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Digital Broadcasting & Broadband Technologies

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THE REPORT ON ANALYSIS OF WB MASTER STUDY PROGRAMMES IN THE FIELD OF ICT

Deliverable 1.2

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Date:	21.7.2016
Work package:	WP1
Dissemination level:	

Project acronym:	**DBBT**
Project full title:	DIGITAL BROADCASTING AND BROADBAND TECHNOLOGIES
Project No:	561688-EPP-1-2015-1-XK-EPPKA2-CBHE-JP
Grant Agreement number:	2015-3763
Coordinator institution:	University in Kosovska Mitrovica
Coordinator:	Prof. Dr. Sinisa Ilic, UNIVERSITY OF MITROVICA Faculty of Technical Sciences
Beneficiaries:	Higher Technical Professional School In Zvečan Univerzitet U Banjoj Luci Univerzitet U Bihaću School Of Electrical Engineering And Computer Science Univerzitet Singidunum VSB-Technical University Of Ostrava Univerza V Ljubljani Universidad Politécnica De Madrid Tartu Ulikool TV Mreza Jp Emisiona Tehnika I Veze Alternativna Televizija

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INTRODUCTION

This document includes a report on the work and results of the WP1 "Analysis consulting and training" activity No2. In the scope of this activity the existing study programmes of the WB partner countries are analysed from the perspective of the DBBT related topics and covered subjects with a preliminary identification of topics needed to implement the DBBT study programmes. Most of the analysed WB study programs are based on electrotechnical and ICT engineering subjects, with added subjects, which contribute to differences between them. The analysed study programmes and their specifics are described in more detail in the following sections

ICT related study programmes of WB partners

This chapter includes presentation of the ICT related study programmes in the WB partner countries: Serbia, Kosovo and Bosnia and Hercegovina. As mentioned, most of them are based on electrical engineering and ICT related topics, with some differences between them. Regardless of the differences, most study programmes present a sound basis for the DBBT Master study programmes, with the exception of one study programme, which will need to incorporate more basic DBBT related topics in order to comply with the given goal. The presented study programmes are similar to the extent that they can be presented by the following domains, which are related to DBBT domain: Basics or fundamentals, Telecommunications, Multimedia, Software development and, though to a lesser extent, the Electronics/automatics domain. The specifics of each University's study programme are presented in individual subchapters.

University of Priština (UPKM)

At the University of Priština the existing ICT study programmes cover two main fields: The electrotechnics and telecommunication on one hand and Computing and information on the other. These represent a good basis for DBBT study programmes as they cover a number of fields related to DBBT in the sense that they represent either the basics or the complementary topics, which are related to DBBT domain. The study programmes' topics at UPKM match the above mentioned domains as follows:

1. **Theoretical basics:** mathematical topics, physics, fundamentals of electrical engineering, digital signal processing, image processing, etc.
2. **Telecommunications:** networking, broadband, basics of telecommunications, optical communications, fundamentals of television, satellite systems, etc.
3. **Multimedia:** Multimedia systems, audio-visual systems, cameras, etc.
4. **Electronics/automatics:** electronics, circuits, automatics, etc.
5. **Software engineering:** software development, algorithms and data structures, software design, etc.

These topics represent a sound basis for a Master study programme in DBBT as many of the existing topics are more or less related to it. The courses most relevant to the field of DBBT are Telecommunications, Digital signal processing, Antennas and EM wave propagation, Digital communications, Radio communications, Broadband communication networks , Multimedia systems, Audio systems and Fundamentals of TV. Somewhat less relevant for the DBBT is the domain of electronics/automatics topics, even though these topics are somewhat related and can be found a useful basis for DBBT master studies in terms of electronic basis of the audio-visual equipment used in studios, etc.

Based on the analysis, it can be suggested that in addition to basic DBBT related topics such as AV production, and technologies topics related to broadcasting chain, broadband, etc., which should take place in the master study programmes, some additional emphasis on interactive multimedia applications development, IPR and human-computer interaction topics could prove useful*.

