



WBCInno

***Western Balkans
Regional University
Innovation Platform***



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Regional University
Innovation Platform***



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Table of Contents

Tables 6
Figures 6
List of Abbreviations 6
Preface 7
1. Introduction 9
2. Review of EU and Regional Policies and Recommendations 13
2.1 EU level 13
2.2 Regional level 18
3. Review of Findings on WBCInno Project 23
3.1 Review of KTT good practices within the EU 23
3.2 Mapping of research and innovation potential of five WBC universities 28
3.3 Benchmarking of WBC university structures/services in the area of knowledge transfer, innovation and research 32
4. Strategic Measures and Recommendations for Establishment of Regional University Platform 37
4.1 Introduction 37
4.2 Assessment and efficiency monitoring of KTT modes 38
4.3 Defining of priority research areas of university and capitalizing the knowledge and research potential 41
4.4 Commercialization of research results and their transformation to innovation 44
4.5 Efficient innovation management supported by a collaborative software platform 47
4.6 Development of co-operations between universities and enterprises 50
4.7 Encouraging students/researchers to establish start-ups and spin-offs 54
4.8 Strengthening university capacity to support the development of Business Incubators and Science Technology Parks 57
5. Action Plan 61
6. Bibliography 65

Tables

- Table 1** Effectiveness vs workloads for different modes of KTT [7] | **24**
- Table 2** Different units mapped at five WBC universities | **28**
- Table 3** Structure of mapped entities in accordance with FOS classification per university | **30**
- Table 4** KPIs for investment in knowledge transfer, innovation and research | **38**
- Table 5** KPIs for knowledge transfer through cooperation | **39**
- Table 6** KPIs for knowledge transfer through exploitation or commercialization of research results | **39**
- Table 7** KPIs for knowledge transfer through people | **40**
- Table 8** Action Plan | **61**

Figures

- Figure 1** Level of overall implementation of the knowledge transfer Recommendation – also including policy plans (Source European Knowledge Transfer Policy Survey 2012) | **15**
- Figure 2** Level of implementation the EC knowledge transfer Recommendation from 2008 – actually implemented policy measures only (source European Knowledge Transfer Policy Survey 2012) | **15**
- Figure 3** Regulations and practices in regard to the CoP principles by country [1] | **16**
- Figure 4** Graphical presentation of structure of mapped entities in accordance with FOS classification per university | **29**
- Figure 5** Idea management workflow and roles | **49**

List of Abbreviations

AC	Associated Countries	KTT	Knowledge and technology transfer
BI	Business incubator	MS	Member States
CPD	Continuing professional development	NGO	Non-government organisation
CoP	Code of Practice	OECD	The Organisation for Economic Co-operation and Development
EEN	Enterprise Europe Network	PRO	Public research organisation
EU	European Union	R&D	Research and development
FTE	Full time equivalent (staff)	ROI	Return on investment
FOS	Field of science and technology classification	RCC	Regional Cooperation Council
GUI	Graphical user interface	SEE	South East Europe
HEI	Higher education institution	SME	Small and medium enterprise
ICT	Information and communication technology	STP	Science technology park
IP	Intellectual property	TTO	Technology transfer office
IPR	Intellectual property rights	UA	University of Alicante
KPI	Key performance indicator	UIP	University innovation platform
KT	Knowledge transfer	WBC	Western Balkan countries
KTO	Knowledge transfer office		

Preface

This report takes the findings of the WBCInno project to date and reviews these to enable a proposal to be developed for a Western Balkans Regional University Innovation Platform. This Platform aims to support the development and growth of a range of KTT activities including commercialisation of research, collaboration between universities and enterprises, and establishing start-ups and spin-offs. It also considers the issues of managing and supporting these activities to optimise success as well as considering ways in which success can be measured and reported.

The report recognises that different universities are at different stages of development, have different strengths and opportunities, and consequently require different support mechanisms. This recognition is reflected in the proposals which are articulated through an Action Plan focusing on ensuring that the needs of each specific university in the Western Balkan countries can be met.

The recommendations within the action plan highlight the need for stakeholder engagement and buy-in at an early stage in the detailed 'design' stage of all aspects, particularly in the light of historical experiences of infrastructure being established which have had only a limited life. The elements of this report include the development of Key Performance Indicators; the specification of a programme of KTT staff development activities; the definition of the Knowledge and Technology Transfer Unit functionalities; the detailed design of the UIP collaborative software platform; the development of motivational aspects; and setting university specific research priorities.

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1 Introduction

In order to develop a proposal for a Western Balkans Regional University Innovation Platform (UIP) it is essential to gain a sound understanding of the parameters influencing the support mechanisms which will be most beneficial to the universities in the Western Balkan countries (WBC). It is clear from the work to date (and reported below) that a single dictated model will not fit all universities as there exists a range of readiness for and development of knowledge and technology transfer (KTT) activity. Furthermore it is transparent that some areas in universities demonstrate clear pinnacles of success, while others are in need of significant support and will benefit from a well-resourced UIP as they seek to grow the KTT activity in scope and volume.

This variance in requirements leads to the need for a platform which maintains flexibility so that it may be customised for each WBC university using it. Customisation will need to be defined in collaboration with the university itself, and in particular with those for whom the UIP will provide support.

A number of significant pieces of work have been completed to underpin the proposed UIP specification, and to propose the Action Plan for each of the WBC universities within this project and hence form part of this pilot. These pieces of work include:

- A review of EU and regional policies and recommendations related to knowledge transfer and innovations, presented in chapter 2.
- A review of best practice within the EU (see section 3.1 below) which seeks to enable the project to benefit from the experience of European partners while accepting that models utilised within the EU may not be directly appropriate for the WBC partners.
- A mapping of the innovation and KTT potential of the partner WBC universities (see section 3.2 below), an exercise carried out by the WBC universities themselves which scopes the capability of the relevant faculties within each university and highlights the breadth of potential from an internal perspective.
- A benchmarking exercise of each of the five WBC partner universities (see section 3.3 below) carried out by the EU partners through questionnaires, interviews and visits to each of the WBC partner universities which highlights the KTT activities, capabilities, limitations and constraints on a university by university basis

The full reports for these pieces of work are available on the WBCInno website (www.wbc-inno.kg.ac.rs) and the key outcomes are summarised below for the benefit of readers of this document.

