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**BESTSDI**

BESTSDI – Western Balkans Academic Education  
Evolution and Professional's Sustainable Training for  
Spatial Data Infrastructures

*With the support of the Erasmus+ program:*

*Higher Education – International Capacity Building  
N° 574150-EPP-1-2016-1-HR-EPPKA2-CBHE-JP*

# **BESTSDI** Task Report

## **Task T2.5: Localisation of curriculum Task T2.6: Implementation of local curriculum Version 1.0**

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### **Work Package / Task:**

WP2a – Development of curriculum / Task 2.5 – Localisation of curriculum

WP2b – Implementation of curriculum / Task 2.6 – Implementation of local curriculum

### **References:**

Project Management Plan / Work Package 2a/2b Work Plan / Task Group 2.5 Localisation of curriculum and Task Group 2.6 Implementation of curriculum

### **Short Description:**

This report is a deliverable of Task Group 2.5 and Task Group 2.6. which will support partner universities in localisation of curriculum to their study programs and to facilitate the process of implementation. This report presents outcomes of the surveys about the content and procedure among the partner countries to collect necessary information for their work.

### **Keywords:**

survey, curriculum, localisation of curriculum, implementation of curriculum

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*Revision History:*

<b>Revision</b>	<b>Date</b>	<b>Author(s)</b>	<b>Status</b>	<b>Description</b>
V0.1	15-10-18	Hamid Čustović Melisa Ljuša	Draft document	Draft Report based on received partners reply's
V0.2	15-11-18	Hamid Čustović Melisa Ljuša	Draft final document	Full Report based on received partners reply's and comments from Project office
V0.3	20-11-18	Hamid Čustović Melisa Ljuša	Final document	Full Report based on received partners reply's and comments from Project office



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## 1. Introduction

The specific BESTSDI project objectives are to develop, test and adapt new curricula, courses, learning material and tools within the field of SDI. By the incorporation of SDI and other modern concepts based on spatial data and information, students of the new courses will provide efficiently spatial data and services to SDI users when entering the job market. In parallel, the project also introduces SDI and related concepts in undergraduate and graduate study programs of academic institutions which professional profiles are well recognized as SDI users, raising awareness among the students and professionals about the relevance of SDI and advantages of well-organized, harmonized and accessible spatial data.

In this context, the specific objective of the project is to develop appropriate curricula, courses and their content for both target groups (SDI providers and SDI users) of academic institutions, as well as for vocational LLL training initiatives. This includes the development of:

- SDI compulsory course for undergraduate study programs in geodesy;
- SDI modules for graduate study programs in geodesy and geo-informatics;
- SDI user course components (not necessary full courses) for undergraduate study programs of partner faculties;
- SDI elective courses for graduate study program of partner faculties (SDI users);
- Development of sustainable training courses (life-long education) of broad scope of professionals.

**The goal of the first part of WP2 “Development of curriculum”** is to develop the learning material to be included in the project curriculum as specified in D1.4-5 and to prepare the partner universities in providing courses according to their needs. This work will address both the data management students/faculties and the SDI user students/faculties.

The WP2 is subdivided into five tasks:

Task 2.1 - Development of project curriculum

Task 2.2 - Development of LLL courses

Task 2.3 - Equipment purchase/installation

Task 2.4 - Training of teachers

**Task 2.5 - Localisation of project curriculum**



When it comes to the T2.5 – Localisation of project curriculum, the project document clearly states that selected parts of the teaching material will be adapted to national contexts (translated, enriched with national specificities) and published. This activity will be organized through the project, conducted by the appointed sub-group but executed by partners from partner countries due to the fact of their knowledge of national and professional specificities in their countries.

The persons dealing with the execution of this task T2.5 are the task leader, the task deputy leader and all partners contributing to the deliverable. The contact information of these persons are as follows:

Role	Name	Organization	e-mail
Task leader	Fitore Bajrami	UNI Prizren (P16)	fitore.bajrami@uni-pr.edu
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Member	Gezim Gjata	PUT FCE (P06.1)	g.gjata2@gmail.com
Member	Miodrag Regodić	UNI Banja Luka (P08)	miodrag.regodic@aggf.unibl.org
Member	Mirko Knežević	UCG BTF (P13.2)	mirkok@ac.me
Member	Ognjen Gabrić	UNI Novi Sad FCE (P15.2)	ogabric@gmail.com

**The goal of second part of WP2 “Implementation of curriculum”** is that each partner university implement, review and enhance a modified version of the project curriculum developed under D2.1 - D.2.5 in its own curricula.

The WP2 Part 2 is subdivided into four tasks:

**Task 2.6 – Implementation of local curriculum**

Task 2.7 – Running the courses to students

Task 2.8 – Evaluation of implementation

Task 2.9 – Revision of project curriculum



The persons dealing with the execution of this task T2.6 are the task leader, the task deputy leader and all partners contributing to the deliverable. The contact information of these persons are as follows:

Role	Name	Organization	e-mail
Task leader	Hamid Čustović	UNI Sarajevo FAFS (P10.2)	custovic.hamid@gmail.com
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Member	Ymer Kuka	UNI Prizren (P16)	ymer.kuka@uni-pr.edu



## 2. Indicators and deliverables

The task produced the following deliverables:

Number	Title	Date
R1.1-1	Curricula implementation and localisation survey/localised curriculum at partner universities	02.04.2018.
R1.1-2	Implementation to local curriculum during the project lifetime - database	28.07.2018.
R1.1-3	Implementation to local curriculum beyond the project lifetime - database	28.07.2018.
R1.1-4	Final report	15.11.2018.

The task is monitored and evaluated by the following indicators and targets:

Number	Indicator	Assessment method	Target value
1	I2.5	Number of new or adapted curricula	16 out of 16 (100%) (all partner country partner faculties adopted at least part of SDI curricula)
2	I2.6	Percentage of courses implemented at partner universities as compared to expectations	100% (where 100% equals to 30 new/modernized courses, average 2 per partner)
3	M2.4	Reports for localisation/implementation of curriculum	16 out of 16 (100%) (all partner country partner faculties replied on questionnaire)

## 3. Communication within the work package

Regular internal communication was done by e-mail and Moodle platform. In order to facilitate the process of data collection and monitoring of curriculum implementation, databases on implementation to local curriculum during and beyond the projects were organized at Moodle platform on 28.07.2018. <http://science.geof.unizg.hr/moodle/course/view.php?id=37>



## 4. Methodology

Work of TG1.4 and 1.5 was the platform for work of Task group 2.5 and 2.6. While TG2. supports partner universities in localisation of curriculum to their study programs to ensure test lecturing in Y3 of the project lifetime (with focus on content), task of TG2.6 is to facilitate the process of implementation and support work of country partners. This understands scanning the procedure at each partner university/faculty and defining precisely time table of activities which must be done so that courses are conducted in Y3 of project lifetime (ac. year 2018/2019) and beyond (with focus on procedure). Therefore, TG 2.5 & 2.6 prepared jointly the survey about the content and procedure among the partner country countries to collect necessary information.

Survey was consisted of two parts:

- 1) First part was related on localisation of curriculum including the questions about level of SDI curriculum content to be implemented in universities' curriculum and execute in the third year of the project, intention to implement a different/higher level of SDI curriculum beyond the project, level of the SDI curriculum content to be implement in the curriculum such as new study program, new module, new course or new lectures incorporated into the existing course, teachers to be involved in execution etc.
- 2) Second part was covering topics related to official procedures of adopting new study program, new module, new course or new lectures incorporated into the existing course, describing each step of adaptation procedure, planned time of activities as well as potential problems which could influence the implementation of the activities.

Survey was released in April 2018.

In order to facilitate the process of data collection and monitoring of curriculum implementation, databases on implementation to local curriculum during and beyond the projects were organized at Moodle. Databases were posted on Moodle in July 2018.

Implementation of tasks 2.5 and 2.6 were supported by prof. Bacic and his project team.

## 5. Results

Results of survey (localization & implementation) as well as data from two databases (implementation) will be presented in this chapter.

### Results of survey conducted in April 2018

#### *Localization of curriculum*

1. *Based on the Report TG1.4 Specification of project curriculum and TG1.5 Adaptation of project curriculum, and especially on your answers to the questionnaire carried out through TG1.5, which level of SDI curriculum content you intend to implement in your curriculum and execute in the third year of the project?*

An overview of the level of SDI curriculum content to be implemented in partner universities/faculties curriculum and execute in the third year of the project is presented in Chart 1.



