

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 3: Modernization of teaching methodologies and infrastructures

Title: D3.4 Web repository for class and lab sessions material, recorded remote classes, and network of audio libraries

Lead Organization: FERIT

Participating Organizations: UNI-KLU, UL, UBL, UNSA, UNTZ, UB, UNI, UNS, ENT, BICOM, BIT, CISCO, NiCAT, RT-RK

Editors: A. Tonello, M. Zajc, S. Rimac-Drlje, N. Suljanović, V. Delić

Contributors: V. Delić, Z. Krpić, D. Došen, A. Mujčić, N. Jakovljević, D. Mišković, D. Žagar, M. Miloloža

Disclaimer:

“The European Commission’s support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.”

Deliverable data	Work Package and Outcome ref.no.	WP3 D3.4
	Title	Web repository for class and lab sessions material, recorded remote classes, and network of audio libraries
	Type	<input checked="" type="checkbox"/> Teaching material <input type="checkbox"/> Event <input checked="" type="checkbox"/> Learning material <input type="checkbox"/> Report <input checked="" type="checkbox"/> Training material <input checked="" type="checkbox"/> Service / Product
	Description	A web repository has been made available on the web portal (from D2.3) and become filled with class and lab sessions material, recorded remote classes and audio libraries developed during the course of the project. AlfaNum has provided high quality text-to-speech synthesizer that is necessary for audio library implementation as an innovative education resource (Task T3.5). The same material is available in all the WB partner countries' languages to promote integration.
	Date	14/04/2020
	Language	English and Bosnian/Croatian/Serbian
Target groups	<input checked="" type="checkbox"/> Teaching staff <input checked="" type="checkbox"/> Students <input checked="" type="checkbox"/> Trainees <input type="checkbox"/> Administrative staff <input checked="" type="checkbox"/> Technical staff <input checked="" type="checkbox"/> Librarians <input checked="" type="checkbox"/> Industry partners, WB Higher education authorities	
Dissemination level	<input type="checkbox"/> Department / Faculty <input type="checkbox"/> Local <input type="checkbox"/> National <input type="checkbox"/> Institution <input type="checkbox"/> Regional <input checked="" type="checkbox"/> International	
Lead Organization	FERIT	
Participating Organizations	UNI-KLU, UL, UBL, UNSA, UNTZ, UB, UNI, UNS, ENT, BICOM, BIT, CISCO, NiCAT, RT-RK	

Revision History				
Version	Date	Author(s)	Organization(s)	Brief description of change
01	03/04/2020	V. Delić, S. Rimac-Drlje	UNS, FERIT	Sections 1 and 2
02	07/04/2020	Z. Krpić, D. Došen, A. Mujčić, N. Jakovljević, D. Mišković	FERIT, FERIT, UNTZ, UNS, AlfaNum	Contributions to Section 3
03	14/04/2020	A. Tonello, M. Zajc, S. Rimac-Drlje, N. Suljanović, V. Delić	UNI-KLU, UL, FERIT, UNTZ, UNS	External review revisions
release 1	01/09/2020			
release 2 proofread	09/02/2021		Sinonim d.o.o.	Proofreading

Table of Contents

1. Introduction.....	5
2. Objectives of the Deliverable	5
3. A Brief Description of Web Repository as a Web Service	5
3.1. Web Repository.....	6
3.2. Link to CABUNS.....	7
4. Conclusions.....	9
5. References.....	10

1. Introduction

The deliverable D3.4 “Web repository for class and lab sessions material, recorded remote classes, and network of audio libraries” is a service (not a report). Nevertheless, a short report is given here.

The relationship of D3.4 with other deliverables and WPs, particularly the WP3 tasks, is shown in Figure 1, with the final goal to contribute to the project goal:

G3: Increase the attractiveness of ICT studies through the development of a joint e-platform.