Chapter 4 presents seven recommended measures for establishment of sustainable and effective Regional University Innovation Platform. Section 4.2 gives an overview of KTT modes with the set of developed metrics for their assessment and efficiency monitoring in form of Key Performance Indicators (KPIs), suggesting the introduction of integrated information system at university level which would support the processes of data collection, assessment and presentation. Section 4.3 suggests the several measures to define the university's priority research areas, starting from mapping of university's research and innovation potential to identification of society and market needs and finally prioritisation of research areas. Section 4.4 reviews management tools for innovation and commercialisation and reflects on those which are best suited to the WBC environment, extending this to ways in which a collaborative software platform (see section 4.5) can be utilised to support the efficacy of such management while minimising the intrusion on those innovating and engaging in KTT. Section 4.6 explores the facilitation of cooperation between

universities and enterprises, taking into account the situation in the WBC and considering the needs across the range of WBC universities, the range of enterprises and the current relationships that exist. Section 4.7 considers the support needed to encourage students, graduates and researchers to establish start-ups and spin-offs, looking at ways in which risks can be mitigated through university support infrastructure and proposing potential provision mechanisms to de-mystify and support such activities. Section 4.8 builds on the preceding sections to identify the needs of start-ups, spin-offs, Business Incubators and Science Technology Parks from the perspective of the capacity (and capability) of the WBC universities; it looks at ways in which university capacity could be strengthened and proposes approaches which are aimed at being sufficiently flexible to accommodate a range of activities across a diverse set of universities.

Chapter 5 concludes the report by way of a proposed Action Plan, presenting these in a format that is readily adaptable for other WBC universities as the project is rolled out on a wider basis.







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2 Review of EU and Regional Policies and Recommendations

2.1 EU level

Although the European universities and public research organizations (PRO) have been recognized as leading science and knowledge producers in the world, the exploitation of these outputs is not satisfactory. Most of the policy documents (Lisbon Strategy, Europe 2020) set ambitious objectives for the EU to become *“the most dynamic and competitive knowledge based economy in the world”*. There is still a need to improve the frameworks and conditions to realize research as well as prerequisites to transform them into innovations of products, services and processes, which will improve the general well-being.

One of the prerequisites for efficient exploitations of research and their transformation into innovations is the effective management of intellectual property (IP) generated at universities and PROs within public funded research projects. For this reason, in April 2008, the European Commission gave a coherent set of guidelines in the document Recommendations and Code of Practice [1]. The document was designed for all stakeholders (national authorities, universities, PROs, industries and researchers), with the aim to:

- Improve IP management between researchers and private sector
- Reduce discrepancies between different national legal frameworks, policies and practices
- Enhance the dissemination of knowledge throughout Europe

Public research organisations (PROs), including universities, need to more actively engage in the exploitation of publicly-funded research results, for instance through academia-industry collaborations, licensing and spin-offs. Professional management of intellectual property (IP) plays a crucial role in the success of these knowledge transfer activities and in building an effective European Research Area (ERA).

Source

Recommendations and Code of Practice [1]

This document also contains set of key policy recommendations for Member States and Associated Countries which public authorities should introduce and adapt within their national policies and measures. Seven measures relevant for this UIP and recommended for all PROs (including universities) are:

- R 1.** Ensure that all PROs define knowledge transfer as a strategic mission.
- R 2.** Encourage PROs to establish and publicise policies and procedures for the management of IP in line with the Code of Practice.
- R 3.** Support the development of knowledge transfer capacity and skills in PROs, as well as measures to raise the awareness and skills of students – in particular in the area of science and technology – regarding intellectual property, knowledge transfer and entrepreneurship
- R 4.** Promote the broad dissemination of knowledge created with public funds, by taking steps to encourage open access to research results, while enabling, where appropriate, the related IP to be protected.
- R 5.** Cooperate and take steps to improve the coherence of their respective ownership regimes as regards IP rights in such a way as to facilitate cross-border collaborations and knowledge transfer in the field of research and development

R 6. Monitoring and reporting on measures taken on the basis of the Recommendation.

R 7. Take steps to ensure the widest possible implementation of the Code of Practice, whether directly or through the rules laid down by national and regional research funding bodies.

Code of Practice for universities and other PROs concerning the management of IP in knowledge transfer activities consists of three main sets of principles:

I. The principles for an internal intellectual property

- CoP 1.** Develop and publicize an IP policy as part of long-term strategy and mission;
- CoP 2.** Provide clear rules for staff and students regarding IP;
- CoP 3.** Promote the identification, exploitation and, where appropriate, protection of IP;
- CoP 4.** Provide incentives for all relevant staff in the implementation of the IP policy;
- CoP 5.** Creation of coherent IP portfolios in specific technological areas which facilitate their exploitation;
- CoP 6.** Raise awareness and basic skills regarding IP and KT through training actions for students and research staff;
- CoP 7.** Develop and publicize a publication/dissemination policy promoting the broad dissemination of research and development results;

II. The principles for a knowledge transfer

- CoP 8.** Consider all types of possible exploitation mechanisms and exploitation partners and select the most appropriate ones in order to promote the use of research results;
- CoP 9.** While proactive IP/KT policy may generate additional revenues, this should not be considered the prime objective in research and exploitation;
- CoP 10.** Ensure professional KT services (legal, financial, commercial, IP protection);
- CoP 11.** Develop and publicise a licensing policy, in order to harmonise practices and ensure fairness in all deals;
- CoP 12.** Develop and publicise a policy for the creation of spin-offs, encouraging the PRO staff to engage in their creation;
- CoP 13.** Establish clear principles regarding the sharing of financial returns from KT revenue between the PRO, the department and the inventors;
- CoP 14.** Monitor IP protection and KT activities and related achievements, and publicise these regularly.

III. The principles for collaborative and contract research

- CoP 15.** The rules governing collaborative and contract research activities should be compatible with the mission of each party (PRO and industrial partner);
- CoP 16.** IP-related issues should be clarified at management level and as early as possible in the research project, ideally before it starts (e.g. allocation of ownership of IP – background, foreground);
- CoP 17.** In a collaborative research project, the ownership of the foreground should stay with the party that has generated it, but can be allocated to the different parties on the basis of a contractual agreement concluded in advance. The ownership of background should not be affected by the project.
- CoP 18.** Access rights should be clarified by the parties as early as possible in the research project, ideally before it starts.

In order to monitor the level to which these recommendations are implemented in the Member States (MS) and Associated Countries (AC), a European KT Policy Survey was conducted in 2010-2012 [2]. The results of the survey were based on questionnaires filled in by the representatives of European Research Area Committee's working groups from 37 European countries (Member States and Associated Countries). The results show that the overall level overall implementation of those recommendations including the policy plans is 53% (Figure 1), while the level of policy measures that are actually implemented is somewhat lower at 49% (Figure 2).