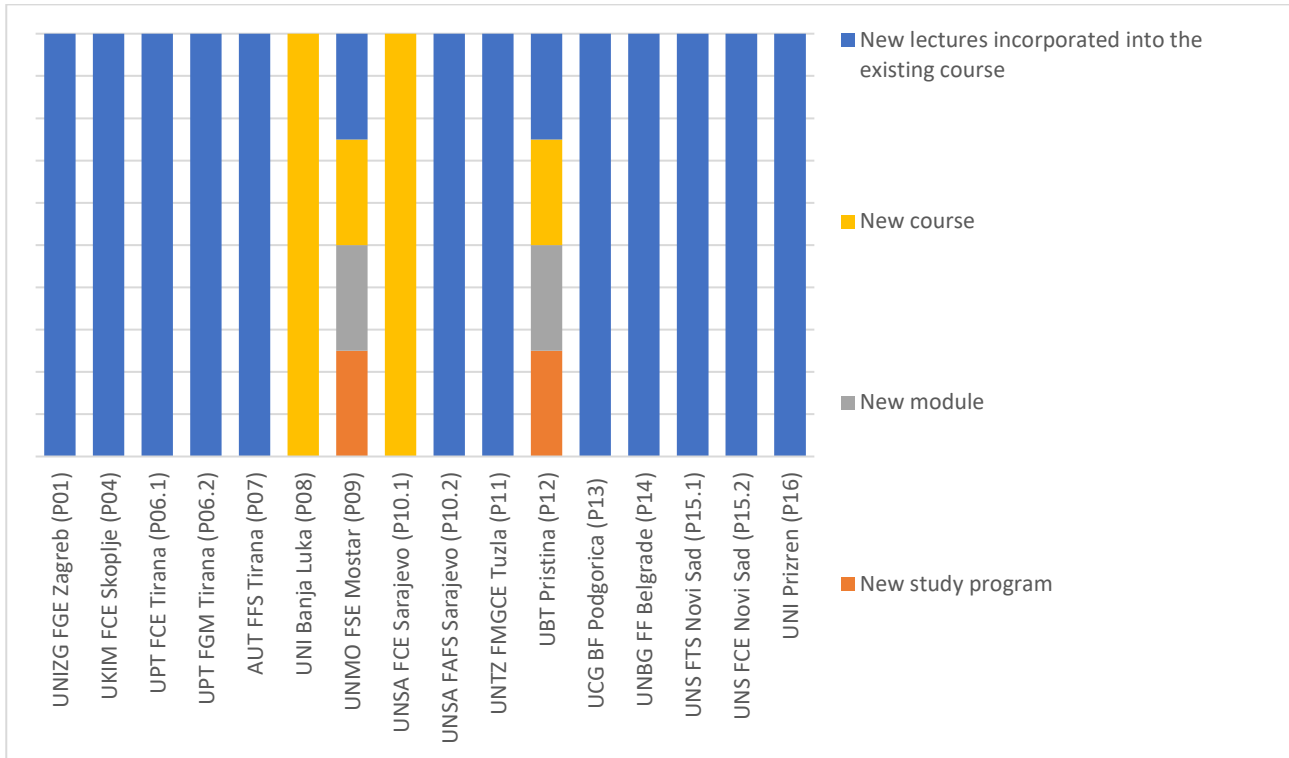


Chart 1. Level of SDI curriculum content to be implemented in partner universities/faculties curriculum and execute in the third year of the project

New study program and new module will be introduced at the two universities, namely UNMO FSE Mostar (P09) and UBT Pristina (P 12). New course will be introduced at four universities, namely UNI Banja Luka (P08), UNMO FSE Mostar (P09), UNSA FCE Sarajevo (P10.1) and UBT Pristina (P12). Majority of partner universities are going to incorporate new lectures into the existing course, a total of 14 faculties out of 16.

2. Do you intend, in a later phase (after the completion of the project, bearing in mind that the EACEA will keep tracking us for another 5 years), to implement a different/higher level of SDI curriculum into your curriculum?

12 out of 16 partner institutions are going to implement a different/higher level of SDI curriculum in the curriculum beyond the project. The exception are UNMO FSE Mostar (P09), UNTZ FMGCE Tuzla (P11), UNS FTS Novi Sad (P15.1) and UNI Prizren (P16).

2. If the answer to the question 2. is YES, please define the level of the SDI curriculum content that you intend to implement in your curriculum:

An overview of the level of SDI curriculum content to be implemented in partner universities/faculties curriculum beyond the project is presented in Chart 2.

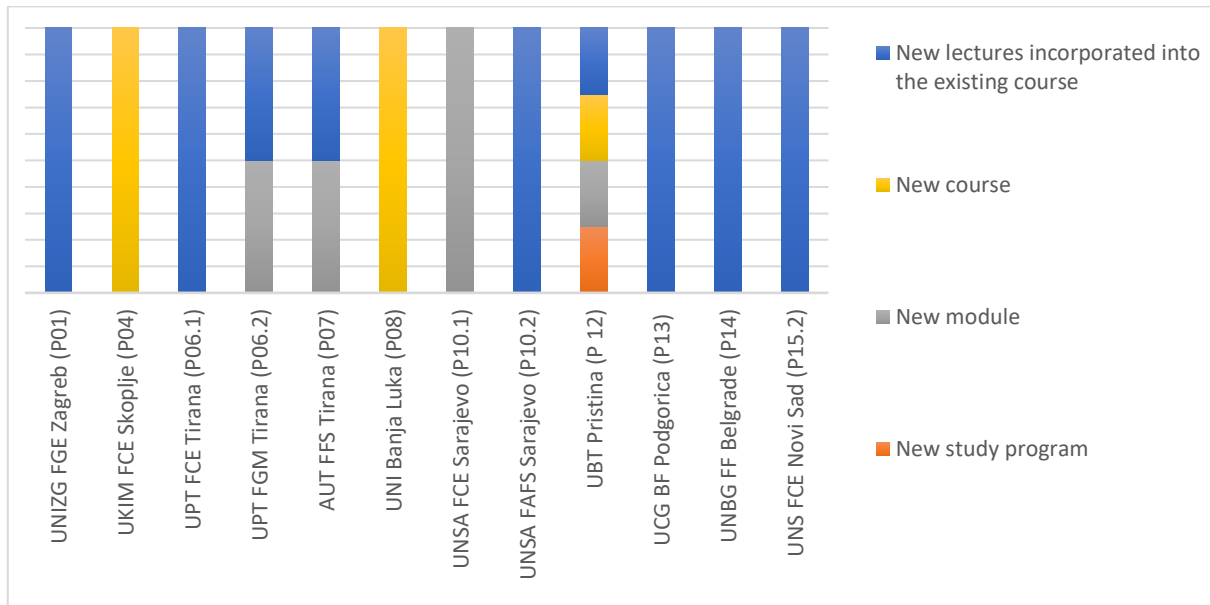


Chart 2. Level of SDI curriculum content to be implemented in partner universities/faculties curriculum beyond the project

As presented in this chart, all level of SDI curriculum will be implemented beyond the project. Most common option is new lectures incorporated into the existing course.

4. Have you designated teachers who will carry out the trial SDI training in the 3rd year of the project?

13 out of 16 partner institutions designated teachers who will carry out the trial SDI training in the 3rd year of the project. Only three partners were not in a position to provide the names of teachers, but stated that it will be done by October, before curriculum implementation starts.

Implementation of curriculum – adaptation procedure

Adaptation procedure will be presented for each level of SDI curriculum (options) individually.

**OPTION 1 - New study program**

As already stated, new study program will be introduced at the two universities, namely UNMO FSE Mostar (P09) and UBT Pristina (P12).

UNMO FSE Mostar (P09) is expected to start an application process by June 2018. Application process at UBT Pristina (P12) for the new study program is expected to start by end of 2018 with program justification for approval at the accreditation agency. The process of approval will take several months until summer of 2019. The actual study program is expected to take place in fall semester 2019.

The adoption procedure at two universities is presented in Table 1.



Table 1. The adoption procedure of new study program

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
<b>UNMO FSE Mostar (P09) - University of Mostar, Faculty of Science and Education</b>					
Step 1	Department of geography	30 days	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 2	Faculty of Science and Education	30 days	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 3	Senate of Mostar University	3-4 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
<b>UBT Pristina (P12) – University for Business and Technology Pristina</b>					
Design of new curricula in Msc. Study program	Rector / Deans & Academic Council, Deans	4 months	June 2018	October 2018	
Application for accreditation	Rector / Deans & Head of Quality Assurance	6 months	December 2018	April 2019	
Program promotion & enrollment	Promotion teams / Teachers	6 months	May 2019	October 2019	
Start of academic year	Deans / Faculties / Teachers	Actual start November 2019			

No problems related to implementation of adoption procedure is reported.

