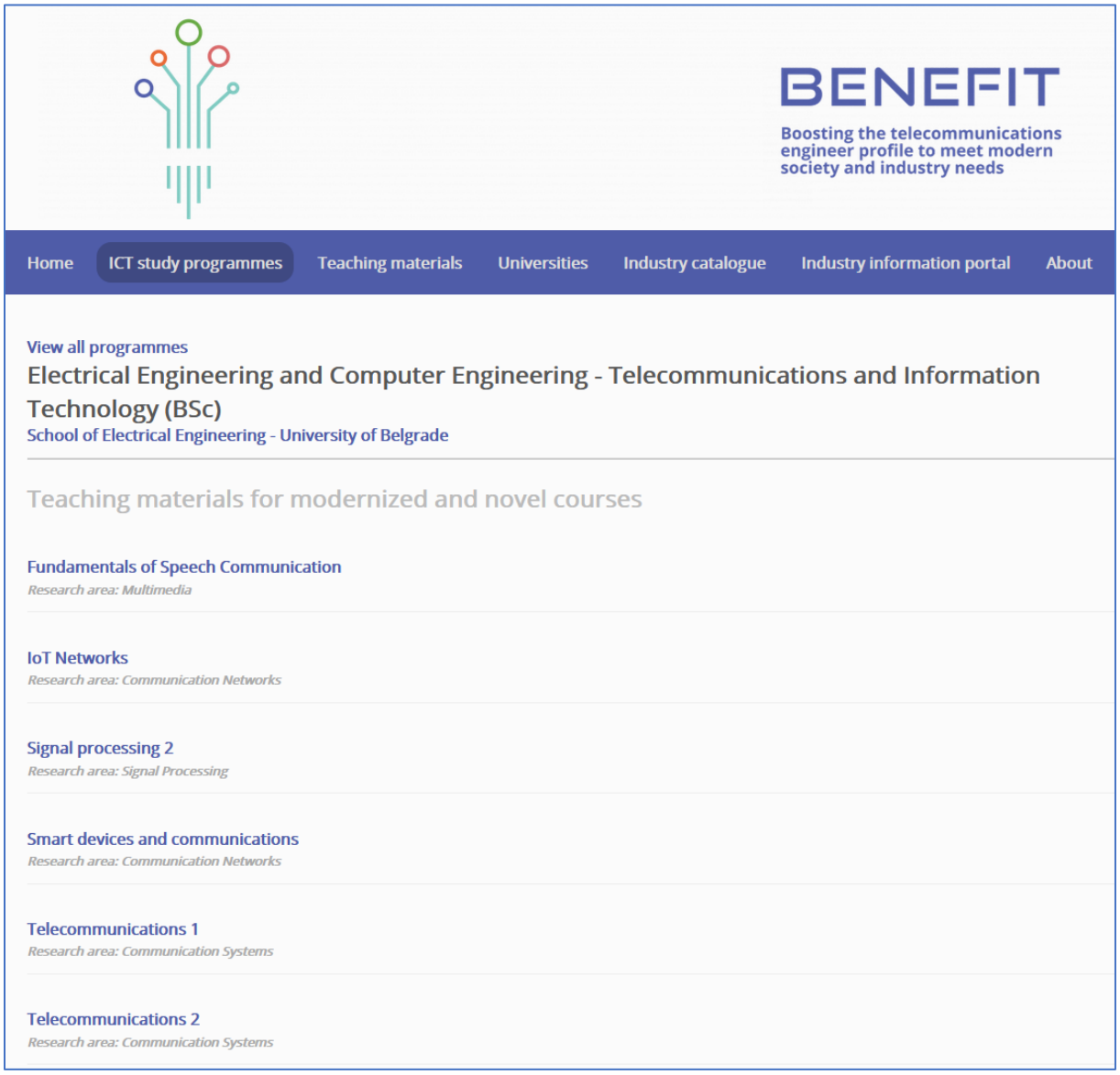

Figure 7. *The list of the modernized courses*

The web platform is created using **applied web programming solutions,** and a **web database** is established in order to help achieve the specific tasks for promoting ICT study programmes. The structure of study programmes database is shown below.

Its first level is the '**Universities**' entry table where all necessary public information will be contained:

1. Unique id + short identifier (primary key, integer);
2. Contact info (text);
3. Description (text) – *a limited max. number of characters;*
4. Contact Name (string);
5. Contact person e-mail (short string) – alias for username for login entry*;

6. Initial password (encrypted string, will be replaced with actual password);
7. Actual password (encrypted string);
8. Logo image placeholder (url string or actual image upload of the logo).

The second level is the '**Faculty**' entry:

1. Unique id + short identifier (primary key, integer)
2. Contact info (text)
3. Description (text) – *a limited max. number of characters*
4. Contact Name (string)
5. Contact person e-mail (short string) – alias for username for login entry*
6. Initial password (encrypted string, will be replaced with actual password)
7. Actual password (encrypted string)
8. Logo image placeholder (url string or actual image upload of the logo).

The third level is the '**Study programme / Module / Submodule**':

1. Unique id (integer)
2. University identifier (linked to the first entry of university table, integer)
3. Title of the study programme (text)
4. Year of the study programme (date)
5. Textual description of the study programme (text) – *a limited max. number of characters.*

The fourth level is the '**Course**' inside one or more study programmes:

1. Unique id (integer)
2. Study programme identifier (linked to the first entry of the second table, integer)
3. Title of the course (text)
4. Description of the course (text)
5. Enrolment information (text).

The fifth level is the '**Repository**' entry:

1. Unique id (integer)
2. Relation to the course (the first entry of the third table, integer)
3. Title (text)
4. Description (text).

The sixth level is the '**File**' within the repository:

1. Unique id (integer)
2. Relation to repository entry (the first entry in the fourth table)
3. Type of file (document type or audio type, short text)

4. Title (text)
5. Description (optional entry, text).

The proposed relation table view in MySQL is presented in Fig. 8. It consists of the following parts:

University -> Faculty -> Study programmes, modules -> Course- > Repository -> Files in the repository:

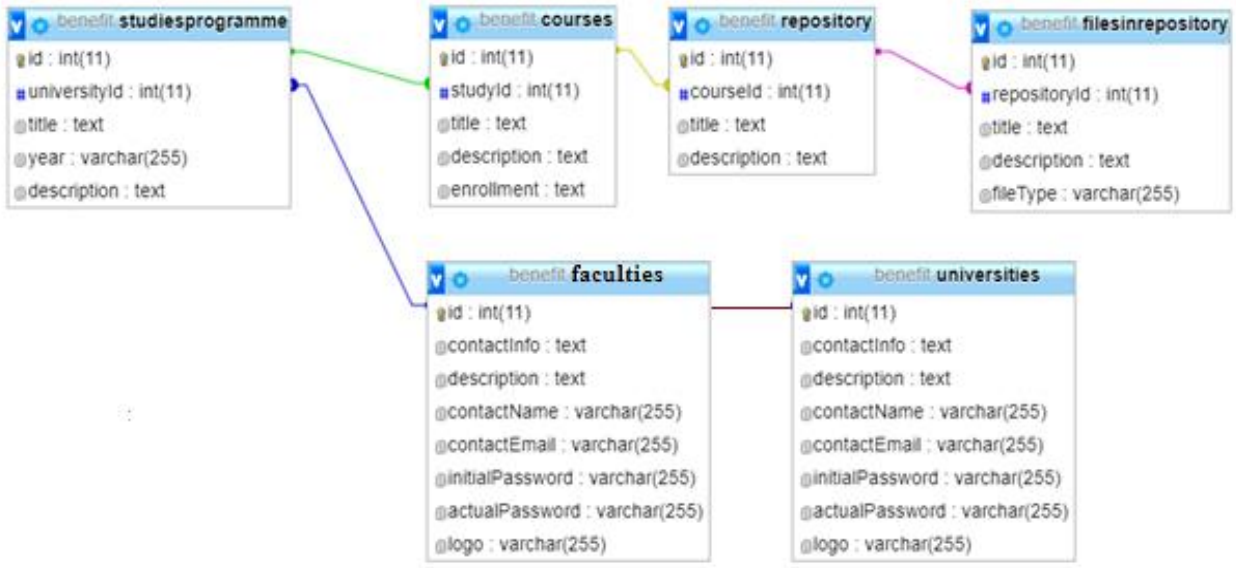

Figure 8. *The structure of the relation table*

The programming techniques used for creating web platform, and the structure of the web database will be documented and available within the related deliverable.

2.3. Teaching material repository

The web repository is aimed to collect class and lab sessions material, recorded remote classes and network of audio-libraries based on new text-to-speech technologies. The teaching material, including video recorded classes, could be collected in multiple languages. The creation and delivery of web repository and platform, as presented in Fig. 9, is led by FERIT. Each WB HEI partner should internally manage upload of new teaching material on the web repository.