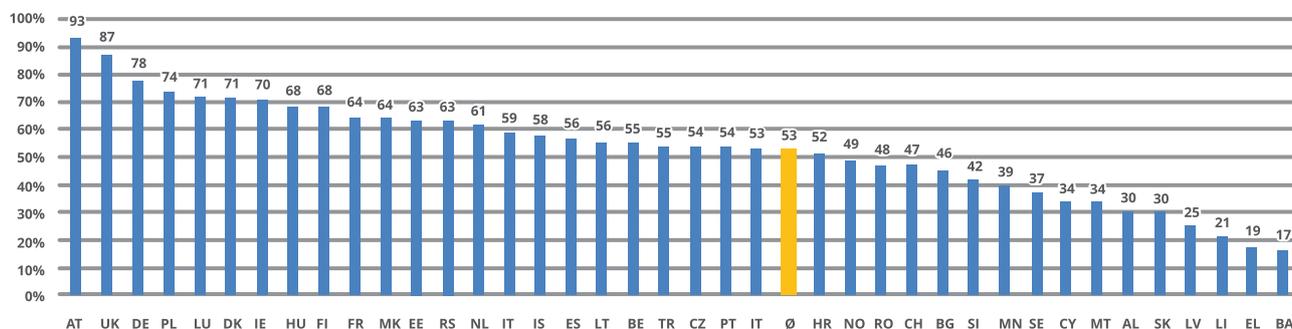


Figure 1: Level of overall implementation of the knowledge transfer Recommendation – also including policy plans (Source European Knowledge Transfer Policy Survey 2012).

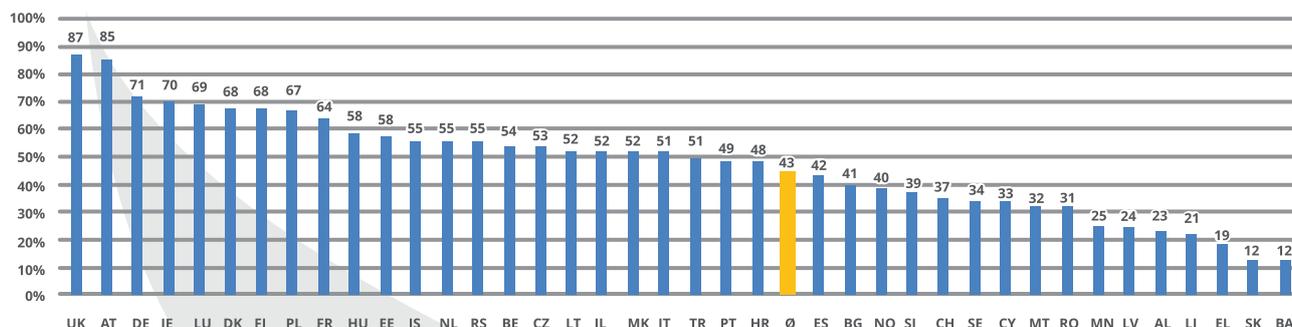


Figure 2: Level of implementation the EC knowledge transfer Recommendation from 2008 – actually implemented policy measures only (source European Knowledge Transfer Policy Survey 2012).

The survey findings presented in the Figure 1 show that the three countries with the highest level of implementation are Austria with most comprehensive KT policies (93%), United Kingdom (87%) and Germany (78%). With somewhat lower implementation levels, but still above the European average, were countries such as Serbia (63%) and Spain (56%), while Montenegro was below the average with 39%. The lowest level of implementation was found in Bosnia and Herzegovina, only 17%¹.

With reference to the percentage of actually implemented policy measures (Figure 2), the top three countries are again United Kingdom, Austria and Germany (87%, 85% and 71%, respectively), but with somewhat lowered implementation level (except UK). The same situation is with other countries: Serbia (55%), Spain (42%), Montenegro (25%) and Bosnia and Herzegovina (12%).

Strong differences among different European MS and AC countries do not relate only to the level of implementation of EU recommendations (both planned and actually implemented), but to the level of implementation of the individual themes as well. In that sense, the highest implementation level is observed for “support of KT capacities and skills” and “facilitation of cross-border KT operation” themes (74% and 68%, respectively), while the lowest level of implementation was for “ensuring the Code of Practice use and implementation” (34%) and “monitoring and reporting of KT policy measures and impact” (35%).

¹ Commented results are for countries included in WBCInno Consortium

Besides this survey, upon the Commission’s request, the FHNW (University of Applied Sciences and Arts Northwestern Switzerland, School of Business) conducted research in order to analyse the implementation and impact of the Code of Practice. The Knowledge Transfer Study 2010-2012 [2] summarizes the findings of this survey carried out among 322 universities and PROs on the implementation of the Code of Practice (CoP), which show a few general issues:

Three of the principles are seemingly not widespread let alone generally accepted among PROs: the creation of coherent IP portfolios and patent/IP pools (**CoP 5**), the existence and publication of a licensing policy (**CoP 11**), and the publication of start-up policies (**CoP 12**).

Publishing policy documents is not common practice at the surveyed PROs. While PROs monitor internally their IP protection (**CoP 14**), they neglect the publication and dissemination aspects.

PROs provide incentives to mobilise their employees for IP issues and KTT and they let them participate in the resulting revenues in one way or another (**CoP 4, 13**).

Access to and provision of professional KTT services is generally widespread and most KTOs have some staff with a technical background and formal qualification in science or engineering (**CoP 10**).

Licences are the most frequent mechanism and existing companies the most frequent partners in the exploitation of IP generated in universities and other public research organisations (**CoP 8**). The most important objectives of IP and exploitation policies are generating possibilities for collaboration (**CoP 9**).

The type of research and the type of IP (foreground or background) influence the negotiation of ownership and access rights in the conclusion of research contracts (**CoP 17, 18**). Common practice is to define this before a project starts, though expressly the sharing of revenues might be agreed upon later in the project or when it becomes clear that such revenues might accrue (**CoP 16**).

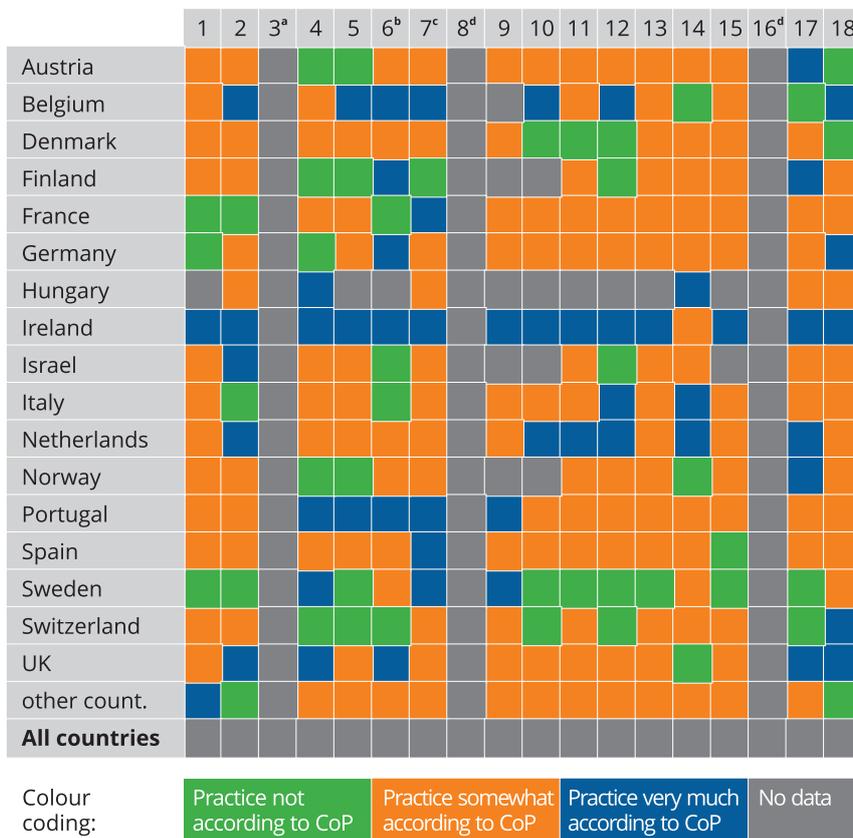


Figure 3: Regulations and practices in regard to the CoP principles by country [1]