Timetable is presented in Table 2.

Table 2. New study program – timetable

New Study Program	2018												2019											
	-	=	≡	≥	>	∇	VII	VII	IX	X	XI	XII	-	=	≡	≥	>	∇	VII	VII	IX	X	XI	XII
UNMO FSE Mostar (P09)																								
UBT Pristina (P12)																								



## OPTION 2 - New module

Three universities will adopt new module/s, namely AUT FFS Tirana (P07), UNMO FSE Mostar (P09) and UBT Pristina (P12).

AUT FFS Tirana (P07) is going to adopt two new modules which will be obligatory to students, namely: Introduction to GIS (Existing B.Sc. Study Programme in Forestry Engineering) and GIS application in landscape planning (New Professional Master Study Programme). The official procedure of the new module adoption is expected to start not before the winter semester of 2018-2019 academic year. The adoption procedure of new modules at AUT FFS Tirana (P07) is presented in Table 3.

Table 3. The adoption procedure of new modules (obligatory) at AUT FFS Tirana (P07)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department of Forestry	No fixed time frame	Beginning of the winter semester 2018-2019	Start of the summer semester 2018-2019	
Step 2	University Senate	No fixed time frame	Right after the approval of the department	At least 2 months after sending the required changes to the senate	
Step 3	National Accreditation Body (the case of the module in the new MP Programme)	Already submitted for approval of the accreditation body	Already accomplished	Before the start of the 2018-2019 academic year	Delays in the decision of the Accreditation Body regarding the modules in the new MP study

UNMO FSE Mostar (P09) are going to adopt three new obligatory modules (SDI concepts and principles, SDI at work and SDI for thematic applications) as well as elective ones. The official procedure of the new module adoption is expected to start by October 2018. Adoption procedure presented in Table 4. is the same for all modules.



Table 4. The adoption procedure of new modules (obligatory & elective) at UNMO FSE Mostar (P09)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department of geography	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 2	Faculty of Science and Education	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 3	Senate of Mostar University	3-4 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	Need for support from partner faculties

UBT Pristina (P12) are going to adopt four obligatory modules: Concepts of SDI, SDI at work, Data Modelling; Non-Tech Developments/ SDI and e-Governance / Legal Aspects etc.; Tech trends / Semantic web / Sensor web / augmented reality etc.; SDI application in other engineering sciences etc. and one elective module SDI for geology, agricultural, forestry etc. Application for the new modules will take place end of 2019 as it involves significant changes to the course programs. Therefore, the process for module creation will start in September 2018, and actual implementation will be fully operational in several areas by spring March 2019 / at latest fall November 2019 for full implementation of all related modules in Bachelor and Master levels. Adoption procedure is different for obligatory and elective modules as presented in Table 5. and Table 6.

Table 5. The adoption procedure of new obligatory modules at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Creating new modules	Rector & Academic Council, Deans	6 months	September 2018	February 2019	
Start of new module – initial phase in	Deans/ Faculties /Teachers	3 months	March 2018	June 2019	
Full mode of module application	Deans/ Faculties /Teachers	3 months	August 2019	October 2019	



Table 6. The adoption procedure of new elective module at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Creating new elective courses	Rector & Academic Council, Deans	6 months	September 2018	February 2019	
Adoption and fitting new modules into existing programs	Deans / Faculties / Teachers	3 months	March 2018	June 2019	
Implementation	Deans / Faculties / Teachers	3 months	August 2019	October 2019	

Timetable is presented in Table 7.

Table 7. New module – timetable

New Module	2018												2019											
	-	=	≡	≥	>	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	Ⅺ	Ⅻ	-	=	≡	≥	>	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	Ⅺ	Ⅻ
<i>Obligatory</i>																								
UPT FCE Tirana (P06.1)																								
UNMO FSE Mostar (P09)																								
UBT Pristina (P12)																								
New Module	2018												2019											
<i>Elective</i>	-	=	≡	≥	>	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	Ⅺ	Ⅻ	-	=	≡	≥	>	Ⅵ	Ⅶ	Ⅷ	Ⅸ	Ⅹ	Ⅺ	Ⅻ
UNMO FSE Mostar (P09)																								
UBT Pristina (P12)																								

### OPTION 3 - New course

Five universities will to adopt new course/s, namely UNI Banja Luka (P08), UNMO FSE Mostar (P09), UNSA FCE Sarajevo (P10.1), UBT Pristina (P12) and UNI Prizren (P16).



### UNI Banja Luka (P08)

UNI Banja Luka (P08) is going to adopt one new elective course - Integrated systems of geodetic survey. Official procedure of the new course adoption is expected to start in 7<sup>th</sup> semester, 4<sup>th</sup> academic year. The adoption procedure of new course at UNI Banja Luka (P08) is presented in Table 8.

Table 8. The adoption procedure of new elective course at UNI Banja Luka (P08)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	University of Banjaluka	Three months	15 <sup>th</sup> of October 2018	30 <sup>th</sup> of January 2019	Procedural problems in curricula adoption in UNIBL

### UNMO FSE Mostar (P09)

UNMO FSE Mostar (P09) is going to adopt one new obligatory course (Modelling of geoinformation) and four new elective courses (Geospatial database, Geospatial data analysis, Remote sensing and System Modelling and Simulation). Official procedure of the new course adoption is expected to start by October, 2018. The adoption procedure of new courses at UNMO FSE Mostar (P09) is presented in Table 9.

Table 9. The adoption procedure of new elective courses at UNMO FSE Mostar (P09)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department of geography	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 2	Faculty of Science and Education	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	



Step 3	Senate of Mostar University	3-4 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	Need for support from partner faculties
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### UNSA FCE Sarajevo (P10.1)

UNSA FCE Sarajevo (P10.1) is going to adopt one new elective course - Spatial databases and SDI. Official procedure of the new course adoption has already started. It will be introduced in master study program at the Faculty of Civil Engineering and UNSA Interdisciplinary Master Study - Protection against natural disasters, which will start in academic year 2018/2019. The adoption procedure of new course at UNSA FCE Sarajevo (P10.1) is presented in Table 10.

Table 10. The adoption procedure of new elective course at UNSA FCE Sarajevo (P10.1)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	UNSA	Three month - one year	Started already	20 <sup>th</sup> of July 2018	UNSA administration

### UBT Pristina (P12)

UBT Pristina (P12) is going to adopt four new obligatory courses (Concepts of SDI, SDI at work, Data Modelling; Non-Tech Developments/ SDI and e-Governance / Legal Aspects etc.; Tech trends / Semantic web / Sensor web / augmented reality etc.; SDI application in other engineering sciences etc.) and one new elective course (SDI for geology, agricultural, forestry etc.). Official procedure of the new course adoption is expected to start by November, 2018. The adoption procedure of new courses at UBT Pristina (P12) is presented in Table 11. (for obligatory courses) and Table 12. (for elective course).





Table 11. The adoption procedure of new obligatory courses at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1 Course review	Rector / Deans/ Respective Faculties – Academic council	3 months	August 2018	October 2018	
Step 2 Implementation	Deans/ Respective Faculties – Academic council	3 months	November 2018	January 2019	

Table 12. The adoption procedure of new elective course at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Creating new elective courses	Rector Deans/ Respective Faculties – board of teachers	3 months	August 2018	October 2018	
Accreditation agency notification	Deans/ Respective Faculties – Academic council / Quality assurance	2 weeks	October 2018	October 2018	
Implementation	Deans/ Respective Faculties – Academic council	3 months	November 2018	January 2019	



## UNI Prizren (P16)

UNI Prizren (P16) is going to adopt one new elective course – SDI with focus on Application Development. Official procedure of the new course adoption will start in October 2021. The adoption procedure of new module at UNI Prizren (P16) is presented in Table 13.

Table 13. The adoption procedure of new elective course at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Naim Baftiu, Ercan Canhasi FSHK, UPZ	Six months for preparation	01.04.2020	01.10.2020	
Step 2	Naim Baftiu FSHK, UPZ	Winter semester for implementation	1.10.2020	20.01.2021	

Timetable is presented in Table 14.