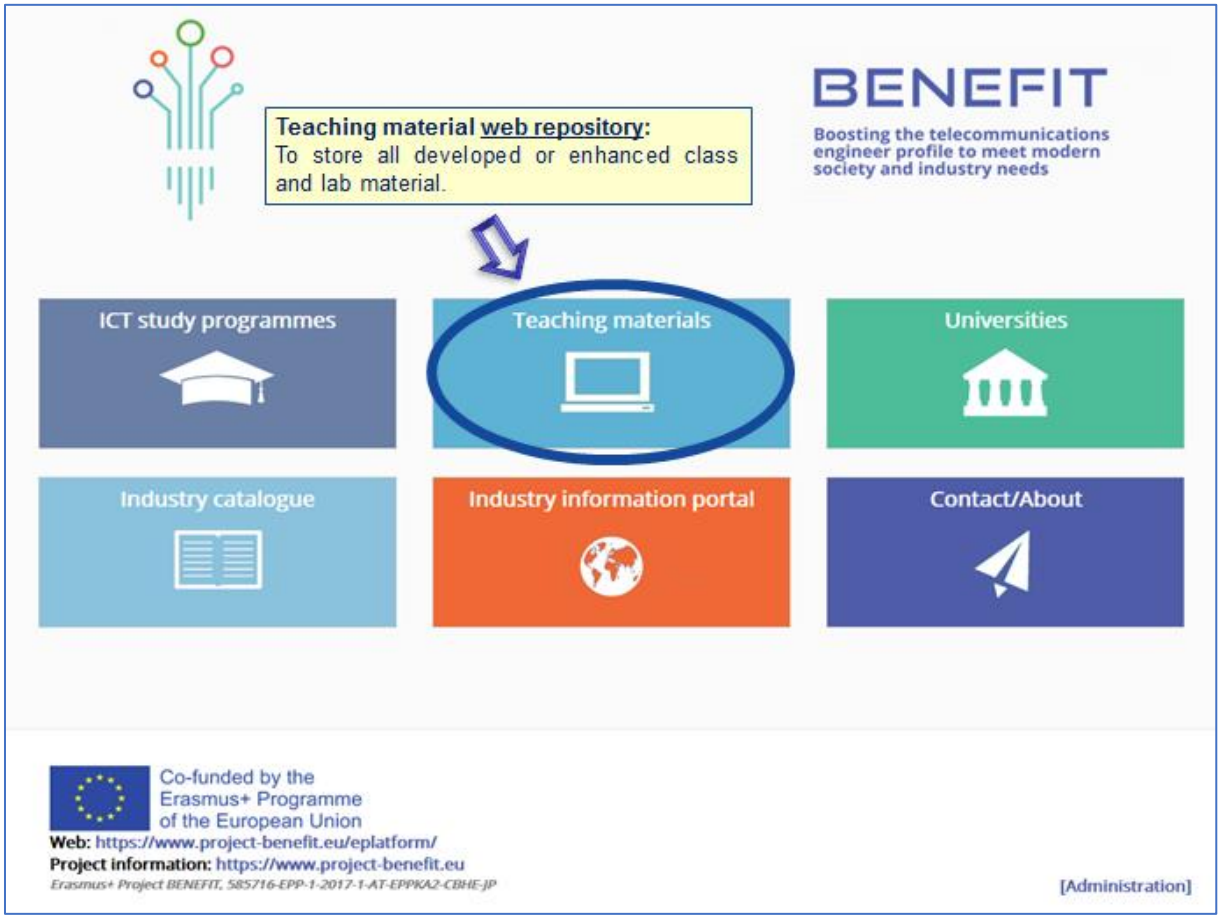

Figure 9. *The link to the teaching material web repository*

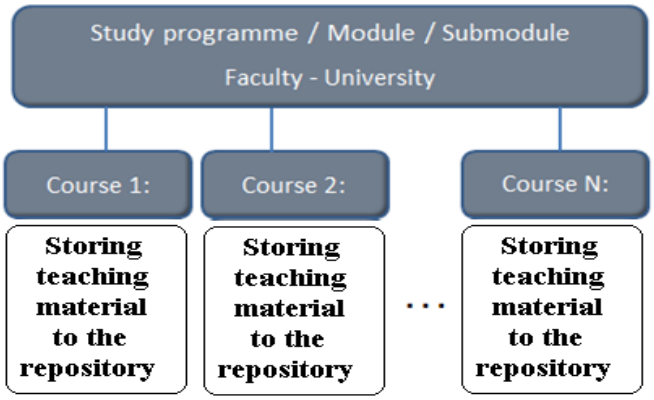

Figure 10. *The structure of class material storing within web repository*

The WP coordinator should verify the delivery of milestones. Before upload of new teaching material in the web repository, collection of preliminary teaching material for new and modernized courses, as well as the translation of preliminary teaching material should be completed. To facilitate accessibility and promote internationalization, the collected teaching material could be offered in Bosnian/Croatian/Serbian and English languages. The update of lectures and training material should allow students, trainees and teachers to easily retrieve information and simplify the teaching and learning processes.

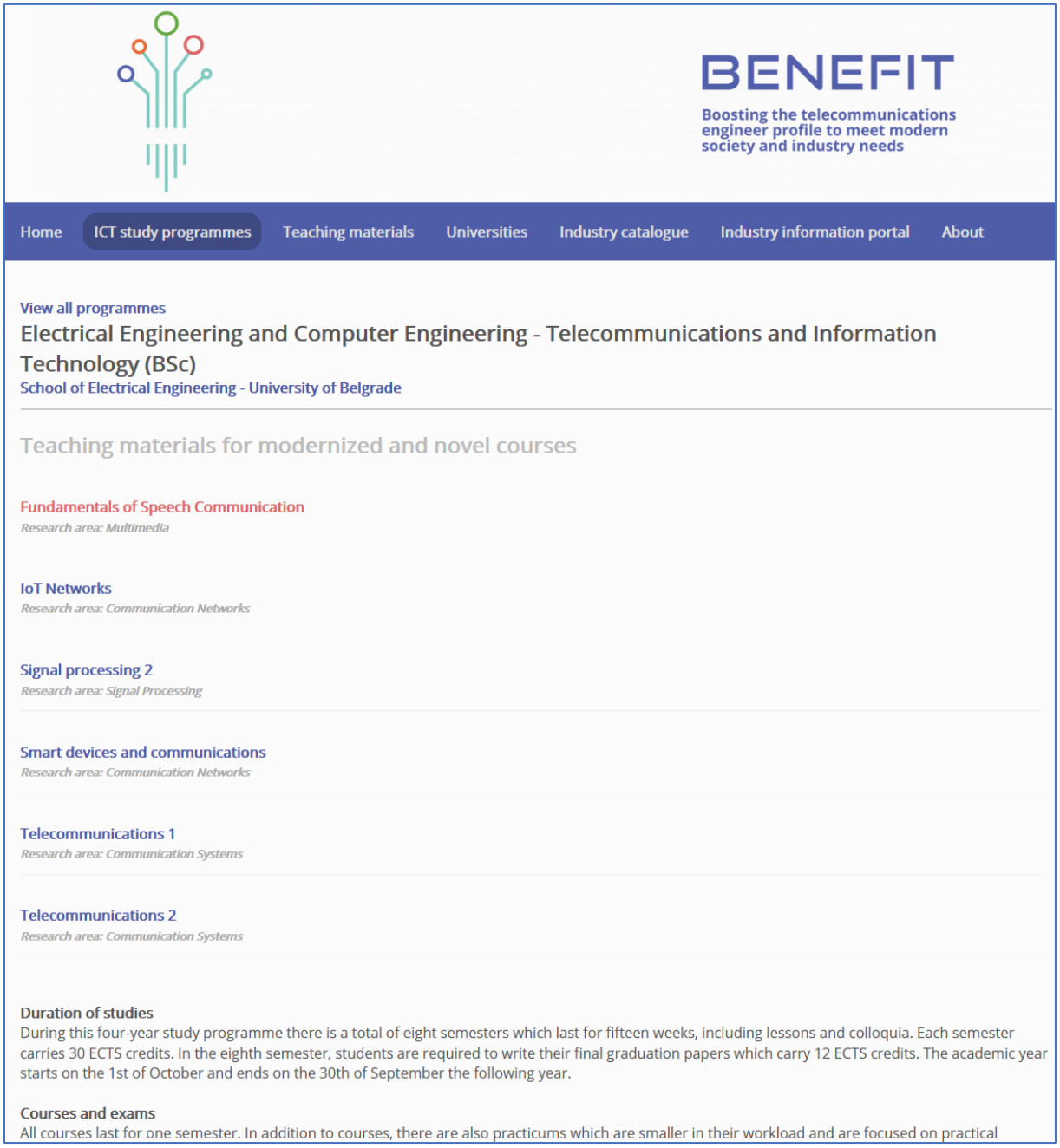

Figure 11. *The structured list of courses*

Figure 12. *The overview of the web repository space for teaching material*

The selected courses are classified, as presented in Fig. 10 and Fig. 11, according to the related ICT study programme. Within this list:

- the enhanced selected courses in ongoing study programmes, and
- new specific-knowledge courses

are all presented.