Additionally, several good practice examples of policy measures already taken by public authorities in some MS are provided in order to help others implement the Recommendation.

R 1. Knowledge Transfer as a strategic mission of public research organisations

- 1.** KT between universities and industry is made a permanent political and operational priority for all public research funding bodies within a Member State, at both national and regional level.
- 2.** The subject clearly falls within the responsibility of a ministry, which is charged with coordinating knowledge transfer promotion initiatives with other ministries.
- 3.** Each ministry and regional government body that carries out knowledge transfer activities designates an official responsible for monitoring their impact. They meet regularly in order to exchange information and discuss ways to improve knowledge transfer.

R 2. Policies for managing Intellectual Property

- 4.** The proper management of IP resulting from public funding is promoted, requiring that it be carried out according to established principles taking into account the legitimate interests of industry (e.g. temporary confidentiality constraints).
- 5.** Research policy promotes reliance on the private sector to help identify technological needs and to foster private investment in research and encourage the exploitation of publicly-funded research results.

R 3. Knowledge transfer capacities and skills

- 6.** Sufficient resources and incentives are available to PROs and their staff to engage in knowledge transfer activities.
- 7.** Measures are taken to ensure the availability and facilitate the recruitment of trained staff (such as technology transfer officers) by PROs.
- 8.** A set of model contracts is made available, as well as a decision-making tool helping the most appropriate model contract to be selected, depending on a number of parameters.
- 9.** Before establishing new mechanisms to promote knowledge transfer (such as mobility or funding schemes), relevant stakeholder groups, including SMEs and large industry as well as PROs, are consulted.
- 10.** The pooling of resources between PROs at local or regional level is promoted where these do not have the critical mass of research spending to justify having their own KT office or IP manager.
- 11.** Programmes supporting research spin-offs are launched, incorporating entrepreneurship training and featuring strong interaction of PROs with local incubators, financiers, business support agencies, etc.
- 12.** Government funding is made available to support knowledge transfer and business engagement at PROs, including through hiring experts.

R 5. Coherence in trans-national cooperation

- 13.** In order to promote transnational KT and facilitate cooperation with parties from other countries, the owner of IP from publicly-funded research is defined by clear rules and this information, together with any funding conditions which may affect the transfer of knowledge, is made easily available. Institutional ownership – as opposed to the “professor’s privilege” regime – is considered the default legal regime for intellectual property ownership at PROs in most EU Member States.
- 14.** When signing international research cooperation agreements, the terms and conditions relating to projects funded under both countries’ schemes provide all participants with similar rights, especially as regards access to IP rights and related use restrictions.

R 4. Knowledge dissemination

- 15.** Open access is implemented by public research funding bodies with regard to peer-reviewed scientific publications resulting from publicly-funded research.
- 16.** Open access to research data is promoted, in line with the OECD Principles and Guidelines for Access to Research Data from Public Funding, taking into account restrictions linked to commercial exploitation.

Source

17. Archival facilities for research results (such as internet-based repositories) are developed with public funding in connection with open access policies.

R 6. Monitoring implementation

18. The necessary mechanisms are put in place to monitor and review progress made by national public research organisations in knowledge transfer activities, e.g. through annual reports of the individual PROs. This information, together with best practices, is also made available to other Member States.

Source

Commission Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organisations

2.2 Regional level

WBC countries are far behind EU countries in terms of GDP level per capita and employment level. This is why there is a strong need to reinforce the region in both economic and institutional terms.

One of coordinated efforts to develop a regional research and development (R&D) strategy for innovation was the Joint Statement of the Ministerial Conference [3], which was signed in April 2009 by the WBC ministries for science and research, the EU commissioner for science and research and the Czech Republic Presidency of the Council of the European Union, under the auspices of the Regional Cooperation Council secretary general. Two years later, an agreement for provision of technical assistance for its development within the project Western Balkans Regional R&D Strategy for Innovation Technical Assistance (WBRIS-TA) was signed by the World Bank and EC. The Strategy sets a number of strategic objectives and policy reforms in the areas of research and innovation and will create significant impact on economic growth and job creation in the Region. Besides complementing and strengthening of national and regional strategies, the Strategy particularly serves as the core of R&D and Innovation policy dimension within the Smart Growth pillar in SEE 2020 Strategy [4].

This SEE 2020 Strategy was developed by the national administrations, regional bodies and relevant initiatives upon the request and initiative of regional Ministries of Economy and under the auspices of Regional Cooperation Council (RCC) in November 2012. The strategy has the aim to widen and strengthen the dialogue, cooperation and links between SEE and EU, giving the overview of the current state in innovation and research area in the South East Europe (SEE), stimulating the key drivers of development, such as innovation, skills and integration of trade. It is based on five pillars, similar to those identified in Europe 2020 Strategy [5]:

1. Integrated growth
2. Smart growth
3. Sustainable growth
4. Inclusive growth
5. Governance for growth

The main objective of Smart Growth pillar is to promote innovation and to foster knowledge-driven growth in the Region. It targets to increase the GDP of the person employed by 32% relative to 2010 and to increase the number of highly qualified persons to 18%. In order to achieve these objectives, four policy dimensions address this pillar:

1. R&D and Innovation
2. Digital society
3. Culture and creative sectors
4. Education and competences

It was recognized that SEE countries need to invest more in research and innovation in order to improve the research excellence and productivity of human capital for research as well as to facilitate science-industry collaboration and technology transfer. This requires strengthening the governance of national research and innovation policies. This is why the key strategy activities within the R&D and Innovation dimensions are:

- To establish a Research Excellence Fund
- To promote Networks of Excellence
- To Introduce a Technology Transfer programme
- To create an early stage start-up programme

As already noted, the above mentioned policy dimensions are included in WBRIS Strategy for Innovation. In order to support the implementation of WBRIS Strategy, the Western Balkans proposed the creation of a regional technical assistance facility, the Western Balkans Research and Innovation Strategy Exercise (WISE) Facility. This not-for-profit organization will coordinate the implementation of WBRIS Strategy and R&D and Innovation policy dimension of SEE 2020 Strategy. It will concentrate on two components: i) Technical assistance and capacity building, and ii) Program design, monitoring, and evaluation.