Table 14. New course – timetable

New Course	2018												2019												2	2
	-	=	III	IV	V	VI	VII	VIII	IX	X	XI	XII	-	=	III	IV	V	VI	VII	VIII	IX	X	XI	XII	0	0
<i>Obligatory</i>																										
UNMO FSE Mostar (P09)																										
UBT Pristina (P12)																										
New Course	2018												2019													
<i>Elective</i>	-	=	III	IV	V	VI	VII	VIII	IX	X	XI	XII	-	=	III	IV	V	VI	VII	VIII	IX	X	XI	XII		
UNI Banja Luka (P08)																										
UNMO FSE Mostar (P09)																										
UNSA FCE Sarajevo (P10.1)																										
UBT Pristina (P12)																										
UNI Prizren (P16)																										



#### OPTION 4 – New lectures incorporated into the existing modules

##### UPT FCE Tirana (P06.1)

UPT FCE Tirana (P06.1) is going to make an update of the following existing modules: NSDI and geo-data legislation; Spatial databases and Web-GIS; Digital Photogrammetry and Advanced GNSS and Applications. The adoption procedure of new lecture into existing modules is presented in Table 15.

Table 15. The adoption procedure of new lectures into existing modules at UPT FCE Tirana (P06.1)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Revision of course content	Department of Geodesy	1 month	1 March	30 April	Revision must be less than 10%/year
Decision of Department	Department of Geodesy	1 month	1 March	30 April	Revision must be less than 10%/year

##### UPT FGM Tirana (P06.2)

UPT FGM Tirana (P06.2) is going to make an update of the existing modules. The adoption procedure of new lecture into existing modules is presented in Table 16.

Table 16. The adoption procedure of new lectures into existing modules at UPT FGM Tirana (P06.2)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department	30	October 2018	October 2018	
Step 2	Faculty	10	October 2018	October 2018	
Step 3	Senate	60	November 2018	December 2018	



### AUT FFS Tirana (P07)

AUT FFS Tirana (P07) is going to make an update of the following existing modules: Topography (B.Sc. Forestry); Erosion and watershed managements (B.Sc. Forestry); Forest Cadaster and GIS (M.Sc. Forestry) and Remote sensing methods in forest inventories (M.Sc. in Forestry). The adoption procedure of new lecture into existing modules is presented in Table 17.

Table 17. The adoption procedure of new lectures into existing modules at AUT FFS Tirana (P07)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department	No time frame. During the running academic year	Every time in the running semester	Before the start of the next winter semester	No potential problems

### UNMO FSE Mostar (P09)

UNMO FSE Mostar (P09) is going to make an update of three modules: SDI concepts and principles; SDI at work and SDI for thematic applications. The adoption procedure of new lecture into existing modules is presented in Table 18.

Table 18. The adoption procedure of new lectures into existing modules at UNMO FSE Mostar (P09)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Teacher	6 month	Immediately	1 <sup>st</sup> of October 2018	
Step 2	Department of geography	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 3	Faculty of Science and Education	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 4	Senate of Mostar University	3-4 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	Need for support from partner faculties



### UNSA FAFS Sarajevo (P10.2)

UNSA FAFS Sarajevo (P10.2) is going to make an update of the following existing modules: Basic cartography in spatial planning, Fundamentals of Geographical Information Systems, Application of GIS in Agro-Ecological Zoning (obligatory and elective), Land Capability and Land Consolidation. The adoption procedure of new lecture into existing modules is presented in Table 19.

Table 19. The adoption procedure of new lectures into existing modules at UNSA FAFS Sarajevo (P10.2)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Development/introduction of new content	Teachers Adoption of annual Study plan by Faculty Council	1 month	June	September	

### UBT Pristina (P12)

UBT Pristina (P12) initially will make an update of three modules: Civil Engineering Modules, Information Systems Modules and Faculty of Architecture (Urban Planning). The adoption procedure of new lecture into existing modules is presented in Table 20.

Table 20. The adoption procedure of new lectures into existing modules at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
New lectures initiation process	Rector/ Deans/ Respective Faculties – board of teachers	2 months	September 2018	October 2018	
Implementation	Deans/ Respective Faculties – Academic council	3 months	November 2018	January 2019	



Timetable is presented in Table 21.

Table 21. New lectures incorporated into the existing modules – timetable

New Lectures incorporated into the existing modules	2018												2019											
	-	=	≡	≧	>	≠	VII	VIII	IX	X	XI	XII	-	=	≡	≧	>	≠	VII	VIII	IX	X	XI	XII
UPT FCE Tirana (P06.1)																								
UPT FGM Tirana (P06.2)																								
AUT FFS Tirana (P07)																								
UNMO FSE Mostar (P09)																								
UNSA FAFS Sarajevo (P10.2)																								
UBT Pristina (P12)																								

### OPTION 5 – New lectures incorporated into the existing courses

#### UNIZG FGE Zagreb (P01)

UNIZG FGE Zagreb (P01) is going to make an update of one existing course - GIS in Environmental Engineering. The adoption procedure of new lectures into existing course is presented in Table 22.

Table 22. The adoption procedure of new lectures into existing course at UNIZG FGE Zagreb (P01)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Teacher	60	September 15	November 15	Other lectures



Step 2	Department of hydrotechnics	30	November 15	December 15	None
Step 3	Teaching Board	60	December 15	February 15	Vacation
Step 4	Faculty Council	30	February 15	March 15	None

### UKIM FCE Skoplje (P04)

UKIM FCE Skoplje (P04) is going to make an update of three existing courses: Spatial planning; Geo Information Systems and Distributed GIS. The adoption procedure of new lectures into existing course is presented in Table 23.

Table 23. The adoption procedure of new lectures into existing course at UKIM FCE Skoplje (P04)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	FCE - Skopje	Nine month to one year	1.01.2018	15.09.2018	no expected problems

### UPT FCE Tirana (P06.1)

UPT FCE Tirana (P06.1) is going to make an update of four existing courses: NSDI and geo-data legislation; Spatial databases and Web-GIS; Digital Photogrammetry and Advanced GNSS and Applications. The adoption procedure of new lectures into existing course is presented in Table 24.

Table 24. The adoption procedure of new lectures into existing course at UPT FCE Tirana (P06.1)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Revision of course content	Department of Geodesy	1 month	1 Mars	30 April	Revision must be less than 10%/year
Decision of Department	Department of Geodesy	1 month	1 Mars	30 April	Revision must be less than 10%/year



*UPT FGM Tirana (P06.2)*

UPT FGM Tirana (P06.2) is going to make an update of four existing courses: Spatial databases and NSDI; Geoinformation science and spatial analysis (GIS/WEB GIS); Remote sensing and image processing and Digital terrain modelling (Cartography). The adoption procedure of new lectures into existing course is presented in Table 25.

Table 25. The adoption procedure of new lectures into existing course at UPT FGM Tirana (P06.2)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department	30	October 18	October 18	
Step 2	Faculty	10	October 18	October 18	
Step 3	Senate	60	November 18	December 18	

*UNMO FSE Mostar (P09)*

UNMO FSE Mostar (P09) is going to make an update of six existing courses: General Cartography; Thematic Cartography; Heritage in tourism; Spatial planning; Topography and Regional geography of Bosnia and Herzegovina. The adoption procedure of new lectures into existing courses is presented in Table 26.

Table 26. The adoption procedure of new lectures into existing course at UNMO FSE Mostar (P09)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Teacher	6 month	Immediately	1 <sup>st</sup> of October 2018	
Step 2	Department of geography	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	
Step 3	Faculty of Science and Education	1 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	





Step...	Senate of Mostar University	3-4 month	1 <sup>st</sup> of June 2018	1 <sup>st</sup> of October 2018	Need for support from partner faculties
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### UNTZ FMGCE Tuzla (P11)

UNTZ FMGCE Tuzla (P11) is going to make an update of one existing course - Introduction in Geoinformation Systems / Geoinformation Systems. The adoption procedure of new lectures into existing course is presented in Table 27.

Table 27. The adoption procedure of new lectures into existing course at UNTZ FMGCE Tuzla (P11)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Mirza Ponjavic RGGF, UNTZ	Modification of existing curriculum	15.06.2018	30.06.2018	
Step 2	Mirza Ponjavic RGGF, UNTZ	Three months for preparation	15.10.2018	15.01.2019	
Step 3	Mirza Ponjavic RGGF, UNTZ	Implementation in the existing courses	15.02.2019	15.10.2019	

### UBT Pristina (P12)

UBT Pristina (P12) is going to make an update of four existing courses: Application of GIS in Water Engineering; GIS Analysis, Modeling and Techniques (information systems / computer science); GIS Data Management Systems (informatics systems) and Geo-Information Science. The adoption procedure of new lectures into existing course is presented in Table 28.

Table 28. The adoption procedure of new lectures into existing course at UBT Pristina (P12)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Introduction of new lectures	Rector / Deans/ Respective	2 months	Sep 2018	Oct 2018	



	Faculties – Academic council				
Implementation	Deans/ Respective Faculties – Academic council	3 months	Nov 2018	Jan 2019	

*UCG FP & BF Podgorica (P13)*

UCG FP & BF Podgorica (P13) is going to make an update of seven existing courses: Soil Reclamation; GIS in agriculture; GIS; Geoecology and environmental protection; Thematic cartography; Geoinformatics and Geography of the soil. The adoption procedure of new lectures into existing courses is presented in Table 29.