The menus for the description and upload of the prepared teaching material within the designed repository is presented in Fig. 12. The initial presented organisation of the teaching material can be grouped based on the following classification:

- lectures,
- exercises,
- practice, or any other combination (depending on the application needs).

The web repository space for teaching material upload is presented in Fig. 13.

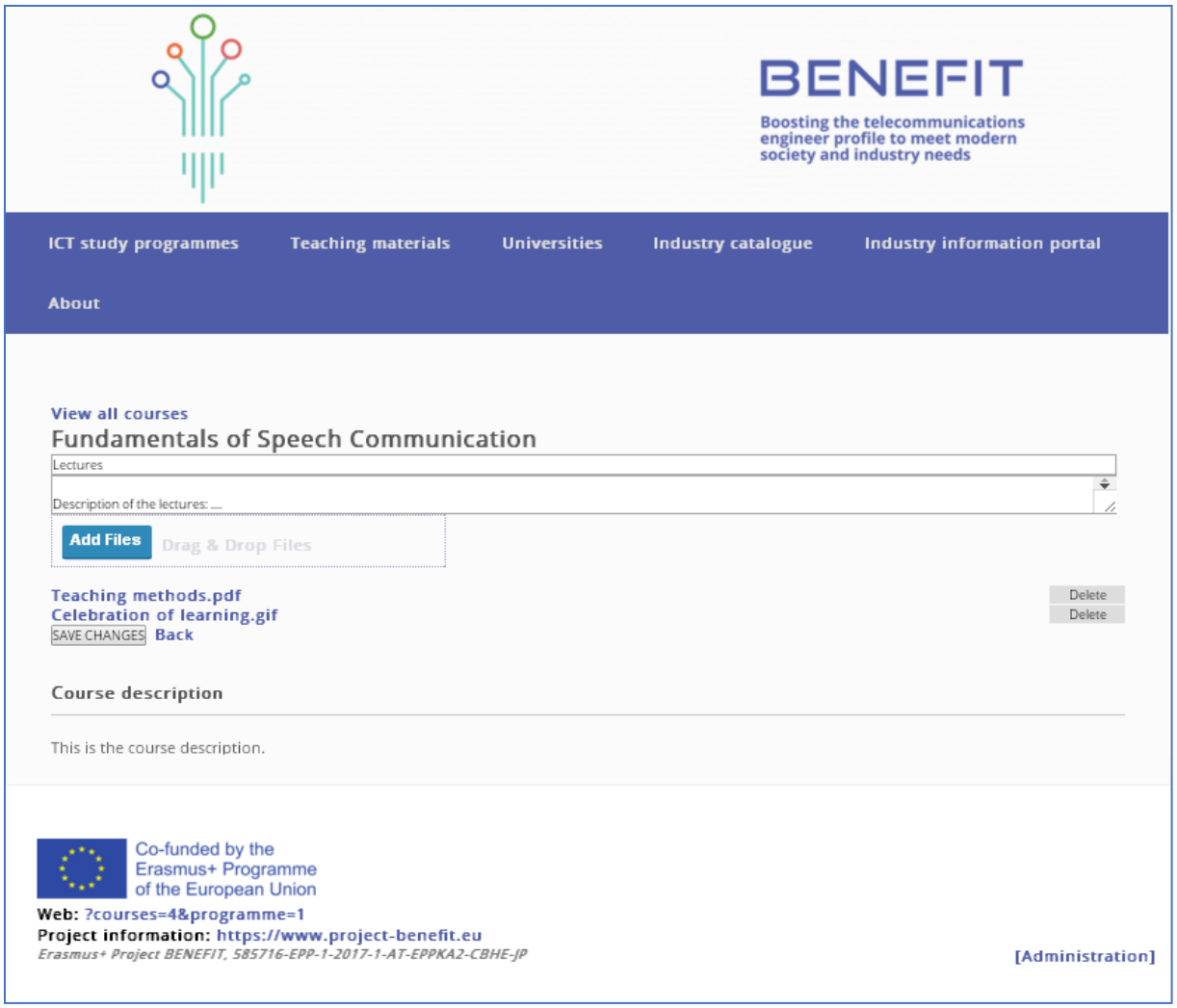

Figure 13. *The web repository space for teaching material upload*

All required information about selected courses and the required storage capacity are gathered for all HEIs, according to the data presented in Table 1, and Appendix A.

Table 1. *Overview of gathered information about modernized courses*

	HEI BSc/MSc study programme:		
	Course title:	**Enhanced (E) or novel (N):**	**Max. required storage:**
Course (#1):	*Course #1 title*	E / N	… GB
Course (#2):	*Course #2 title*	E / N	… GB
Course (#3):	*Course #3 title*	E / N	… GB
Course (#4):	*Course #4 title*	E / N	… GB
Course (#5):	*Course #5 title*	E / N	… GB

Approx. planned: 2-10 enhanced and 1-4 novel courses for BSc, and a bit less for MSc

Approx. required space: 100 MB - 10 GB per course

After completion of study programmes modernization, the web portal will be updated with new programmes, and the delivery of modernized study programmes will be initiated.

2.4. Industry web catalogue

WB HEI partners have established a long lasting cooperation with companies and technology parks in their environment. The collaboration with industry allows creation of a web catalogue where a list of companies working in the ICT domain can report their main profile. The catalogue serves as a tool to map the economic landscape.

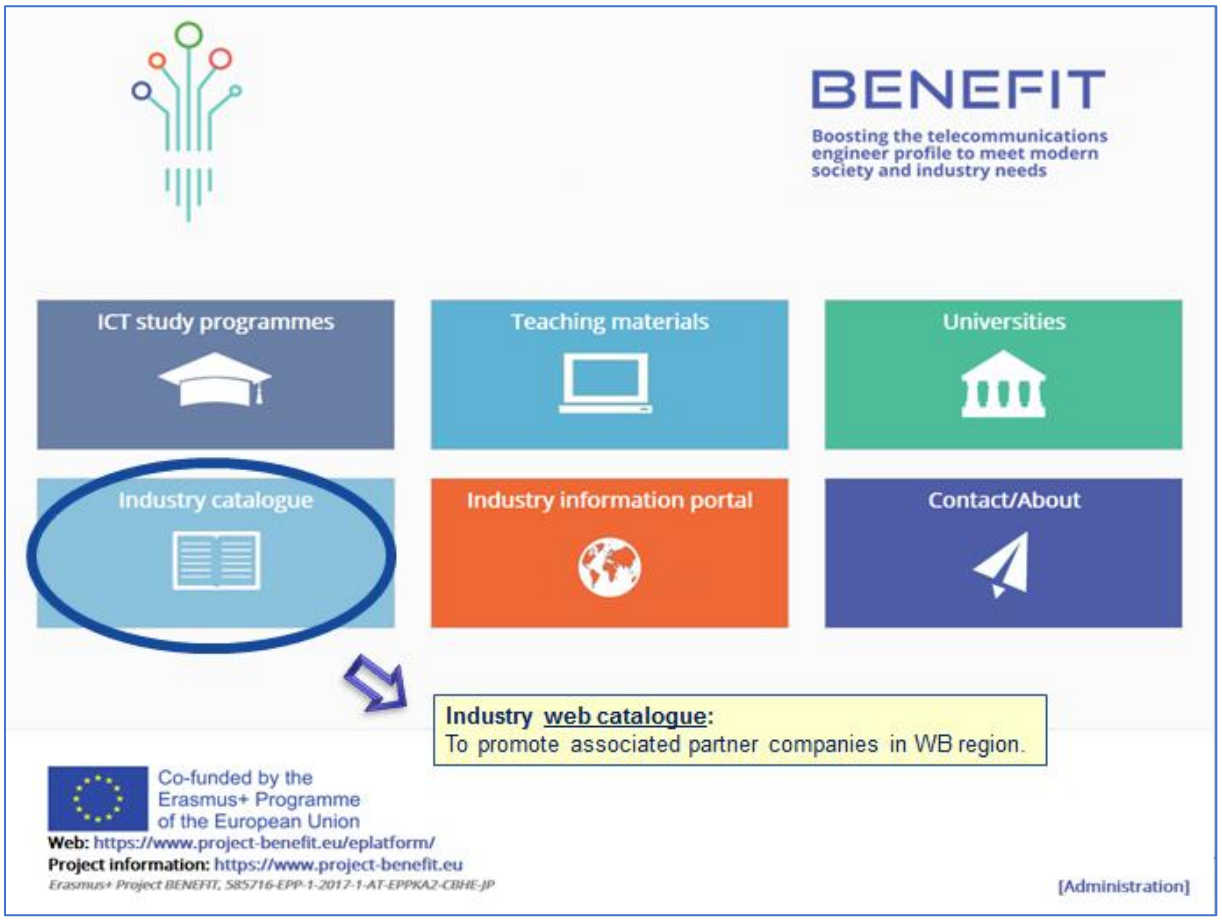

Figure 14. *The link to the industry web catalogue*

The catalogue of ICT companies in the WB region makes them more visible and more attractive to students and trainees even beyond the region.