Within the second component, the WISE proposed four programmes: the Research Excellence Fund, the Networks of Excellence Program, the Technology Transfer Program, and the Early-Stage Start-Up Program.



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Research Excellence Fund

Objective: The Research Excellence Fund will strengthen research capabilities in the Western Balkan countries and promote excellence by providing stable, transparent, and merit-based support for research. More specifically, it aims to:

- Improve the quality of research in the region by fostering collaboration between scientists from Western Balkan countries and the region's scientific diaspora as well as integration into the European Research Area.
- Provide support to young scientists.

The fund would foster competition for research grants beyond the national markets while leaving room to build capacity before exposure to international grant competition (such as Europe-wide competition). By providing regional funding and scaling up resources, it would help avoid fragmentation across countries and focus financial, human capital, and infrastructure resources on scientific areas with the largest benefits for regional competitiveness and development.

Networks of Excellence Program

Objective: The objective is to strengthen the quality of research by creating the critical mass of resources (human, physical, and financial) needed for generating world-class research in selected fields. The program will promote the concentration of resources in core research groups capable of achieving international standards of excellence. In addition, the program will encourage research mobility within the region, the training of young scientists, and doctorates and master's degrees in selected sectors.

This critical mass will be formed through a joint program of activities aimed primarily at integrating the research capacities of the network participants while, at the same time, advancing knowledge on the topic. The Network of Excellence is therefore an instrument for strengthening quality by tackling the fragmentation of European research and for structuring and shaping the way that research is carried out.

Technology Transfer Program

Objective: To make better use of the knowledge base for regional economic development through more extensive research-industry collaboration, marketable research, and value creation. The regional Technology Transfer Program will facilitate knowledge transfer from research to industry and spur new business potential by assisting research institutions in the deployment of technology transfer capabilities and the management and economic valorization of the regional research pool. It will complement ongoing initiatives in the area and look for formal interaction and synergies to enhance the transfer of knowledge and technology from research institutions to industry in the region.

Early-Stage Start-Up Program

Objective: The Early-Stage Start-Up Program will provide business development services along with a select group of financial instruments (pre-seed and seed financing) to nurture growth in technology-based start-ups in coordination with national initiatives and serve as a pipeline to the Western Balkans' Enterprise Innovation Fund, other EDIF initiatives, and regional investors interested in later-stage financing.

- In particular, the program will seek to attract and develop a network of investors in the Western Balkan countries and strengthen connectivity by establishing a network platform between local companies and

local and international investors. The network should have local connections, be well integrated into the innovation cycle, and provide a global outlook.

- It will also support the consolidation of the deal flow across the region and the development of a potentially attractive pipeline of companies by providing business development services. In the longer run, this initiative should promote a healthy investment environment linked to foreign capital markets.

Source

Western Balkans Regional R&D Strategy for Innovation, 2013 [6]

WBCInno and its achievement through the development of five strategic regional documents contribute to the above mentioned regional initiatives and policies. In the design of the University Innovation Platform and the proposed strategic measures detailed in the following sections of this document, the authors relied on R&D and Innovation policy dimensions and proposed actions in the SEE 2020 Strategy as well as suggested WISE programs. Additionally, the specifics identified at five WBC universities engaged in the WBCInno project were taken into account and described in the next Chapter as starting points.





3 Review of Findings on WBCInno Project

Modernization of university structures and mechanisms within WBCInno project is based on several studies, conducted at EU, regional and local level. They deal with identification and dissemination of EU good practices in the area of KTT between science and businesses, mapping of research and innovation potential at five WBC universities and benchmarking analysis through on-site visits. As the result of these studies, several strategic WBCInno documents were elaborated and one of them is Regional University Innovation Platform, which is why some of the most relevant findings and results are presented in this chapter.

3.1 Review of KTT good practices within the EU

In this survey, all five EU partners on WBCInno project were involved (University of Brighton, Graz University of Technology, University of Alicante, Hamburg University of Technology, Centre for Social Innovation), led by Graz University of Technology, whose team developed the questionnaire, structured in order to collect the data and complete at least 10 EU practices for further analysis. The questionnaire included a set of questions grouped into five areas:

1. Modes of KTT - knowledge and technology transfer
2. Good practice activity in one or more KTT modes
3. Businesses involved in KTT activities
4. R&D databases as prerequisites for promoting KTT
5. Infrastructure for promoting KTT

The following KTT modes were surveyed:

- R&D collaboration, contract research projects, scientific or technological services
- Commercialization of R&D results by patenting, licensing
- Entrepreneurship (spin-outs from university, start-ups)
- Student mobility, career services
- Student projects with businesses
- Mobility of academics between science and businesses
- Involvement of businesses in curricula development
- Lifelong learning, training courses

For selection of institutions and their KTT units, it was recommended to EU partners to select EU based offices at or in close cooperation with a university, with at least 10 years of existence (track record) and experience with all or most "modes" of KTT mentioned above. Eleven good practices were selected and their KTT offices and research results were presented in the publication "*Knowledge And Technology Transfer Between Science And Businesses: Academic KTT Offices' Experience And Good Practice*"² [7].

1. Delft University of Technology, Netherlands, Valorisation Centre, www.tudelft.nl
2. Graz University of Technology, Austria, R&T House, www.fth.tugraz.at
3. Politecnico di Milano, Italy, Servizio Valorizzazione Ricerca, www.polimi.it/tto

² http://www.wbc-inno.kg.ac.rs/pub/download/13899615499696_wbc_inno_academic_ktt_offices_web.pdf

4. Fundación Zaragoza Logistics Center, Spain, www.zlc.edu.es
5. University of Alicante, Spain, Oficina de Transferencia de Resultados de Investigación, www.ua.es
6. University of Brighton, United Kingdom, Centre for Collaboration and Partnership, www.brighton.ac.uk/ccp
7. Vienna University of Technology, Austria, Research and Transfer Support, <http://www.tuwien.ac.at/dle/transfer/>
8. University of Vienna, Austria, DLE Research Services and Career Development, <https://forschung.univie.ac.at/en/home/>
9. Hamburg University of Technology, Germany, TuTech Innovation GmbH, www.tutech.de
10. University of the West of England, Bristol, United Kingdom, Faculty of Environment & Technology, <http://www.uwe.ac.uk>
11. University of Wales, United Kingdom, Global Academy, <http://www.wales.ac.uk/en/globalacademy>

Characteristics of KTT offices

About half of the KTT offices reviewed can be regarded as integrated KTT offices whose services cover most of the available KTT modes while others are specialized in a specific one (in particular in the commercialization of R&D results). The three most comprehensive fields of activity based on the average reported workload are “assisting R&D collaboration/contract research projects/scientific/technological services” (42% workload), “Commercialization of R&D results by patenting, licensing” (22%) and “Student projects with businesses” (11%), as presented in table 6.