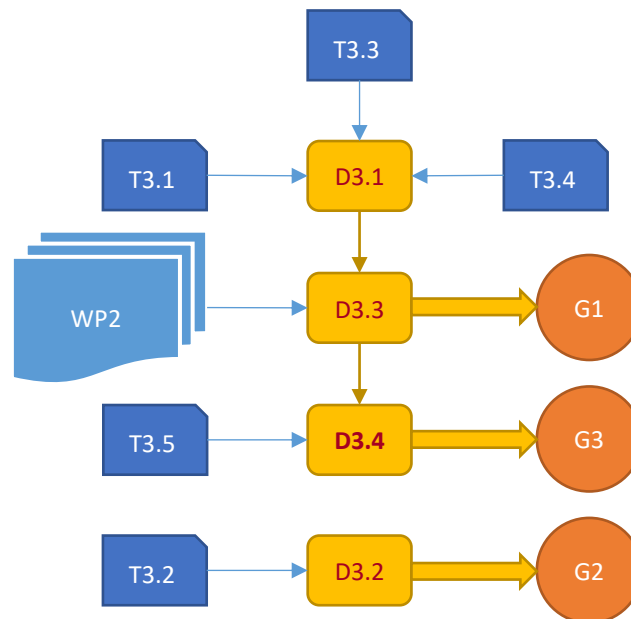


Figure 1. *D3.4 among other WP3 deliverables and their contributions to the project goals*

The web repository is one of the e-platforms integrated in the central project web platform. It is based on the collection of teaching material for new and modernized courses (D3.3) as well as the Central Audio Library of the University of Novi Sad (CABUNS), which is developed in collaboration with AlfaNum as the industrial partner of the BENEFIT project.

2. Objectives of the Deliverable

The main objective of the D3.4 deliverable is to provide teaching/learning materials for new and modernized courses, class and lab sessions material, recorded remote classes, and network of audio libraries – altogether as a web service.

3. A Brief Description of Web Repository as a Web Service

The web repository and the e-platform have been delivered and used. Each PowerPoint presentation can be accompanied with a link to its audio edition made by CABUNS using TTS (text-to-speech technology).

3.1. Web Repository

Web Repository is available as an integral part of the Web Platform. It enables upload of the teaching materials in text, audio or video formats in numerous file types. The Web Repository itself is a single point of storage for all the teaching materials from all the studies and all the courses. It uses protection from the potential data loss by backup mechanisms, it is easily searchable and readily available. As shown in Figure 2, browsing the Web Repository is possible by several categories: study programme (1) or other training materials (2), knowledge area (3) and course (4).