Table 29. The adoption procedure of new lectures into existing course at UCG FP & BF Podgorica (P13)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	UoM	90 days	September 2018	January 2019	Procedural problems in curricula adoption in UoM

*UNBG FF Belgrade (P14)*

UNBG FF Belgrade (P14) is going to make an update of one existing course - Geodesy and GIS. The adoption procedure of new lectures into existing course is presented in Table 30.

Table 30. The adoption procedure of new lectures into existing course at UNBG FF Belgrade (P14)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
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Introduce 3 new lectures and 3 new exercises about SDI, (20%) until new Bologna start	Teacher	90	01.11.2018.	31.01.2019.	
In new Bologna Introduce 1 more lecture and 1 more exercise about SDI	Faculty	180	01.10.2019.	01.04.2020.	No adoption from Faculty

### UNS FTS Novi Sad (P15.1)

UNS FTS Novi Sad (P15.1) is going to make an update of two existing courses - Spatial Data Infrastructure and Geoportals and geospatial services. The adoption procedure of new lectures into existing course is presented in Table 31.

Table 31. The adoption procedure of new lectures into existing course at UNS FTS Novi Sad (P15.1)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Miro Govedarica, FTS, UNS	Three months for preparation	01.04.2018	01.07.2018	
Step 2	Aleksandra Radulović, Dubravka Sladić, FTS, UNS	Winter semester for implementation in the existing courses	10.10.2018	20.01.2019	

### UNS FCE Novi Sad (P15.2)

UNS FCE Novi Sad (P15.2) is going to make an update of seven existing courses: Irrigation and drainage engineering; Basics of Urban Planning; Building heritage protection and revitalization; Basics of building design; Design of multi-family housing; Complex synthesis project and Traffic Infrastructure and Space. The adoption procedure of new lectures into existing course is presented in Table 32.



Table 32. The adoption procedure of new lectures into existing course at UNS FCE Novi Sad (P15.2)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Department for Geodesy forms a proposal for the change in the existing course	7 days	15. 10. 2018.	22. 10. 2018.	
Step 2	Teaching and Scientific Council of the Faculty accepts the proposal	30 days	23. 10. 2018.	22. 11. 2018.	
Step 3	Senate of the University accepts the proposal	30 days	23. 11.	24. 12. 2018.	Possible objections to the proposal by the Committee for Technical Sciences of the Senate
Step 4	Commission for Accreditation and Quality Assurance (CAQA)	30 days	24. 12. 2018.	25. 01. 2019.	Procedural problems within (CAQA)

### UNI Prizren (P16)

UNI Prizren (P16) is going to make an update of two existing modules namely: Principles of Geographic Information Systems and SDI with focus on Application Development. The adoption procedure of new lecture into existing course is presented in Table 33.

Table 33. The adoption procedure of new lectures into existing courses at UNI Prizren (P16)

Specify and describe each step of the procedure, especially from initiating the idea to completing it	Who is the decision maker?	Time needed for the implementation (days)	Expected date of starting the activities	Expected date of ending the activities	Note (potential problems which could influence the implementation of the activities)
Step 1	Naim Baftiu, Ercan Canhasi FSHK, UPZ	Three months for preparation	01.04.2019	01.07.2019	



Step 2	Naim Baftiu FSHK, UPZ	Winter semester for implementation in the existing courses	1.10.2019	20.01.2020	
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Timetable is presented in Table 34.

Table 34. New lectures incorporated into the existing courses – timetable

New Lectures incorporated into the existing courses	2018												2019												2020
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
UNIZG FGE Zagreb (P01)																									
UKIM FCE Skoplje (P04)																									
UPT FCE Tirana (P06.1)																									
UPT FGM Tirana (P06.2)																									
UNMO FSE Mostar (P09)																									
UNTZ FMGCE Tuzla (P11)																									
UBT Pristina (P12)																									
UCG FP & BF Podgorica (P13)																									
UNBG FF Belgrade (P14)																									
UNS FTS Novi Sad (P15.1)																									
UNS FCE Novi Sad (P15.2)																									
UNI Prizren (P16)																									

### Data from databases on curriculum implementation during the project lifetime 2018/2019

#### Implementation of curriculum – Bachelor study program

During the project lifetime, 11 faculties from 9 partner universities are going to implement 33 courses. Courses are part of 15 study programs. 29 courses out of 33 are obligatory while only 4 courses are elective ones. Some details regarding implementation of curriculum at Bachelor study program are presented in the Table 35.



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Table 35. Implementation of of curriculum at Bachelor study program

Partner university	Partner faculty	Study program	Course name	Course type	Semester
010 University of Zagreb	012 Faculty of Geotechnical Engineering	Environmental Engineering	Geodesy	Obligatory	IV.
061 Polytechnic University Tirana	061 Faculty of Civil Engineering	Geodesy	Cadastral Systems and Land use	Obligatory	IV.
			Cadastral system & Land Use	Obligatory	II.
070 Agricultural University Tirana	070 Faculty of Forestry	Forestry Engineering	Introduction to GIS	Elective	III.
			Topographic cartography	Obligatory	I.
080 University of Banja Luka	080 Architecture, Civil Engineering and Geodesy Faculty	Geodesy	Integrated systems of survey	Elective	IV.
110 University of Tuzla	110 Faculty of Mining, Geology and Civil Engineering	Geology and Mineral raw material exploitation	Basic of Geoinformation Systems	Obligatory	IV.
			Geoinformation systems	Obligatory	III.
120 University for Business and Technology Pristine	120 UBT Pristine	Faculty of Information Systems	Spatial Information Systems	Obligatory	I.
			Decision Support Systems	Obligatory	I.
		Faculty of Architecture and Spatial Planning	Basic Geodesy and Topography	Obligatory	I.
			EU Spatial Planning	Obligatory	I.
Faculty of Computer Science	Big Data	Obligatory	I.		
130 University of Montenegro	132 Biotechnical Faculty Podgorica	Plant production	Amelioration	Obligatory	III.
		Continental Fruit Growing and Medicinal Plants	Amelioration and soil reclamation	Obligatory	II.
		Mediterranean Fruit Growing	Amelioration and soil reclamation	Obligatory	II.
		Plant production	GIS in agriculture	Elective	IV.
	131 Faculty of Philosophy Nikšić	Geography	Thematic Geography	Obligatory	IV.
			GIS	Obligatory	IV.



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			Geography of soil	Obligatory	III.
140 University of Beograd	140 Faculty of Forestry	Forestry	Geodesy and GIS	Obligatory	II.
150 University of Novi Sad	151 Faculty of Civil Engineering Subotica	Civil Engineering	Geology and Petrology	Obligatory	II.
			Engineering Geology	Obligatory	IV.
			Irrigation and drainage	Obligatory	VI.
			Basics of urban planning	Obligatory	VI.
			Building heritage protection and revitalization	Obligatory	VIII.
			Basics of building design	Obligatory	III.
			Design of multi-family buildings	Obligatory	V.
			Traffic infrastructure and space	Obligatory	IV.
	151 Faculty of Technical Sciences Novi Sad	Geodesy and Geoinformatics	Spatial Data Infrastructure	Elective	VII.
			Remote sensing and Image Processing	Obligatory	VII.
			Photogrammetry	Obligatory	IV.
Geospatial databases			Obligatory	VII.	



An overview of the number of courses to be implemented is presented in the Table 36.

Table 36. An overview of number of courses to be implemented per partner universities

Partner university	Obligatory	Elective
010 University of Zagreb	1	
061 Polytechnic University Tirana	2	
070 Agricultural University Tirana	1	1
080 University of Banja Luka		1
110 University of Tuzla	2	
120 University for Business and Technology Pristine	5	
130 University of Montenegro	6	1
140 University of Belgrade	1	
150 University of Novi Sad	11	1
<b>Total</b>	<b>29</b>	<b>4</b>

Dynamics in courses implementation per semester is presented in Chart 3.