Table 1: Effectiveness vs workloads for different modes of KTT [7]

Effectiveness: 1 (very effective) to 5 (very little effect); ranking in this table by workload (average)	Effectiveness	Workload % of total
R&D coll. / contract research projects, scientific/tech. services	1.30	42
Commercialization of R&D results by patenting, licensing	2.67	22
Student projects with businesses	2.44	11
Entrepreneurship: spin-outs from university, start-ups	2.30	8
Student mobility, career services	2.00	6
Lifelong learning, training courses	2.22	5
Mobility of academics between science and businesses	2.00	3
Involvement of businesses in curricula development	2.60	2

A comparison between workload and an assessment of the effectiveness of different modes of KTT illustrates that assisting R&D collaboration or contract research projects does not only occupy most of the workload but is also top-ranked when it comes to effectiveness of KTT measures. However the commercialization of R&D results by patenting/licensing, even if it is second in terms of workload, ranks at the bottom in terms of effectiveness.

The rather low ranked effectiveness of “Commercialization of research results by patenting and licensing” may be due to:

- the uncertainty of substantial additional income
- the high cost of patenting
- the long duration from an invention to a market success
- an increasing focus on valorising research output for society and not only for companies
- the need for specialized support staff who must accommodate rather uncertain individual career perspectives (e.g. no scientific career path, an administrative career may be seen as unattractive)

Two studies (“Report of the Knowledge Transfer Study 2011”: Arundel, A. et al., 2013 [8] and “Financially Sustainable Universities II: European universities diversifying income streams”: Estermann, T. et al., European University Association 2011 [9]) provide some backing for this assessment. According to the Knowledge Transfer Study 2011 license income of European universities is highly concentrated with “... the top 10% of universities and research institutes earning circa 85% of all license income (the vast majority i.e. 80% of reported license income is from biomedical inventions). Universities earned, on average, €500,000 of license income per 1,000 researchers p.a.” In comparison, universities with a focus on applied R&D usually generate 25 to 50% of their total budgets from “third-party income”, e.g. RWTH Aachen 48%, TU Munich 42%, ETH Zurich 25%. Taking into account that European universities make a total of about 20% of their budget from “third party income” (according to the “Financially Sustainable Universities II” study defined as “all income other than direct national/regional public funding and student financial contributions”), the contribution of IP income to achieving greater financial autonomy in times of decreasing public budgets is somewhat limited, or at least a matter for a handful of very successful universities.

It therefore is recommended that when promoting the extension of KTT activities these should not be started by an aggressive commercialization of university IP (top down) but by building on “low-threshold” KTT modes which combine bottom-up and top-down characteristics and capitalize on the ever growing need of businesses for qualified human capital (students, graduates, scientific experts).

A typical KTT office has a staff of 10 persons (median value). It is noted that in some cases staff are not co-located but are distributed across different offices within the organisation. More than 50% of the staff dedicated to supporting KTT have got a science or engineering degree, 22% are business economic or law graduates.

The university budget is by far the most important budget source for the KTT offices with an average share of more than 60% budget. On top of this most of the offices successfully attract other public sources which account for another 25% of the budget (on average), some office are also generating private income.

For KTT offices specialising in commercialisation of intellectual property (IP) and/or situated in a large city and/or charging commercial fees, the majority of business partners is beyond 100 km distance while for those in smaller agglomerations a distinctive regional focus is given (up to 100 km distance).

Frequently there are contractual arrangements with regional business incubators and technology or science parks to promote and assist entrepreneurship (spin-outs from university, start-ups). In some cases this incubation function, as well as testing facilities and laboratories, are integrated into one building.

Measures and incentives used to motivate researchers for an extended involvement in R&D collaboration/ contract research projects with businesses

- Practical hands-on services: individual consulting on funding opportunities for given projects or project requests; help with legal questions and contract-management to minimize administrative effort; support services for the management of projects obtained from R&D grants schemes
- Communication: good preparation of businesses' cooperation requests to accelerate decision-making by the scientists/technologists; regular visits of technology transfer office (TTO) staff to research groups to gather information about recent and planned activities; proactive offering of possibilities to scientists to participate in national and international projects
- Training courses: by KTT office for researchers in project management, funding opportunities and collaboration with industry.
- Strategic aspects: appointing professors with industrial experience; involvement of key researchers in thematic R&D and innovation platforms set up between industry and university; inclusion of KTT performance in regular appraisal discussions and in staff promotion routes.

Measures and incentives used to motivate researchers to commercialize their R&D results by patenting/ licensing

- Financial incentives: monetary premium (lump sum) irrespective of revenues from their IP; monetary participation in revenues from their IP: often a 1/3,1/3,1/3 rule applies – university, research group, researcher receive equal parts of net revenue.
- Awareness/appreciation/recognition: Inventors' Event (festive presentation of inventors, presentation of good practice cases in technology commercialization)
- Practical hands-on services: individual consulting on intellectual property rights (IPR) questions with respect to inventions, innovation and business contracts
- Communication: Proactive invention and innovation scouting by the KTT office
- Training courses by KTT office for researchers in IPR issues, in particular IP in collaboration with industry.

Reporting on KTT performance at university level

When assessing the overall KTT performance of universities it should be taken into account that this depends on a number of framework conditions:

- Not all universities have a KTT mission. Such a mission is in particular common with Universities of Technology and Universities of Applied Science.
- There are different suites of values for different scientific fields: in some fields peer-reviewed publications are the core performance indicators whereas patents are very unusual
- Governance and financing of universities: KTT efforts of universities can be encouraged by government (1) in order to substitute decreasing public budgets and/or (2) in order to create knowledge diffusion and spillovers which the regional/national business environment will profit from (rationale: competitiveness of the innovation system)

The overall KTT performance of a university cannot be directly attributed only to the KTT offices' activities. These offices are usually part of the administration and therefore act as facilitators and advisors, in a subsidiary function - often they are responsible for the enforcement of KTT regulations, central data collection and reporting to the rectorate and stakeholders. To give an example there is a substantial difference between the indicator "number of projects for which the KTT office provided assistance" and "number of projects for the university in total": in some cases it is mandatory for university staff to report all projects or those above a fixed threshold (e.g. €5,000 or €20,000) to the KTT office. In other universities this is not the situation and hence these KTT offices do not have ready access to the total number of projects, but only the data on projects assisted by the office.