The task to coordinate creation of web catalogue of industry capacities and companies, presented in Fig. 14 and Fig. 15, as well as its implementation, is led by FERIT with the help of the HEIs' representatives and the three involved ICT clusters (BIT, NICAT, VOICT) which will make sure that the highest number of companies in the region is reached.

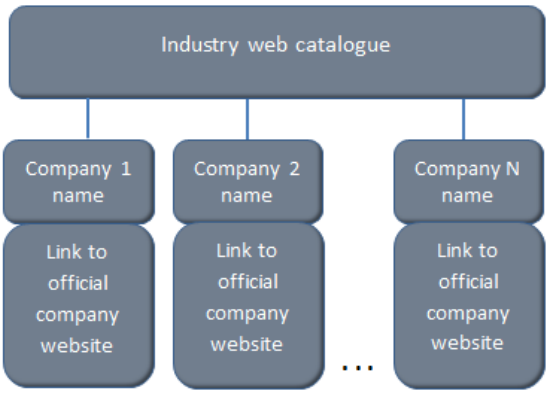

Figure 15. *The structure of the industry web catalogue*

These three technology clusters should contribute to reach hundreds of companies in the region. This should attract job applications from other countries and reduce the engineers drain.

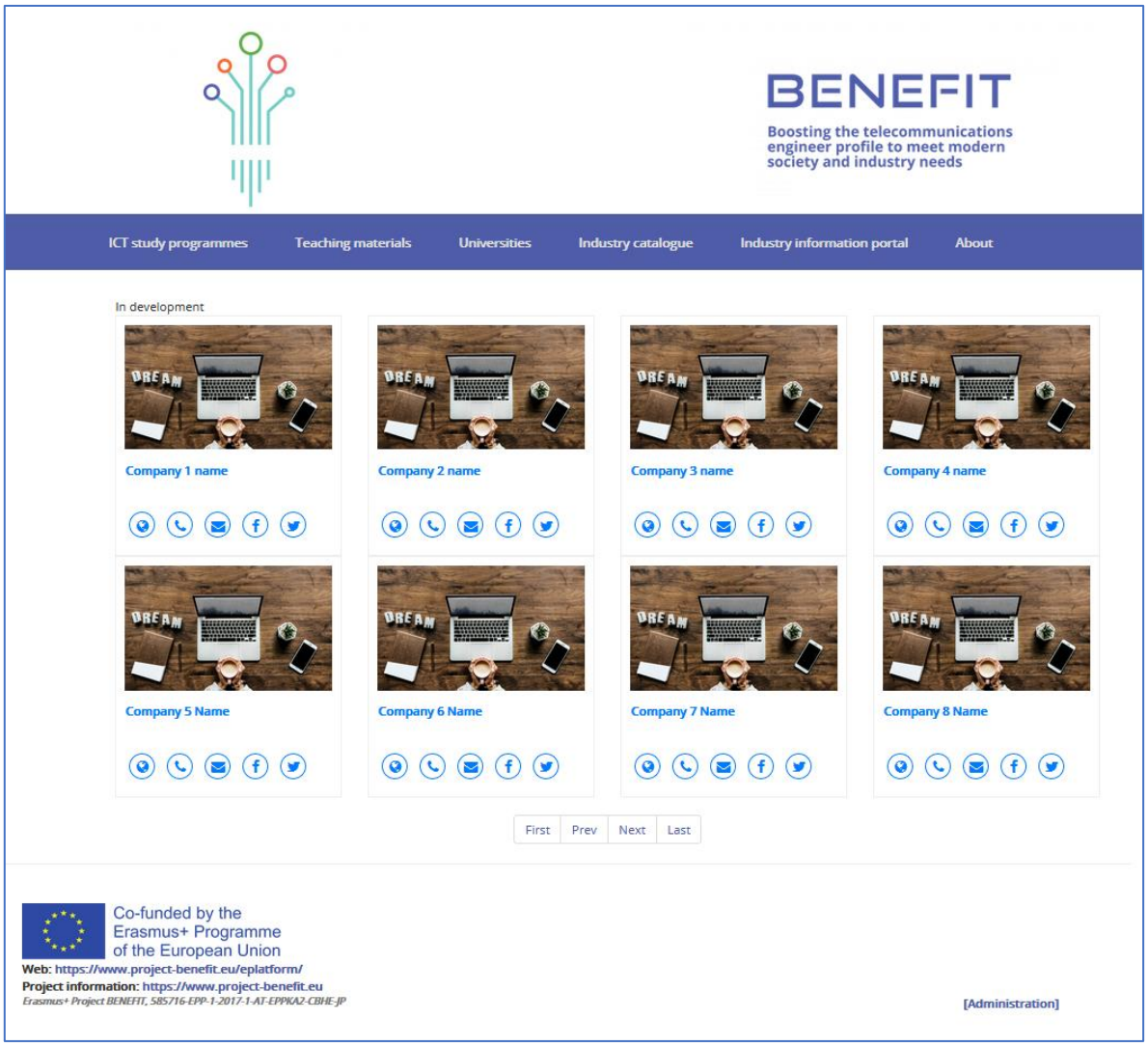

Figure 16. *The industry web catalogue*

More visibility is given to the involved universities showing their capacity to interact with industry. This will make them more attractive to students even beyond the WB region.

The overview and necessary input dialogues of the Industry web catalogue are presented in Fig. 16 and Fig. 17. They include the basic information about partner companies:

- Company name
- Identification number
- Address
- City
- Phone
- Mobile
- Email address
- Web site address
- Facebook page
- Twitter page.