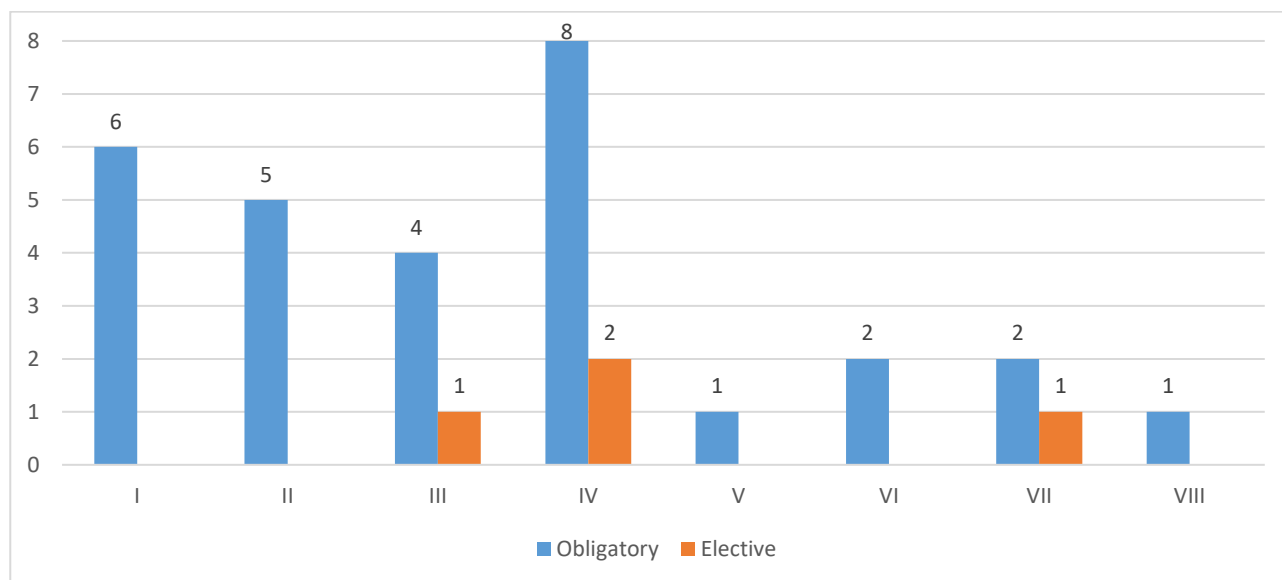


Chart 3. Dynamics in courses implementation per semester

It has to be note that 33 teachers will be involved in implementation of above mentioned courses.

When it comes to curricula content formalization, only three faculties specified the procedure as following:

- 080 University of Banja Luka - Adoption of annual Study plan by Faculty Council;
- 061 Polytechnic University Tirana - Approval of major changes by University Senate in existing study program;
- 150 University of Novi Sad - Decision of the University Senate/Faculty Council on minor changes in existing study program.





Some of partner universities pointed out preconditions for curriculum implementation as follows:

- 010 University of Zagreb: Contentual preparation – from learning materials prepare lectures; Technical preparation – install necessary software (if needed);
- 070 Agricultural University Tirana: Update/upgrade the contents of other courses (e.g Forest Management) taking into consideration the introduction of ALFIS - Albanian Forest Information System;
- 080 University of Banja Luka: Technical preparation: gathering of all equipment planned for realization of this course, adoption of computer lab for this course;
- 110 University of Tuzla: Contentual: to define SDI topics for lectures (considering BESTSDI teaching/learning material); Technical: extension of academic SW licenses (PB MapInfo) or use OS SW (QGIS);
- 140 University of Beograd: Include SDI topics in the next Bologna curriculum; Preparing lectures and learning materials of SDI; Install new equipment and software in the Lab;
- 150 University of Novi Sad: Formal procedure: the Teaching Scientific Council of the faculty approves changes to existing courses; Faculty informs the Commission for Accreditation and Quality Assurance about approved changes; Contentual preparation: Teachers and associates will prepare teaching material by using and adjusting BESTSDI and/or LINKVIT material.

### *Implementation of curriculum – Master study program*

During the project lifetime, 10 faculties from 7 partner universities are going to implement 78 courses. Courses are part of 15 study programs. 54 courses out of 78 are obligatory, 16 courses are elective while 8 are distinguishing ones. Some details regarding implementation of curriculum at Master study program are presented in the Table 37.



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Table 37. Implementation of of curriculum at Master study program

Partner university	Partner faculty	Study program	Course name	Course type	Semester
010 University of Zagreb	012 Faculty of Geotechnical Engineering	Environmental Engineering	GIS in Environmental Engineering	Obligatory	III.
061 Polytechnic University Tirana	062 Faculty of Geology and Mine	Natural resource engineering	Digital Cartography	Obligatory	II.
			GIS & DI	Obligatory	II.
			Photogrammetry	Obligatory	II.
			Satellite Geodesy	Obligatory	II.
			Mineral Resource Modeling	Obligatory	II.
			Remote Sensing	Obligatory	II.
	061 Faculty of Civil Engineering	Geodesy	NSDI and EU- Albania legislation	Obligatory	III.
			Geo-information science and Spatial analysis	Obligatory	I.
			Digital Photogrammetry	Obligatory	I.
			Geodetic Reference Systems	Obligatory	I.
			Spatial databases and Web-GIS	Obligatory	II.
			Land Management/ Urban Planning (S)	Obligatory	II.
			Project management and Research methodology	Obligatory	II.
			Hydrography and Marine Geodesy	Obligatory	I.
			Digital Cartography	Obligatory	I.
			Digital Processing of Satellite Images	Obligatory	I.
NSDI & legislation	Obligatory	I.			
Geo-information science and spatial analysis	Obligatory	I.			



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			Digital Photogrammetry	Obligatory	I.		
			Geodetic Reference Systems	Obligatory	I.		
			Spatial databases and Web-GIS	Obligatory	II.		
			Land Management/ Urban Planning (S)	Elective	II.		
			Project management and Research methodology	Obligatory	II.		
			070 Faculty of Forestry	Professional Master	Land-use Planning and GIS	Obligatory	II.
			070 Faculty of Forestry	Forestry Engineering	Forest Cadaster and GIS	Obligatory	II.
National Forest Inventories and Remote Sensing	Obligatory	III.					
090 University of Mostar	090 Faculty of Science and Education	Geoinformatics	Remote sensing	Obligatory	I.		
			SDI concepts and principles	Obligatory	I.		
			Geoinformation systems	Obligatory	I.		
			Basics of statistics	Obligatory	I.		
			Programming 1	Distinguishing	I.		
			Databases (for geography)	Distinguishing	I.		
			Cartography 1	Distinguishing	I.		
			GIS 1 (for informatics)	Distinguishing	I.		
			SDI in geomorphology	Elective	I.		
			SDI in hydrogeography	Elective	I.		
			SDI in Biogeography	Elective	I.		
			Open source system	Obligatory	II.		
			IT in geosciences	Obligatory	II.		
			Modeling of geodata	Obligatory	II.		
Programming 2	Distinguishing	II.					



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			Operating systems (for geography)	Distinguishing	II.
			Cartography 2	Distinguishing	II.
			GIS 2 (for informatics)	Distinguishing	II.
			SDI in demography	Elective	II.
			SDI in urban geography	Elective	II.
			SDI in rural geography	Elective	II.
			SDI for thematic applications	Obligatory	III.
			Geoecology	Obligatory	III.
			SDI in tourism	Elective	III.
			SDI in transport geography	Elective	III.
			SDI in industrial geography	Elective	III.
			Regionalization and synthesizing geoinformation	Elective	III.
			SDI at work	Obligatory	IV.
			Visualization of data	Obligatory	IV.
101 University of Sarajevo	102 Faculty of Agriculture and Food Science	Sustainable management of land and rural areas	Basic cartography in spatial planning	Obligatory	I.
			Fundamentals of Geographical Information Systems	Obligatory	I.
			Application of GIS in Agro-Ecological Zoning	Obligatory	III.
			Application of GIS in Agro-Ecological Zoning	Elective	II.
			Land Capability	Obligatory	III.
			Land Consolidation	Obligatory	III.
	101 Faculty of Civil Engineering	Geodesy and Geoinformatics	Web-GIS	Obligatory	I.
		GIS in Spatial planning	Obligatory	I.	



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			Geovisualization	Obligatory	II.
			Spatial databases and SDI	Elective	II.
		Center for Interdisciplinary Studies -Protection from natural disasters	Spatial databases and SDI	Elective	I.
		Civil Engineering - Transport	Transportation planning and infrastructure	Obligatory	II.
120 University for Business and Technology Pristine	120 UBT Pristine	Faculty of Information Systems	Geo-Information Science	Obligatory	I.
			GIS Analysis, Modeling and Techniques	Obligatory	I.
			GIS Data Management Techniques	Obligatory	I.
		Faculty of Computer Science	Data Analytics	Obligatory	I.
			Data Modeling	Obligatory	I.
150 University of Novi Sad	151 Faculty of Technical Sciences Novi Sad	Geodesy and Geoinformatics	Geoportals and Geospatial Services	Obligatory	I.
			Laser Scanning of Terrains and Objects	Obligatory	I.
		Civil Engineering	Complex synthesis project	Obligatory	I.
160 University "Ukshin Hoti" Prizren	160 Faculty of Computer Sciences	Information Technology and communication	Principles of geographic information systems	Elective	I.
			SDI with focus on Application Development	Elective	III.