From the questionnaire, especially its question B6 "What are the key elements you use in reporting KTT performance: qualitative information and/or (if applicable) quantitative key indicators?", surveyed

EU universities stated following metrics (Key Performance Indicators – KPIs), both qualitative and quantitative, for the measuring the extent of KTT processes and assessment of their efficiency:

Metrics used for reporting on KTT offices` performance:

- Number of consultancy meetings with researchers and/or businesses (“pre-award” phase, consulting on available expertise and public funding issues)
- Number of and expected income from (public funded) projects assisted in the application phase
- Number of invention disclosures handled
- Share of self-financing (if applicable, e.g. by commercial services or involvement in regional or international KTT projects).

Metrics used for reporting on R&D collaboration, contract research, scientific and technological services:

- Number of and income generated by collaborative research projects, contract research projects and scientific/ technological service projects, broken down by funding partners: national and EU subsidies, local, national and international businesses and other organisations (preferably broken down by line of business and location).

Metrics used for reporting on commercialization of R&D results by patenting and licensing:

- Number of invention disclosures of university employees
- Number of patents filed for application (here it must be considered that the number of new patent applications filed in a given period (e.g. year) depends both on quantity and quality of inventions disclosures and on patent cost budget available to the university or KTT office).
- Number of patents granted, at national and international level
- Number of license deals, number of patents transferred
- Revenues from licensing / IP royalty income (may include licenses and lump sum payments).

Metrics used for reporting on entrepreneurship processes:

These metrics are mostly applicable to incubator units which are often not integrated into the university let alone into KTT offices:

- Number of start-ups accepted
- Number and amount of pre-seed loans granted to start-ups
- Amount of seed and venture capital attracted by start-ups
- Growth of start-ups (full time equivalent staff (FTE), Turnover, Profits)
- Number of spin-out companies, related to IP
- Amount of income and return on investment (ROI) when exit from spin-out companies
- For the university: Number of students and researchers participating in entrepreneurship education
- For the university: R&D projects income from their start-ups.



3.2 Mapping of research and innovation potential of five WBC universities

Mapping of innovation potential at WBC universities was conducted in order to identify and collect data on research infrastructure, laboratories, centres, research teams with noteworthy results, developed technologies and knowledge, offered commercial services and training, licenses, patents etc. For this purpose, the University of Novi Sad developed the questionnaires that were distributed to the leaders of the centres, laboratories, offices and teams dealing with knowledge transfer, research and innovation at five WBC universities involved in the WBCInno project (University of Kragujevac, University of Novi Sad, University of Zenica, University of Banja Luka and University of Montenegro). Based on the collected data, five Catalogues on the Research and Innovation Potential³ were developed and published for each university, presenting in well-structured and systematic way the available resources and infrastructure of these units [10, 11, 12, 13, 14].

The Catalogues include data collected in the first round of mapping (presented in tables 2 and 3), since the regular and continuous mapping was planned these data will be updated and extended by new entities. These will be presented through the new edition of the Catalogues (upon the decision of the universities), and more importantly through the online version of the Catalogues for each University⁴.

Table 2: Different units mapped at five WBC universities

Name of University	Centers	Laboratories	Research groups	Other ⁵	Total number of mapped entities
University of Kragujevac	13	7	6	-	26
University of Novi Sad	7	5	10	1	23
University of Zenica	-	13	-	9	22
University of Banja Luka	3	10	-	7	20
University of Montenegro	15	6	-	1	22

All entities dealing with knowledge transfer, research and innovation at those five WBC universities were grouped into different categories in accordance with the Field of Science and Technology Classification (FOS 2007). The structure of mapped entities in accordance with this classification per university is given below.



³ <http://www.wbc-inno.kg.ac.rs/article/results-20122013/mapping-of-universities-innovation-potential.html>

⁴ <http://www.bsokg.kg.ac.rs/index.php?lang=en&www.bsons.uns.ac.rs>
www.bsoze.unze.ba
www.bsobl.unibl.ba
www.bsoum.ac.me

⁵ Includes larger research units, such as institutes, departments, etc.

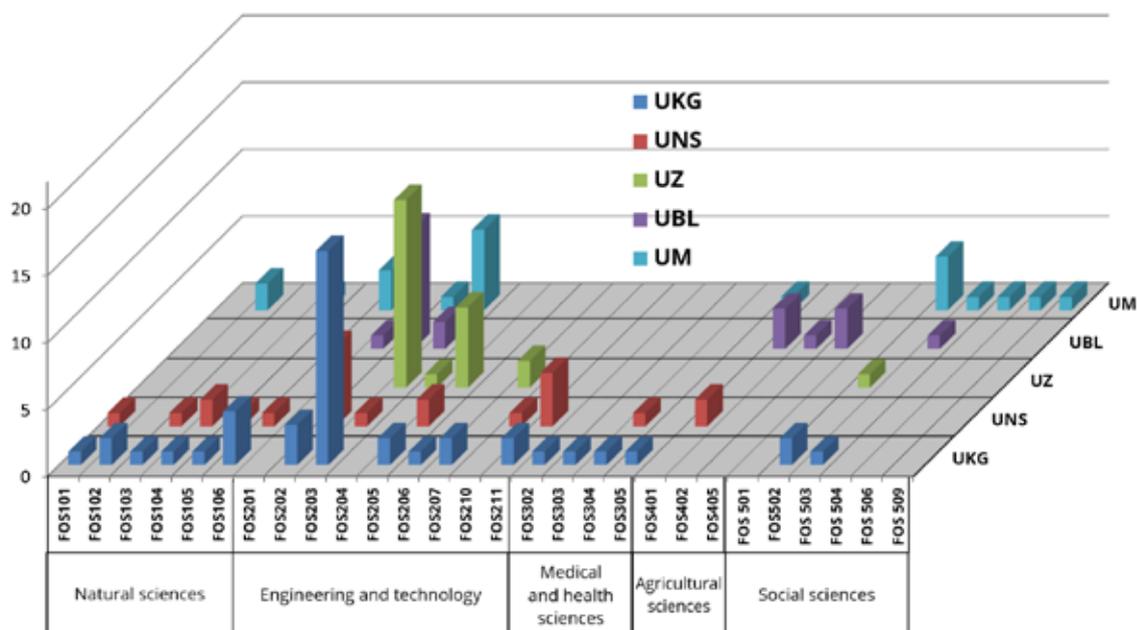


Figure 4: Graphical presentation of structure of mapped entities in accordance with FOS classification per university

Resulting out of the above review of preceding activities, priority research areas for each university can be proposed. However, it can only give a broad direction and need to be developed by the universities themselves to ensure relevance and ownership. It is in the interest of the WBCInno partners to define their major research fields on their own, after carefully reflecting and completing further mapping of faculties and their knowledge and technology transfer capabilities.