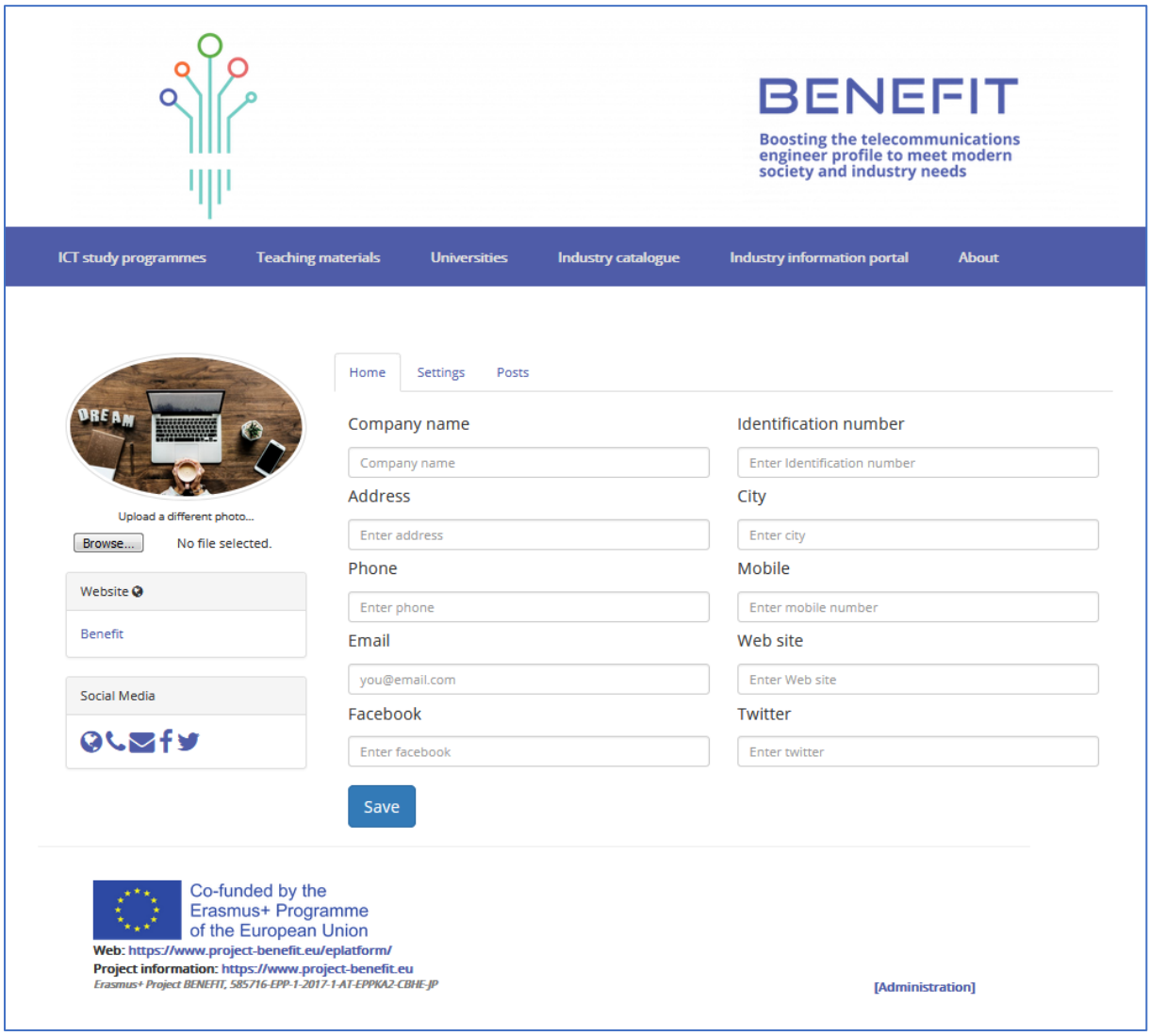

Figure 17. *The industry web catalogue input dialogues*

For the purpose of gathering the necessary information that should be entered within the industry catalogue, a short survey is created by FERIT team.

This survey is forwarded to the delegated contact persons from WB HEIs to collect required data from their industry partners. The survey is available at:

https://docs.google.com/forms/d/11rXvuKuF28byVPSHowqUiwqgypAkkvEExbyiUGHTlVQ/edit

It includes the following information required for creating the user accounts within industry portal, as well as industry catalogue:

- Company name *
- Company ID
  - The ID of the company (if applicable)
- Company address *
  - The main address of the company
- Company official phone number *
  - The company's main contact phone number
- Company email address *
  - The company's main email address
- Company website
  - Website of the company (complete URL)
- Company logo (icon)
  - The company logo/icon that will be used to enhance the visual identity and recognition of the company
- Company contact person *
  - The first and last name of the company contact person
- Company contact person email *
  - E-mail address of the contact person
- Comments
  - Any comments that you find useful for accompanying the contact information provided.

Within the survey, data denoted by ´*´ present necessary inputs. The overview of the survey is presented in Fig. 18.

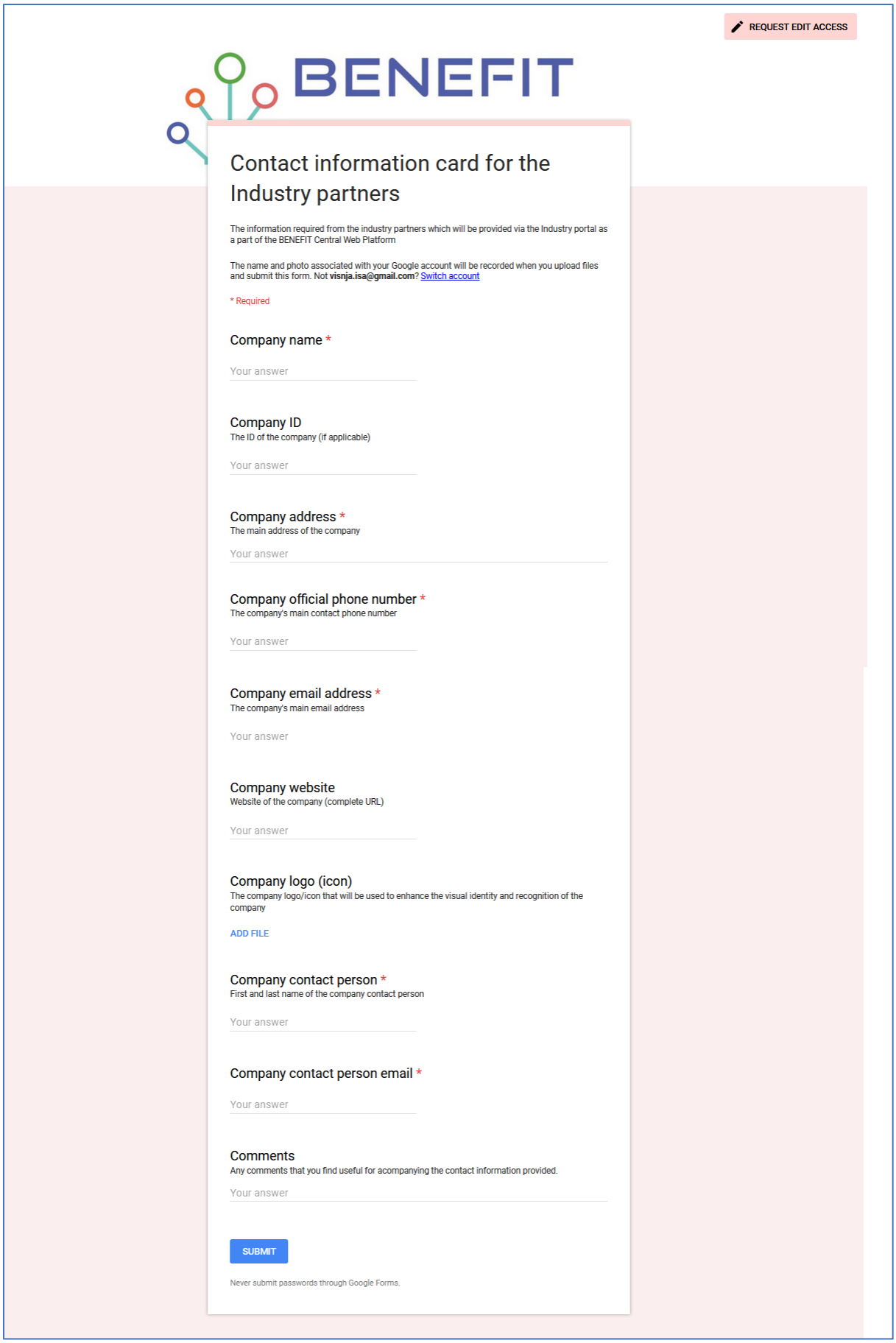

Figure 18. *The structure of the survey for industry partners*

2.5. Industry information portal

FERIT leads a creation of information portal for training, internship and job opportunities, as presented in Fig. 19. The aim of information portal is to list the workforce needs, knowledge requirements, job vacancies, former student's feedback and advice to student community, etc. Information on the portal can be published in all WB partner countries' languages and English language to promote further integration.

This industry information portal is intended to present basic information and application procedures, as well as all information related to training and internship opportunities that should be updated over time, as presented in Fig. 20 and Fig. 21.