An overview of the number of courses is presented in the Table 38.

Table 38. An overview of number of courses per partner universities

Partner university	Obligatory	Elective	Distinguishing
010 University of Zagreb	1		
061 Polytechnic University Tirana	22	1	
070 Agricultural University Tirana	3		
090 University of Mostar	11	10	8
101 University of Sarajevo	9	3	
120 University for Business and Technology Pristine	5		
150 University of Novi Sad	3		
160 University "Ukshin Hoti" Prizren	2		
<b>Total</b>	<b>54</b>	<b>16</b>	<b>8</b>

Dynamics in courses implementation per semester is presented in Chart 4.

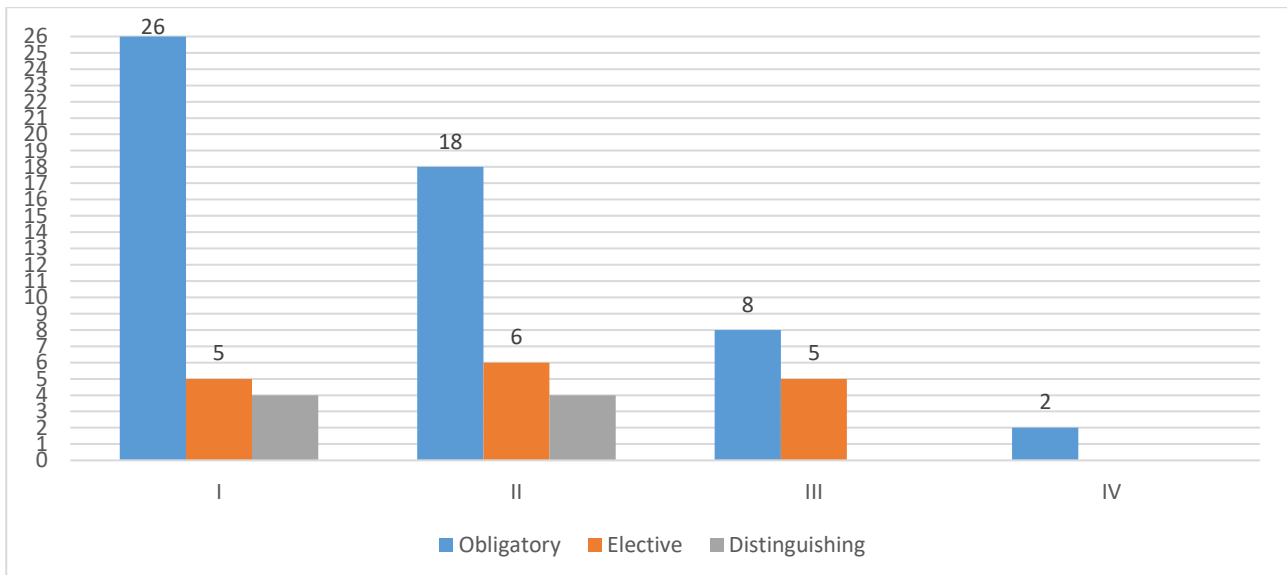


Chart 4. Dynamics in courses implementation per semester

It has to be note that 43 teachers will be involved in implementation of above mentioned courses.

When it comes to curricula content formalization, only five faculties specified the procedure as following:

- 061 Polytechnic University Tirana - 061 Faculty of Civil Engineering - Decision of the University Senate/Faculty Council on minor changes in existing study program for all courses;
- 101 University of Sarajevo - 102 Faculty of Agriculture and Food Science - Adoption of annual Study plan by Faculty Council for all courses;
- 101 University of Sarajevo - 101 Faculty of Civil Engineering - Adoption of annual Study plan by Faculty Council for course Transportation planning and infrastructure; Approval of new study



program by authorized institution for course Spatial databases and SDI Approval of major changes by University Senate in existing study program for the rest of courses;

- 150 University of Novi Sad - 151 Faculty of Civil Engineering Subotica - Decision of the University Senate/Faculty Council on minor changes in existing study program for course Complex synthesis project;
- 160 University "Ukshin Hoti" Prizren - 160 Faculty of Computer Sciences - Decision of the University Senate/Faculty Council on minor changes in existing study program for all courses and External evaluation for the course SDI with focus on Application Development.

Some of partner universities pointed out preconditions for curriculum implementation as follows:

- 010 University of Zagreb: Contentual preparation – from learning materials prepare lectures; Technical preparation – install necessary software (if needed);
- 061 Polytechnic University Tirana: Formal procedure: Discussion in Department, Approval in Faculty, Approval in Senate of University; Technical preparation: Establishing Working groups for different subjects, Literature consulting, Curriculum design;
- 070 Agricultural University Tirana: Update/upgrade the contents of other courses (e.g Forest Management) taking into consideration the introduction of ALFIS - Albanian Forest Information System;
- 101 University of Sarajevo: Attendance of minimum 5 or 20 students depend on course;
- 150 University of Novi Sad: Formal procedure: the Teaching Scientific Council of the faculty approves changes to existing courses; Faculty informs the Commission for Accreditation and Quality Assurance about approved changes; Contentual preparation: Teachers and associates will prepare teaching material by using and adjusting BESTSDI and/or LINKVIT material.
- 160 University "Ukshin Hoti" Prizren: Introduce 2 blue SDI Learning Building Blocks into existing GIS course; Introduce a new elective course with a focus on the SDI App Dev.

## **Data from databases on curriculum implementation beyond the project**

### *Implementation of curriculum – Bachelor and Master study program*

After completion of the project, 12 faculties from 9 partner universities are going to further work on improvement of 46 courses. Courses are part of 20 study programs. 38 courses out of 46 are obligatory while 8 courses are elective ones. Some details regarding implementation of curriculum at Bachelor and Master study program are presented in the Table 39.



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Table 39. Implementation of of curriculum at Bachelor and Master study program beyond the project

Partner university	Partner faculty	Study program	Course name	Course type	Semester
061 Polytechnic University Tirana	061 Faculty of Civil Engineering	Geodesy	Cadastral system & Land Use	Obligatory	II.
			NSDI & legislation	Obligatory	III.
			Geo-information science and spatial analysis	Obligatory	I.
			Digital Photogrammetry	Obligatory	I.
			Geodetic Reference Systems	Obligatory	I.
			Spatial databases and Web-GIS	Obligatory	II.
			Land Management/ Urban Planning	Elective	II.
070 Agricultural University Tirana	070 Faculty of Forestry	Forestry Engineering	Topographic cartography	Obligatory	II.
			Forest Management	Elective	IV.
			Community based forest management	Obligatory	II.
			MSc in Forestry Engineering	Obligatory	III.
			National Forest Inventories and Remote Sensing	Obligatory	II.
080 University of Banja Luka	080 Architecture, Civil Engineering and Geodesy Faculty	Geodesy	Integrated survey systems	Elective	VIII.
101 University of Sarajevo	101 Faculty of Civil Engineering	Civil Engineering - Transport	Transportation planning and infrastructure	Obligatory	II.
		Center for Interdisciplinary Studies -Protection from natural disasters	Spatial databases and SDI	Elective	I.





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	102 Faculty of Agriculture and Food Science	Sustainable management of land and rural areas	Basic cartography in spatial planning	Obligatory	I.	
			Fundamentals of Geographical Information Systems	Obligatory	I.	
120 University for Business and Technology Pristine	120 UBT Pristine	Information Systems	Spatial Information Systems	Obligatory	III.	
			GIS Data and Management Techniques	Obligatory	VIII.	
			GIS in Civil Engineering	Elective	VIII.	
130 University of Montenegro	131 Faculty of Philosophy Nikšić	Geography	Thematic Geography	Obligatory	IV.	
			Geography of soil	Obligatory	III.	
			GIS	Obligatory	IV.	
	132 Biotechnical Faculty Podgorica	Plant production	Amelioration	Obligatory	III.	
			Continental Fruit Growing and Medicinal Plants	Amelioration and soil reclamation	Obligatory	II.
			Mediterranean Fruit Growing	Amelioration and soil reclamation	Obligatory	II.
140 University of Beograd	140 Faculty of Forestry	Forestry	Geodesy and GIS	Obligatory	II.	
		Ecological engineering for soil and water resources protection	Geodesy and GIS	Obligatory	II.	
		Landscape architecture	Geodesy and GIS	Elective	IV.	
150 University of Novi Sad	151 Faculty of Civil Engineering Subotica	Civil Engineering	Geology and Petrology	Obligatory	II.	
			Engineering Geology	Obligatory	IV.	
			Irrigation and drainage	Obligatory	IV.	
			Basics of urban planning	Obligatory	IV.	
			Building heritage protection and revitalization	Obligatory	IV.	
Basics of building design	Obligatory	III.				