University of Banja Luka (UNIBL)

At the University of Banja Luka the existing 4 year ICT study programmes cover three main fields: The electronics and telecommunication, Computing and informatics and Power and Industrial Systems/Power Engineering and Automation. Out of these three, the relevant ones for the DBBT study programmes are “The electronics and telecommunications” as well as “Computing and informatics”. Similarly to other study programmes of WB partners they also represent a good basis for DBBT study programmes as they cover a number of fields related to DBBT. The study programmes’ topics at UNIBL match the above mentioned domains as follows:

1. **Theoretical basics:** mathematical topics, physics, fundamentals of electrical engineering, digital signal processing, etc.
2. **Telecommunications:** telecommunication systems, telecommunications networks, antennas and radio waves, information theory and coding, digital communications, radio relay communications, etc.
3. **Multimedia:** Multimedia telecommunications, multimedia signals and systems, acoustics and audio-technics, etc.
4. **Electronics/automatics:** digital electronics, microwave technics, etc.
5. **Software engineering:** programming

The structure of the study programmes is such that the first year of studies covers the fundamentals through basic courses such as Mathematics, Physics, Fundamentals of electrical engineering and Programming.

These topics also represent a sound basis for a Master study programme in DBBT as many of the existing topics are more or less related to it. The most relevant courses to the field of DBBT are

Telecommunications, Digital signal processing, Antennas and radio waves, Multimedia communications, Multimedia signals and systems, Acoustics and audio technics.

Based on the analysis, it can be suggested that in addition to basic DBBT related topics such as AV production, and technologies topics related to broadcasting chain, broadband, etc., which should take place in the master study programmes, some additional emphasis on software development for interactive multimedia applications development, IPR and human-computer interaction topics would prove useful*.

Singidunum University (SINGI)

At the Singidunum University the existing 4 year ICT study programme is based on software engineering and development as well as on electrotechnical engineering. This differentiates it from other study programmes in a way that SINGI offers more software/programming oriented topics than any other of the WB project partners. Nevertheless, many topics and subjects represent the basis for DBBT master study programmes. The study programmes' topics at SINGI match the above mentioned domains as follows:

1. **Theoretical basics:** mathematical topics, physics, electrical engineering, digital signal processing, etc.
2. **Telecommunications:** telecommunications, signals and systems, internet technologies and web services with additional elective courses such as mobile communication systems, telecommunications access networks, etc.
3. **Multimedia:** multimedia is not that strongly represented as in other study programmes. There is one related course named Multimedia systems.
4. **Electronics/automatics:** not very strongly represented, some courses like automated management systems and power converters do exist.
5. **Software engineering:** this field is strongly represented through a number of topics such as application software, programming, concurrent and distributed systems, fundamentals of computer technology, cloud computing, operating systems, databases, security, mobile applications development, internet programming, etc.

The structure of the study programmes is such that the first year of studies covers the fundamentals through basic courses such as Mathematics, Physics, Fundamentals of electrical engineering and programming. Later on there are many elective topics, which the students can choose from.

This study programme also represents a sound basis for a Master study programme in DBBT as many of the existing topics are more or less related to it. The most relevant courses to the field of DBBT are Telecommunications, Digital signal processing, signals and systems, Multimedia systems and many of the software engineering topics as digital TV domain experts need the knowledge on development of interactive applications.

Based on the analysis, it can be suggested that basic DBBT related topics such as AV production, and technologies topics related to broadcasting chain, broadband, etc., should take place in the master study programmes, while less emphasis will be needed on software development for interactive

multimedia applications development, as their students already cover these topics in first cycle study programmes*.

The school of Electrical and computer engineering of applied studies (VISER)

The school of Electrical and computer engineering of applied studies (VISER) offers thirteen study programmes, 7 bachelor applied studies and 6 specialist applied studies - most of them are offered on both levels. These study programmes are Electronics and Telecommunications, Avdio and video technologies, Electronic business, Mechatronics, New Computer Technologies, Computer science, New Energy Technologies and Security of Information and Communication systems. Two of these study programmes are very related to the field of DBBT and as such offer a sound basis for the DBBT post-graduate studies: The Electronics and Telecommunications and Avdio and video technologies. The former is related to DBBT from the engineering perspective while the latter is oriented towards the production of the digital TV related content (audio and video content). Other study programmes are not that related and will not be discussed in this document.

The study programmes' topics at VISER, analysed for the two study programmes, match the above mentioned domains as follows:

The Electronics and Telecommunications study programme

1. **Theoretical basics:** mathematical topics and electrical engineering, digital signal processing, etc.
2. **Telecommunications:** telecommunications, digital transmission systems, communication networks, mobile communications, telecommunication services and technologies etc.
3. **Multimedia:** multimedia topics are not that strongly represented, but there is a very relevant and DBBT related course named Digital TV
4. **Electronics/automatics:** is strongly represented through courses like analogue electronics, digital electronics, audio electronics, automatic control, microcontrollers, programmable logic circuits, etc.
5. **Software engineering:** this field is well represented, through a number of related topics such as application software, fundamentals of programming, computer architecture and organisation, etc.