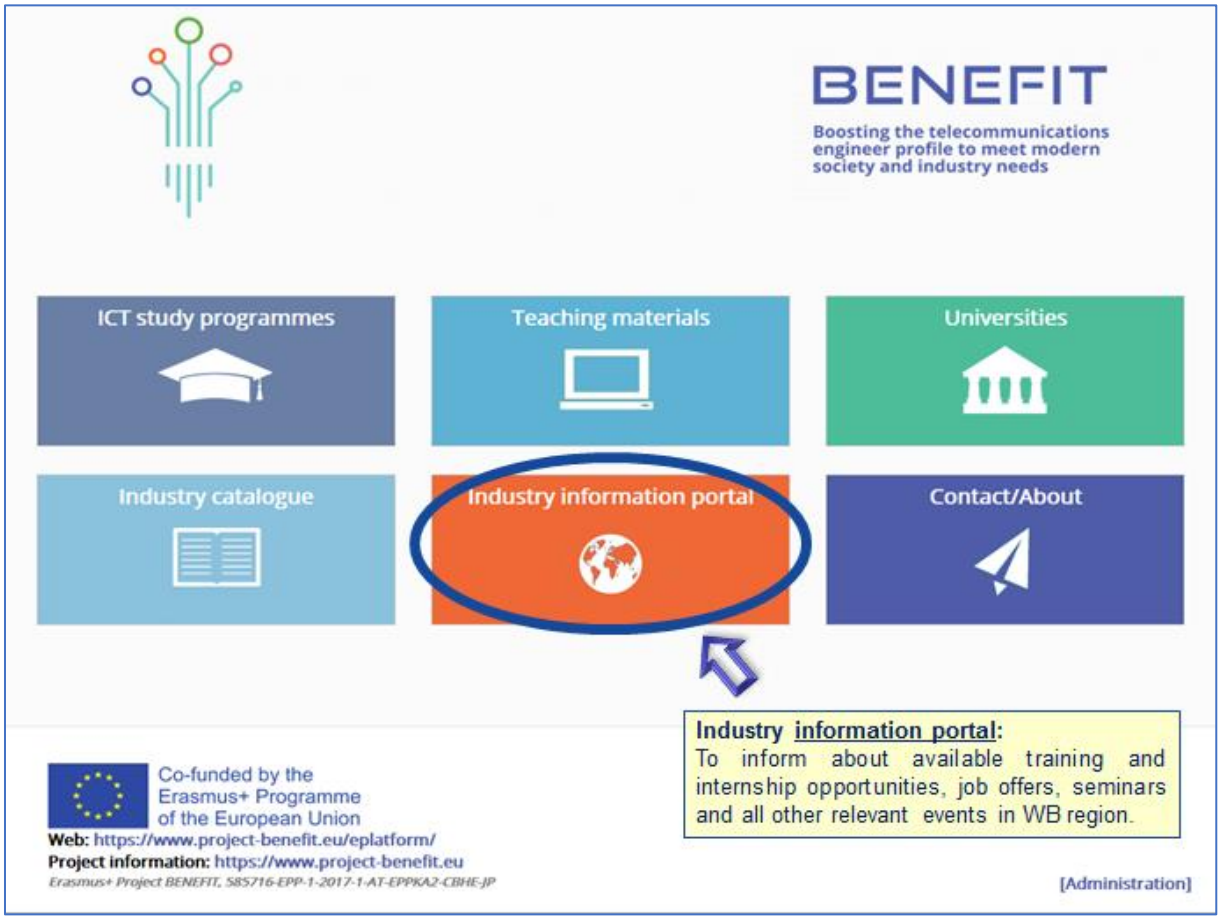

Figure 19. *The link to the industry information portal*

The joint university-industry labs created in other WPs serve as places for research fostering, student training and teaching material enhancement. The contribution should be realized during the education period since some internships in industry should be instanced.

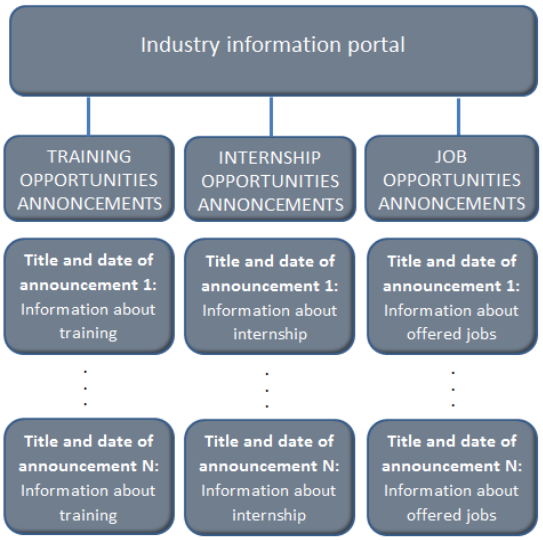

Figure 20. *The structure of the industry information portal*

The ICT clusters should help to reach a large number of other companies and obtain a good mapping of the ICT industry in the region for cooperation. The companies are committed to offer internship opportunities to students and to make such opportunities more visible so that more students can be attracted.

Figure 21. *The industry information portal*

2.6. Additional information

All other important official information are also comprised within the central project web platform, as presented in Fig. 22, 23, 24 and 25.

These information include:

- the list of all partner HEIs (Fig. 23)
- the list of HEIs' official information (Fig. 25)

All these can be reached using the links given within the central platform view, as presented in Fig. 22 and Fig. 24.