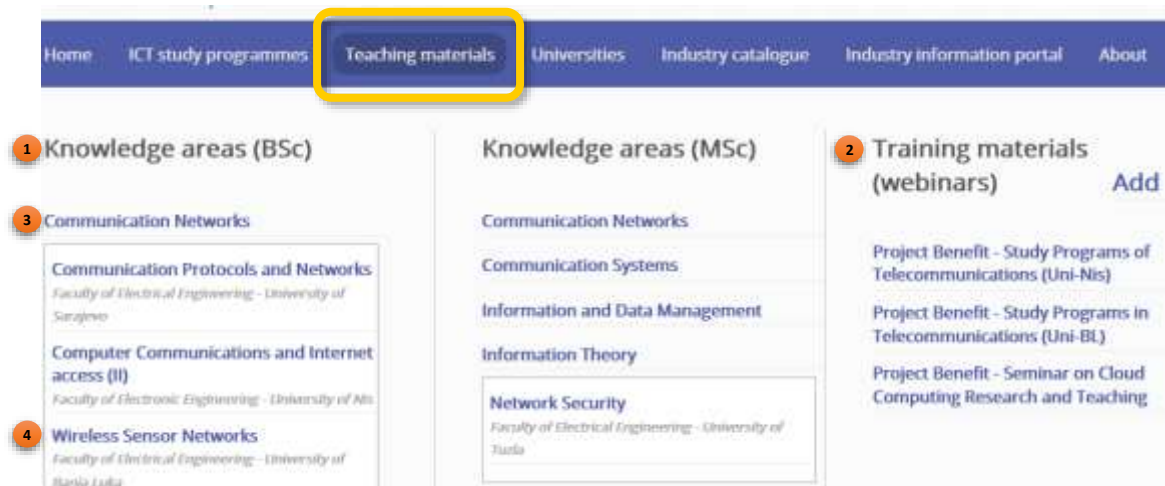


Figure 2. Teaching materials web repository browsing categories

The Web Repository itself is a collection of course repositories. A course can have multiple repositories, thus enabling an easy organization of the course materials according to the arbitrary criteria. Course repositories are maintained within each course, which can be seen in Figure 3. There the repositories can be created, edited and deleted. The list of uploaded files for a single course per repository is visible when a user clicks a course. Basic information for each file is displayed when browsing a course repository, such as filename and file size. Also, the authorised persons can delete each file from a course repository or a complete repository can be removed.



Figure 3. Handling course repositories within the course administration panel

For each course repository a desired storage size can be defined, thus making an efficient use of the storage space of the Web Repository. This way the teachers can estimate how much storage they need, avoiding reservation of unnecessary storage space. When creating a course repository, teachers can specify the title (1) and description (2) of the repository, shown in Figure 4. Additionally, a course repository can be password protected so teachers can restrict the access to the teaching materials (3).

Figure 4. *Creating a course repository*

The files can be uploaded to the course repository by a simple *drag&drop* action, or by manually selecting the file(s) to upload, Figure 5.

Figure 5. *Editing a course repository*

3.2. Link to CABUNS

Central Audio Library of the University of Novi Sad (CABUNS) is a web-portal that provides textbooks, presentations and other teaching material augmented by accompanying audio contents generated automatically from the written text. The main architectural aspects are presented in Figure 6. The core of the system is the ASP.NET framework as the latest generation of the Active Server Pages (ASP) technology. This layer is responsible for processing requests accepted by the Internet Information Services (IIS) server and work distribution according to the request type.

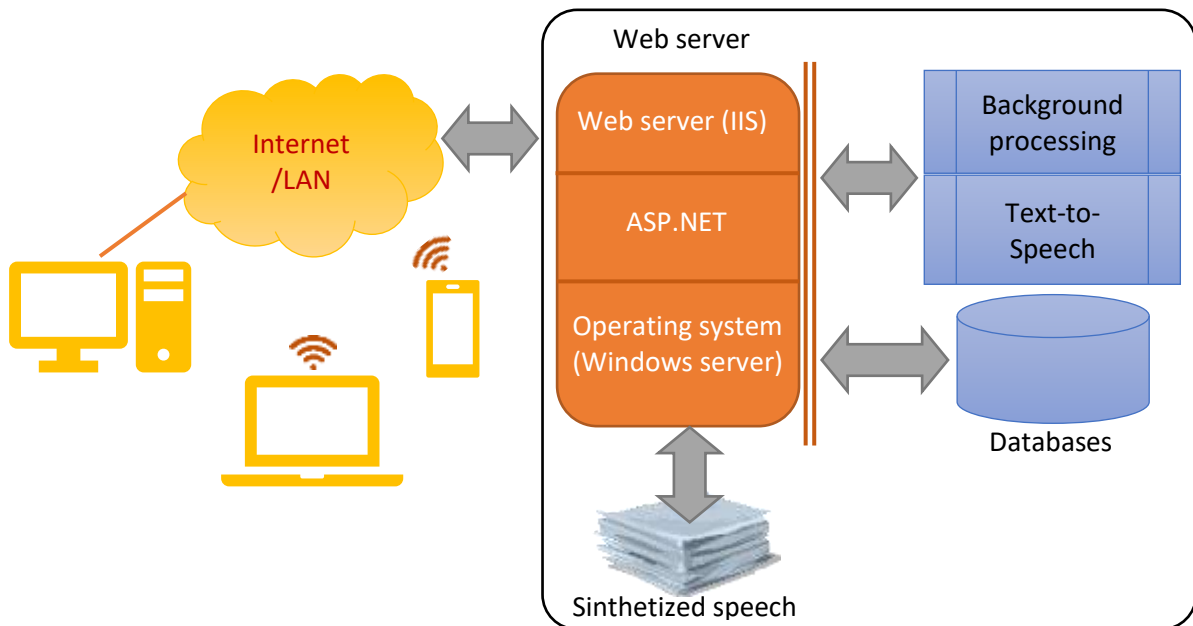


Figure 6. CABUNS architecture and data flow diagram

Only academic teaching staff that is registered to the CABUNS can upload teaching material in the form of Word documents and PowerPoint presentations. Processing a Word document includes the following phases:

- parsing a document to extract pages and text;
- generating a pdf file to provide visual access on various devices (personal computers, tablets, smartphones);
- synthesizing speech from the extracted text;
- verification of the created material by the owner of the original documents.

Processing PowerPoint presentations is very similar to the previous one, but with two important distinctions:

- text is extracted from the slide notes;
- for each slide, output HTML combines visual presentation (in the form of picture) and corresponding synthesized speech.

Quality of synthesized speech is high and it is obtained by the AlfaNum synthesizer based on the principles of parametric speech synthesis using neural networks. The synthesis is limited to Serbian, Croatian, Bosnian and English. It supports changing speaking style and speaker voice. More details on CABUNS and the TTS system reader are available in the references.

In the near future, CABUNS will be available to the all participants of the BENEFIT project in the Western Balkan countries. From the technical point of view, it is ready at this moment, but some administrative issues should be solved. Appropriate teaching material can be uploaded on the CABUNS web-portal, and only its link can be posted on the BENEFIT e-platform. From the user perspective, this would not cause any significant changes. The proposed concept is proofed by prof. Aljo Mujčić.

4. Conclusions

Although the deliverable D3.4 “Web repository for class and lab sessions material, recorded remote classes, and network of audio libraries” is not a report, but rather a service, a short report is given here. The connections of D3.4 with other deliverables and WPs are shown, including the relationship to WP3 tasks. After a brief description of the objectives, a few more details are given about the Web Repository; it is described as a Web Service. Finally, it is explained how the Central Audio Library of the University of Novi Sad become available to the BENEFIT partners.

5. References

- Vlado Delić, Dejan Vukobratović, Milan Sečujski, Milan Narandžić, Živko Bojović, Tatjana Lončar-Turukalo, Dragana Bajović, Nikša Jakovljević, Vojin Šenk (2019) „Unapređenje profila inženjera telekomunikacija u skladu s potrebama savremenog društva i industrije“, XXV skup trendovi razvoja “Kvalitet visokog obrazovanja” - TREND 2019, Kopaonik, Srbija, 11-14.02.2019., ISBN: 978-86-6022-157-7, pp. 147-150
- Vlado Delić, Dragiša Mišković, Siniša Suzić, Tijana Delić, Branislav Popović, Nikša Jakovljević, Milan Sečujski (2019) „Centralna audio-biblioteka Univerziteta u Novom Sadu“, XXV skup trendovi razvoja “Kvalitet visokog obrazovanja” - TREND 2019, Kopaonik, Srbija, 11-14.02.2019., ISBN: 978-86-6022-157-7, pp. 36-39
- Vlado Delić, Dragiša Mišković, Branislav Popović, Milan Sečujski, Siniša Suzić, Tijana Delić, Nikša Jakovljević (2019) “Central Audio-Library of the University of Novi Sad”, Intelligent Human-Machine Interfaces, 13th International Symposium on Intelligent Distributed Computing, 7-9.10.2019, Saint-Petersburg, Russia, I. Kotenko et al. (Eds.): IDC 2019, SCI 868, Springer, pp. 467-476, DOI: 10.1007/978-3-030-32258-8_55
- Tijana Delić, Siniša Suzić, Milan Sečujski, Darko Pekar (2018) "Rapid development of new TTS voices by neural network adaptation." In: 17th Int. Symposium INFOTEH-JAHORINA, 1–6. Jahorina, Bosnia and Herzegovina
- Tijana Delić, Milan Sečujski, Siniša Suzić (2017) "A review of Serbian parametric speech synthesis based on deep neural networks." Telfor Journal, 9(1), 32–37, DOI: 10.5937/telfor1701032