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			Design of multi-family buildings	Obligatory	V.
			Traffic infrastructure and space	Obligatory	IV.
			Complex synthesis project	Obligatory	I.
	151 Faculty of Technical Sciences Novi Sad	Geodesy and Geoinformatics	Spatial Data Infrastructure	Elective	VII.
			Geoportals and Geospatial Services	Obligatory	I.
			Remote sensing and Image Processing	Obligatory	VII.
			Photogrammetry	Obligatory	IV.
			Laser Scanning of Terrains and Objects	Obligatory	I.
			Geospatial databases	Obligatory	VII.
160 University “Ukshin Hoti” Prizren	160 Faculty of Computer Sciences	Information Technology and communication	SDI with focus on Application Development	Elective	III.

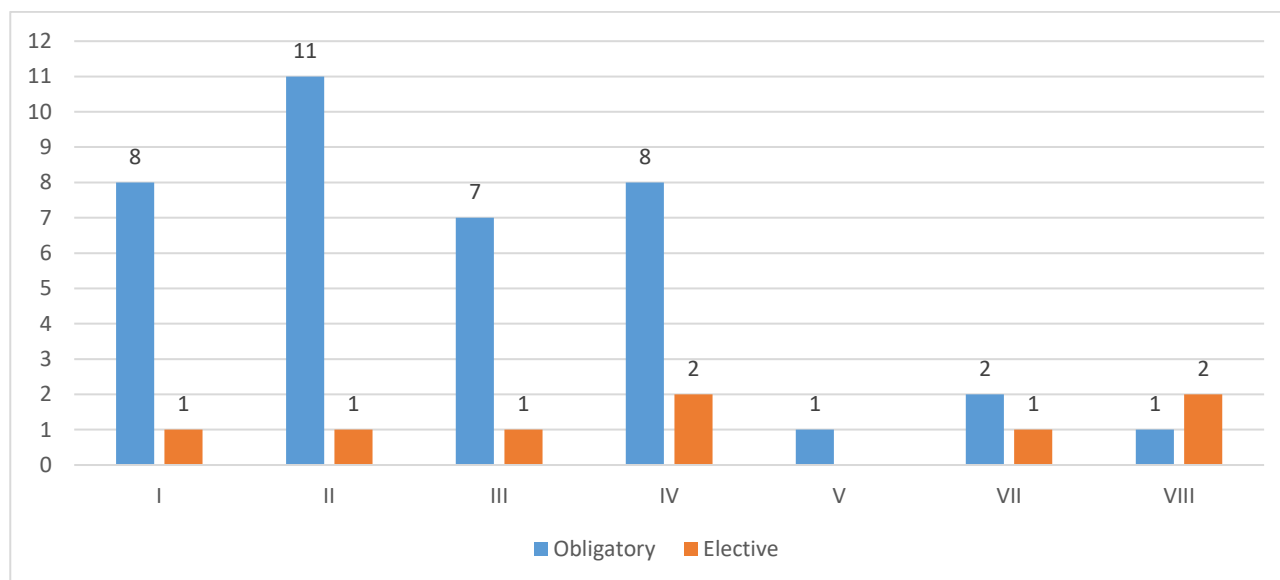


An overview of the number of courses is presented in the Table 40.

Table 40. An overview of number of courses per partner universities

Partner university	Obligatory	Elective
061 Polytechnic University Tirana	7	1
070 Agricultural University Tirana	4	1
080 University of Banja Luka		1
101 University of Sarajevo	3	1
120 University for Business and Technology Pristine	2	1
130 University of Montenegro	6	
140 University of Beograd	2	1
150 University of Novi Sad	14	1
160 University "Ukshin Hoti" Prizren		1
<b>Total</b>	<b>38</b>	<b>8</b>

Dynamics in courses implementation per semester is presented in Graph 5.



Graph 5. Dynamics in courses implementation per semester

It has to be note that 46 teachers will be involved in implementation of above mentioned courses.

In addition to number of courses per partner universities presented in Table 40., it should be noted that 010 University of Zagreb will work on further improvement of courses at Master study program. However, Faculty of Geodesy in Zagreb will face the reaccreditation of its Master study program "Geodesy and Geoinformatic" in year 2020. It is expected that whole study program will be evaluated and modernized in a manner that new study program will be proposed. In this program SDI will be addressed in systematic manner through the whole study program. In this very moment it is not known will presently existing directions inside the study program be fully separated in two study programs "Geodesy" and "Geoinformatic" or not. What is envisaged is that in direction/study program Geoinformatic there will be obligatory course on SDI and several other obligatory and elective courses which will incorporate parts of SDI curricula.



When it comes to curricula content formalization, nine universities specified the procedure as following:

- 061 Polytechnic University Tirana - Decision of the University Senate/Faculty Council on minor changes in existing study program;
- 070 Agricultural University Tirana - Decision of the University Senate/Faculty Council on minor changes in existing study program and Approval of new study program by authorized institution in case of course Land use planning and GIS;
- 080 University of Banja Luka - Adoption of annual Study plan by Faculty Council;
- 101 University of Sarajevo - Adoption of annual Study plan by Faculty Council as it is the case with Faculty of Agriculture and Food Sciences, and Decision of the University Senate/Faculty Council on minor changes in existing study program and Approval of new study program by authorized institution in case of Faculty of Civil Engineering;
- 120 University for Business and Technology Pristine - Adoption of annual Study plan by Faculty Council;
- 130 University of Montenegro - Adoption of annual Study plan by Faculty Council;
- 140 University of Beograd - Adoption of annual Study plan by Faculty Council;
- 150 University of Novi Sad - Decision of the University Senate/Faculty Council on minor changes in existing study program;
- 160 University "Ukshin Hoti" Prizren - Decision of the University Senate/Faculty Council on minor changes in existing study program, External Accreditation.

Some of partner universities pointed out preconditions for curriculum implementation as follows:

- 101 University of Sarajevo - Attendance of minimum 5 students;
- 150 University of Novi Sad - Formal procedure: the Teaching Scientific Council of the faculty approves changes to existing courses; Faculty informs the Commission for Accreditation and Quality Assurance about approved changes; Contentual preparation: Teachers and associates will prepare teaching material by using and adjusting BESTSDI and/or LINKVIT material;
- 140 University of Beograd - Lab to be equipped with computers, Internet; Teaching material to be prepared;
- 070 Agricultural University Tirana - Expected decision of the Minister of Education Youth and Sports on the opening of the study programme;
- 160 University "Ukshin Hoti" Prizren - Introduce a new elective course with a focus on the SDI.

## 6. Conclusion

Survey on Localization of curriculum and Implementation of curriculum in terms of adaptation procedures provided us with very good inside of what partner universities are going to apply.



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New study program will be introduced at the two universities. New modules will be introduced at three universities. New course will be introduced at five universities, while majority of partner universities are going to incorporate new lectures into the existing course.

The adaptation procedures vary from university to university and therefore strong monitoring of these activities is needed. However most of partners will finalize adaptation processes before winter semester 2018/2019 starts.

When it comes to implementation in the academic year 2018/2019, a total of 111 courses will be implemented; 33 courses at Bachelor and 78 courses at Master study program. Courses are part of 15 study programs. At Bachelor study program 29 courses out of 33 are obligatory while only 4 courses are elective ones. At Master study program, 54 courses out of 78 are obligatory, 16 courses are elective while 8 are distinguishing ones. Several faculties stated that that they need to complete formalization process for curricula content.

The survey and databases show big diversity as well as potential for curriculum development from different aspects at all study level. The introduction of new study programs and new modules has always been a problem due to the conservatism of the education system in our circumstances. Therefore most universities and faculties joined the process of improvement existing study programs, modules/courses. Anyhow it has to be noted that we also have impressive number of new modules/courses as well as two study programs that are going to be introduced into study system.

In order to ensure broader application of SDI in practice, it is necessary to make an effort to dissemination and transfer the knowledge to users. This should, to a certain extent, improve general electronic literacy, connectivity between different providers and users, and not make it a privilege of one profession.