Audio and video technologies study programme

1. **Theoretical basics:** mathematical engineering and electrical engineering are mandatory topics.
2. **Telecommunications:** not very strongly represented, but the students get the basics through courses like Fundamentals of IT, Fundamentals of TV and Digital TV.
3. **Multimedia:** The most represented field as the entire study programme is multimedia oriented. There are a number of courses about studio and production equipment, audio

recording, acoustics, sound design and audio production, video production, multimedia production, computer graphics and animation, digital multimedia and digital TV, etc.

4. **Electronics/automatics:** not very strongly represented, there is a course named Electronics
5. **Software engineering:** understandably not significant in the study programme, with the exception of a course Applicaton software.

It should be noted that this study programme includes also other interesting topics, such as mass media, marketing, social networks etc., which are not directly related to the DBBT domain, but are indirectly connected to it.

These topics also represent a sound basis for a post-graduate study programme in DBBT, one from the production perspective, while the other from the engineering perspective. The most relevant courses to the field of DBBT are Telecommunications, Digital TV, Audio production, Video production, Multimedia production, etc.

Based on the analysis, it can be suggested that in addition to basic DBBT related topics such as technologies topics related to broadcasting chain, broadband, etc., which should take place in the post-graduate study programmes, some additional emphasis on software development for interactive multimedia applications development, IPR and human-computer interaction topics would prove useful*.

University of Bihać (UNBI)

At the University of Bihać, the relevant and analysed study programme is from the Faculty of technical engineering. The main domain is electrotechnical engineering with a significant inclusion of software engineering topics. Again, the study programmes' topics at UNBI match the above mentioned domains as follows:

1. **Theoretical basics:** mathematical topics, physics, electrical engineering, digital signal processing, etc.
2. **Telecommunications:** not much emphasis but the basics are obtained through Basics of telecommunications and Computer networks.
3. **Multimedia:** represented through courses Multimedia systems and Computer graphics and animation.
4. **Electronics/automatics:** digital electronics, electronics, design of microprocessors, automatic control, robotics and automatisation, etc.
5. **Software engineering:** A very well represented domain, includes topics on software development, computer architectures, databases, computer security, operating systems, web design, etc.

These topics represent a sound basis for a Master study programme in DBBT as many of the existing topics are more or less related to it. The most relevant courses to the field of DBBT are Basics of Telecommunications, Digital signal processing, Multimedia systems and software development topics including Web design. Somewhat less relevant for the DBBT is the field of electronics/automatics topics, even these topics are somewhat related and can be found a useful basis for DBBT master studies in terms of electronic basis of the audio-visual equipment used in studios, etc.

Based on the analysis, it can be suggested that basic DBBT related topics such as AV production, and technologies topics related to broadcasting chain, broadband, TV engineering etc., which should take place in the master study programmes, will be recommended. Additionally some optional emphasis on IPR and human-computer interaction could prove useful*.

Higher technical professional school in Zvečan (HTPSZ)

The study programme Management in electrical engineering from the Higher technical professional school in Zvečan differs from the other study programmes in the sense that it is not that ICT/telecommunications engineering oriented. The study programme's main domain is power electrical engineering with a significant inclusion of managerial, social and business topics. It should be noted, that some basic topics are covered such as physics, mathematical topics and basics of electrical engineering, which do present a basis for DBBT study programmes to certain extent. The study programme is matching the DBBT related topics as follows:

1. **Theoretical basics:** physics, electrical engineering, engineering mathematics
2. **Telecommunications:** not covered
3. **Multimedia:** not covered with the exception of Computer graphics course
4. **Electronics/automatics:** not covered with the exception of Electronics course
5. **Software engineering:** somewhat represented through Basics of computer science and Database course

In order to provide basis for a DBBT based post-graduate study programme, more of the telecommunications and multimedia related topics are needed, which can be covered through a number of mandatory and elective courses covering the above mentioned domain on graduate and post-graduate level. These solutions will be investigated in the course of future project work.

REFERENCES

1) University of Pristina study programmes[+]
2) University of Banja Luka study programmes[+]
3) Singidunum University programmes[+]
4) VISER study programmes[+]
5) University of Bihać study programmes[+]
6) Higher technical professional school in Zvečan study programmes[+]

[+]*The documents presenting the individual study programmes were sent to EU partners over email*
* These proposals will be discussed in more detail in the Deliverable1.3.