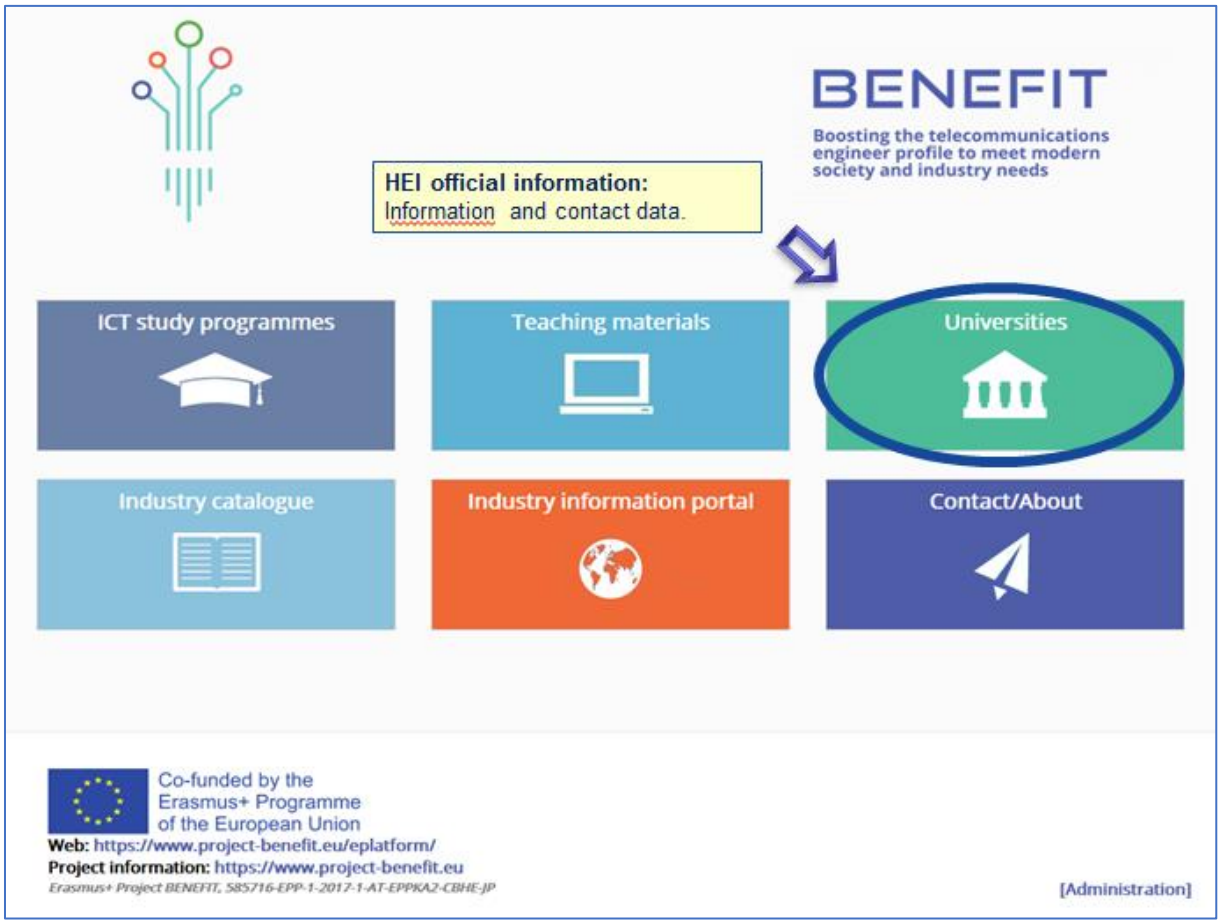

Figure 22. *The link to the HEI official information*

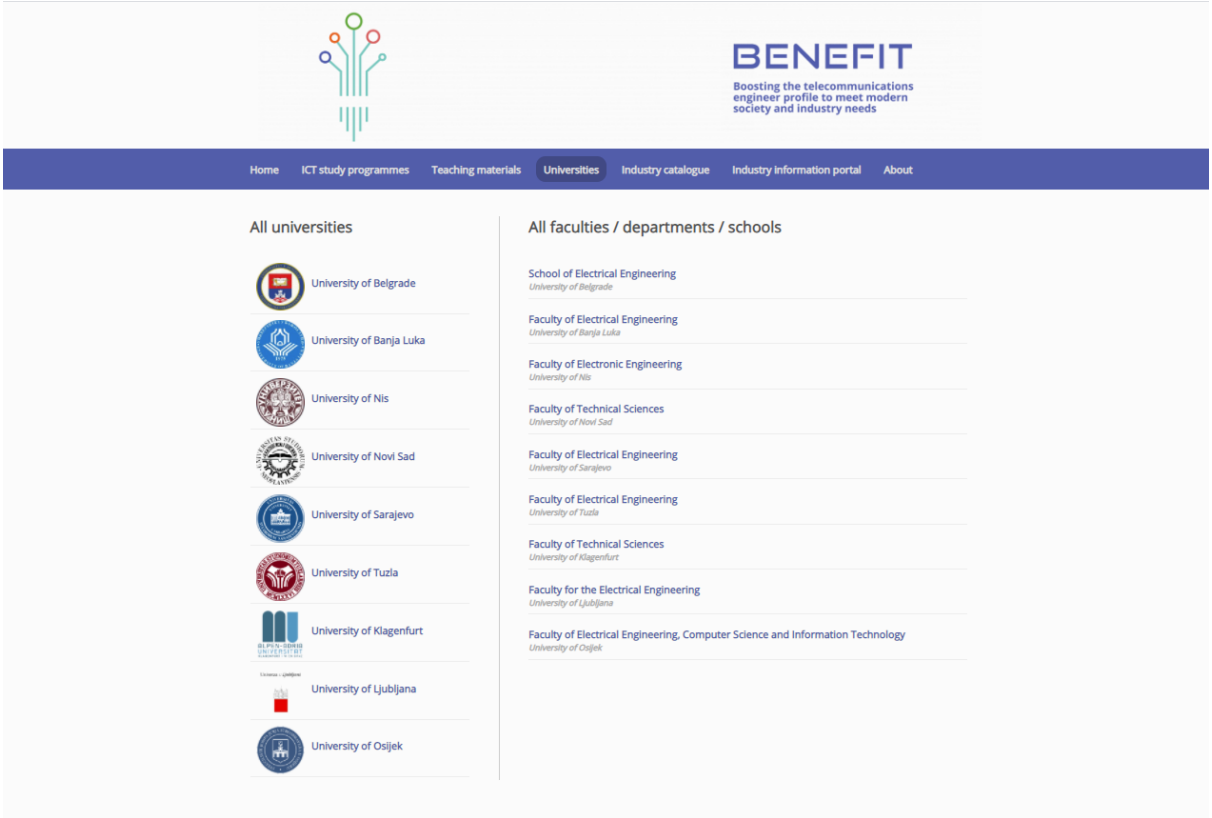

Figure 23. *The list of all partner HEIs*

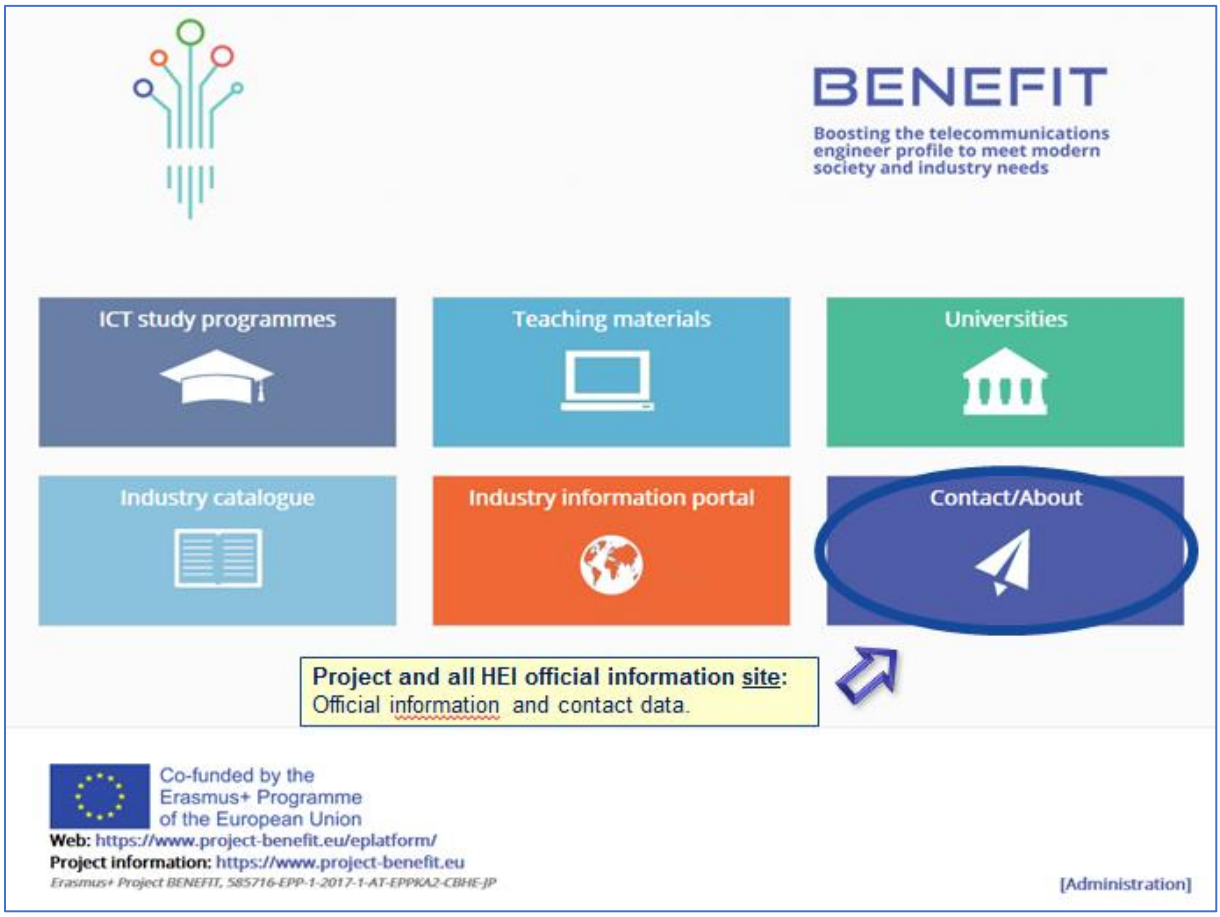

Figure 24. *The link to the project official information and the list of all partner HEIs*

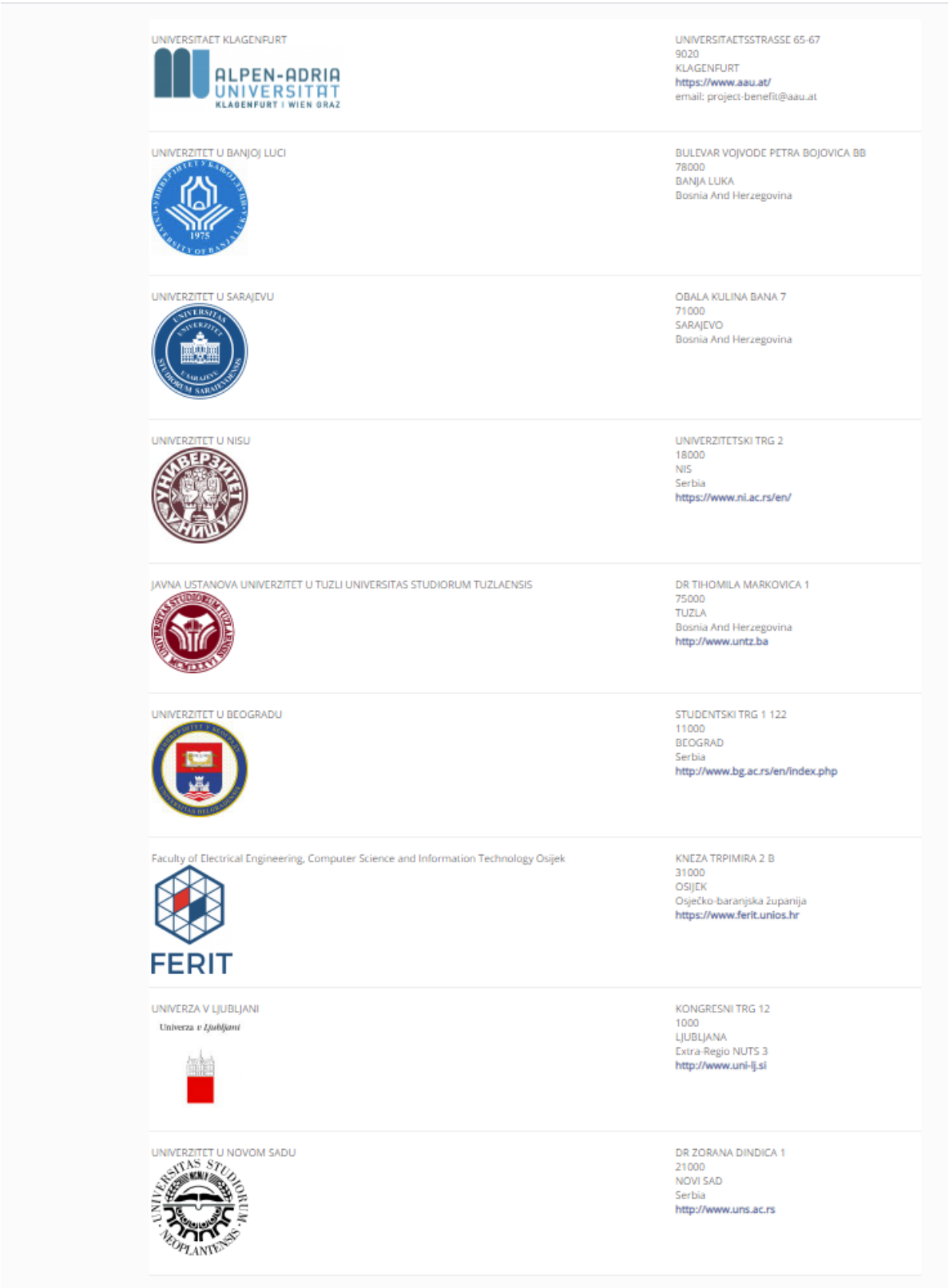

Figure 25. *The list of HEIs' official information*

3. Concluding remarks

In this deliverable, the description of the designed central project web platform aimed to promote achieved project results and to provide relevant information related to available modernized ICT study programmes, as well as existing internship, training and job opportunities to a wider community is presented.

The overview of all central project web platform‘s parts: the study programmes web portal, industry web catalogue, teaching material repository and industry information portal are also presented.
Individual parts of created central platform will be also described in the related chapters of the Deliverables (D) within other Work Packages (WP2-WP4), including:

- **D2.3** - ICT study programmes web portal
- **D2.4** - Industry catalogue
- **D3.5** - Teaching material web repository
- **D4.1** - Industry portal.

4. APPENDIX A.

An overview of all gathered data related to the modernized courses titles and the related approximated storage requirements is presented in the following Tables.

The selected courses denoted by green colour are the new specific-knowledge courses, and the courses denoted by yellow colour are the enhanced selected courses in ongoing study programmes.

Since the modernization of telecommunications engineering study programmes is planned for both the 1st and 2nd cycles, the courses are presented separately according to their related study programme types.

1st Cycle Study Programmes (BSc):

In the several following Tables, the 1st cycle courses are presented.

Table 1. *The list of all modernized courses within the UB's BSc study programme*

University of Belgrade (UB), School of Electrical Engineering		
Study programme title:	**Electrical Engineering and Computer Engineering**	
Module:	**Telecommunications and Information Technology**	
	Course title:	Max. storage:
Course (#1):	Fundamentals of Speech Communication	100 MB
Course (#2):	IoT Networks	150 MB
Course (#3):	Signal processing 2	100 MB
Course (#4):	Smart devices and communications	50 MB
Course (#5):	Telecommunications 1	100 MB
Course (#6):	Telecommunications 2	100 MB

Table 2. *The list of all modernized courses within the UBL's BSc study programme*

University of Banja Luka (UBL), Faculty of Electrical Engineering		
Study programme title:	**Electronics and Telecommunications**	
	Course title:	Max. storage:
Course (#1):	Antennas and Radio Wave Propagation	1 GB
Course (#2):	Digital Signal Processing	10 GB
Course (#3):	Electrical Measurements	1 GB
Course (#4):	Fundamentals of Electrical Engineering I	10 GB
Course (#5):	Fundamentals of Electrical Engineering II	10 GB
Course (#6):	Fundaments of Radar Systems	1 GB
Course (#7):	Multimedia Signals and Systems	1 GB
Course (#8):	Systems for Digital Signal Processing	1 GB
Course (#9):	Telecommunication Networks	1 GB
Course (#10):	Wireless Sensor Networks	10 GB

Table 3. *The list of all modernized courses within the UNI's BSc study programme*

University of Niš (UNI), Faculty of Electronic Engineering		
Study programme title:	**Electrical engineering and Computer Science**	
Module:	**Communications and Information Technologies**	
Submodule:	**System Engineering and Radio-Communications**	
	Course title:	Max. storage:
Course (#1):	Computer Communications and Internet access (II)	100 MB
Course (#2):	Measurements in Telecommunications	100 MB
Course (#3):	Microwave Design for IoT	100 MB
Course (#4):	Mobile Communication Systems	100 MB
Course (#5):	Smart Systems and IoT	100 MB

Table 4. *The list of all modernized courses within the UNI's BSc study programme*

University of Niš (UNI), Faculty of Electronic Engineering		
Study programme title:	**Electrical engineering and Computer Science**	
Module:	**Communications and Information Technologies**	
Submodule:	**Communications and Information Processing**	
	Course title:	Max. storage:
Course (#1):	Advanced RFIC for Telecommunication Systems	100 MB
Course (#2):	Data Analysis and Compression	100 MB

Table 5. *The list of all modernized courses within the UNS's BSc study programme*

University of Novi Sad (UNS), Faculty of Technical Sciences		
Study programme title:	**Power, Electronic and Telecommunication Engineering**	
Module:	**Information and Communication Technology and Signal Processing**	
	Course title:	Max. storage:
Course (#1):	Design of Industrial IoT Systems	1 GB
Course (#2):	Machine learning 1	1 GB
Course (#3):	Machine learning 2	1 GB
Course (#4):	Modelling and Simulation of Communication Systems	1 GB
Course (#5):	Software of Telecommunication Systems	1 GB
Course (#6):	Wireless Communication Systems	1 GB

Table 6. *The list of all modernized courses within the UNSA's BSc study programme*

University of Sarajevo (UNSA), Faculty of Electrical Engineering		
Study programme title:	**Telecommunications**	
	Course title:	Max. storage:
Course (#1):	Antennas and Wave Propagation	400 MB
Course (#2):	Communication Protocols and Networks	400 MB
Course (#3):	Software Engineering for Telecommunications	400 MB

Table 7. *The list of all modernized courses within the UNTZ's BSc study programme*

University of Tuzla (UNTZ), Faculty of Electrical Engineering		
Study programme title:	**Electrical and Computer Engineering**	
Module:	**Telecommunications**	
	Course title:	Max. storage:
Course (#1):	Analog Integrated Electronics	1 GB
Course (#2):	Digital Communications	1 GB
Course (#3):	Fundamentals of Communications	1 GB
Course (#4):	Introduction to Electronics	1 GB
Course (#5):	Microprocessor Systems in Telecommunications	1 GB
Course (#6):	Sequential Circuits	1 GB
Course (#7):	Signals and Systems	1 GB
Course (#8):	Telemedicine	1 GB

2nd Cycle Study Programmes (MSc):

In the several following Tables, the 2nd cycle courses are also presented.

Table 1. *The list of all modernized courses within the UB's MSc study programme*

University of Belgrade (UB), School of Electrical Engineering		
Study programme title:	Electrical Engineering and Computer Engineering	
Module:	Information and Communications Technology	
	Course title:	Max. storage:
Course (#1):	IoT Networks Architecture	100 MB
Course (#2):	Wireless Sensor Networks	150 MB
Course (#3):	Multirate Systems	50 MB

Table 2. *The list of all modernized courses within the UNI's MSc study programme*

University of Niš (UNI), Faculty of Electronic Engineering		
Study programme title:	**Master academic studies Communications and Information Technologies**	
Module:	**System Engineering and Radio Communications**	
	Course title:	Max. storage:
Course (#1):	Artificial Intelligence and Machine Learning for RF applications	100 MB
Course (#2):	Broadband access networks	100 MB
Course (#3):	Circuit Design for 5G systems	100 MB
Course (#4):	Wireless power transfer and energy harvesting	100 MB

Table 3. *The list of all modernized courses within the UNI's MSc study programme*

University of Nis (UNI), Faculty of Electronic Engineering		
Study programme title:	**Master academic studies Communications and Information Technologies**	
Module:	**Communications and Information Processing**	
	Course title:	Max. storage:
Course (#1):	Statistical Learning in Signal Processing	100 MB
Course (#2):	Computing for IoT Communications	100 MB
Course (#3):	Principles of Software Radio	100 MB
Course (#4):	Big Data Analysis	100 MB
Course (#5):	Intelligent audio algorithms	100 MB
Course (#6):	Telecommunication and Information Technologies in Telemedicine	100 MB

Table 4. *The list of all modernized courses within the UNS's MSc study programme*

University of Novi Sad (UNS), Faculty of Technical Sciences		
Study programme title:	**Power, Electronic and Telecommunication Engineering**	
Module:	**Information and Communication Technology**	
	Course title:	Max. storage:
Course (#1):	Big Data - Management and Analysis	1 GB
Course (#2):	Cognitive Radio	1 GB
Course (#3):	Network Science	1 GB
Course (#4):	Cryptography	1 GB

Table 5. *The list of all modernized courses within the UNSA's MSc study programme*

University of Sarajevo (UNSA), Faculty of Electrical Engineering		
Study programme title:	**Telecommunications**	
	Course title:	Max. storage:
Course (#1):	Advanced Telecommunication Protocols and New Generation Networks	400 MB
Course (#2):	Image and video compression	400 MB
Course (#3):	Telecommunications Network Management	400 MB
Course (#4):	Human Computer Interaction	400 MB

Table 6. *The list of all modernized courses within the UNTZ's MSc study programme*

University of Tuzla (UNTZ), Faculty of Electrical Engineering		
Study programme title:	**Electrical and Computer Engineering**	
Module:	**Telecommunications**	
	Course title:	Max. storage:
Course (#1):	IoT Networks	1 GB
Course (#2):	Network Security	1 GB
Course (#3):	Telecommunication System Programming	1 GB