As becomes evident from the above tables, the structures of and within the research areas are quite diverse, as might be expected given the independence of the drivers behind research growth and development. Also, regarding the knowledge and technology transfer capability, there is a broad but limited infrastructure already in place which has the potential to be shaped and exploited by the research community. Therefore, it is reasonable to foster the existing structures, e.g. through extending their activities and portfolio of services towards the requirements coming from the universities, the professors, and industry.



Table 3: Structure of mapped entities in accordance with FOS classification per university

		University of Kragujevac	University of Novi Sad	University of Zenica	University of Banja Luka	University of Montenegro
Natural sciences						
FOS101	Mathematics	✓ 1	✓ 1			
FOS102	Computer and information sciences	✓ 2				✓ 2
FOS103	Physical sciences	✓ 1	✓ 1			
FOS104	Chemical sciences	✓ 1	✓ 2			✓ 1
FOS105	Earth and related environmental sciences	✓ 1	✓ 1			
FOS106	Biological sciences	✓ 4	✓ 1			✓ 3
FOS107	Other natural sciences					
Engineering and technology						
FOS201	Civil engineering				✓ 1	
FOS202	Electrical engineering, electronic engineering, information engineering	✓ 3	✓ 6		✓ 9	✓ 1
FOS203	Mechanical engineering	✓ 16	✓ 1	✓ 14	✓ 2	✓ 6
FOS204	Chemical engineering			✓ 1		
FOS205	Materials engineering	✓ 2	✓ 2	✓ 6		
FOS206	Medical engineering	✓ 1				
FOS207	Environmental engineering	✓ 2		✓ 2		
FOS208	Environmental biotechnology					
FOS209	Industrial biotechnology					
FOS210	Nano-technology		✓ 1			
FOS211	Other engineering and technologies	✓ 2	✓ 4			
Medical and health sciences						
FOS301	Basic medicine					
FOS302	Clinical medicine	✓ 1				
FOS303	Health sciences	✓ 1				
FOS304	Health biotechnology	✓ 1	✓ 1			
FOS305	Other medical sciences	✓ 1				✓ 1

Agricultural sciences

FOS401	Agriculture, forestry, and fisheries		✓ 2		✓ 3	
FOS402	Animal and dairy science				✓ 1	
FOS403	Veterinary science					
FOS404	Agricultural biotechnology					
FOS405	Other agricultural sciences				✓ 3	

Social sciences

FOS501	Psychology					
FOS502	Economics and business	✓ 2		✓ 1		✓ 4
FOS503	Educational sciences	✓ 1			✓ 1	✓ 1
FOS504	Sociology					✓ 1
FOS505	Law					
FOS506	Political Science					✓ 1
FOS507	Social and economic geography					
FOS508	Media and communications					
FOS509	Other social sciences					✓ 1

Humanities

FOS601	History and archaeology					
FOS602	Languages and literature					
FOS603	Philosophy, ethics and religion					
FOS604	Art					
FOS605	Other humanities					

3.3 Benchmarking of WBC university structures/services in the area of knowledge transfer, innovation and research

Within the WP2 of WBCInno project, a benchmarking study was performed in order to analyse the capabilities and potential of five WBC universities (University of Kragujevac, University of Novi Sad, University of Zenica, University of Banja Luka, University of Montenegro), as well as to generate ideas towards improvements regarding the knowledge and technology transfer. In order to do so, benchmarking metrics and questionnaire were developed by Hamburg University of Technology⁶. Furthermore, an in-depth interview was carried out during on-site benchmarking visits by EU partners of WBCInno (University of Brighton, Graz University of Technology, University of Alicante, Hamburg University of Technology and Center for Social Innovation). The aim of these visits was to explore further issues related to existing business models of cooperation, driving forces of KTT processes, coordination of internal and external activities, management of KTT processes, barriers and promoters.

Based on this benchmarking survey, different strengths, issues with the current provision, as well as ideas towards solutions have been identified. Even though some of the detailed recommendations included in the benchmarking reports [15, 16, 17, 18, 19] differ considerably between the universities, some general strands can be extracted. These general strands are presented here in order to support the development of the priorities and recommendations for achieving innovation and KTT excellence.

Strengths

- Highly motivated and competent staff
- Good and in scientific world accepted research (e.g. peer reviewed journal publications)
- Attempts towards integration, coming from very decentralized structures in the WBC
- Successful in European project implementation (e.g. Tempus, FP7, COST, etc.)
- Different knowledge and technology transfer mechanisms / KTT units (e.g. entrepreneurship and innovation centres, collaborative training centres, R&D centres, knowledge transfer centres, start-up areas, career development centres, international project offices, lifelong learning, EEN, etc.)
- Former strong relationships with industry, particularly large companies, experience with industry associated research and R&D cooperation
- Partly industrial fellowship, (doctoral) scholarship or internship programs which support the alignment between the university and the enterprises
- University visions and strategies are in line with the intention to enhance the knowledge and technology transfer capabilities and competences
- WBC universities already offer several networking and training measures to overcome some KTT hindering effects, e.g. info days, workshops, brokerage events, trainings for start-ups/spin-offs, consultancy in patent application, etc.

Issues with current provision

- The support mechanisms that are in place do not work in a coordinated or integrated way. This is inefficient and results in some necessary support not being available and risks potential overlap. Some apparent 'KTT units' are inactive. There are no formal procedures to establish coordination between these structures

⁶ <http://www.wbc-inno.kg.ac.rs/article/results-20122013/benchmarking-assessment-of-uni-structureservices.html>

- Remaining decentralized structures of universities with ongoing integration attempts cause shortcomings in centralized strategies
- The university members (e.g. faculties, institutes) are not familiar with the activities performed and services offered by the KTT units. This might also bear upon the fledging state of KTT development. Consequently, researchers tend to use the KTT units more for administrative help rather than for structural assistance
- There is a fear among professors/researchers of dedicating time towards developing KTT activities as it is high risk and takes away time from other important activities such as research, generating publications, applying for research funds, and teaching
- Faculties are not aware of the good practices that occur within other faculties (and perhaps also within their own) as there is no mandatory reporting for researchers and professors. Communication between the faculties themselves and between faculties and the university KTT structures often is relatively weak. In only a few cases are standard processes implemented. Information sharing, e.g. about ongoing projects, often happens through personal contacts, since it is voluntary
- The lack of communication also manifests itself in missing monitoring instruments. In only one university an evaluation system is established. Therefore, project-related data often is not available and the KTT or the university's rectorate is not aware of the ongoing research. Neither the success nor effectiveness of the KTT units is measured, and well defined targets are generally lacking. There are no quantitative measures of success and the culture does not expect this
- Different KTT service structures are established which are rarely coordinated on a superior level, causing redundant overlaps on the one side, and a lack of available relevant support on the other
- Good students tend to continue their studies abroad resulting in an ongoing brain-drain. Excellent researchers are therefore hard to find. Moreover, public bodies are perceived as highly desirable employers. Industry is considered as less attractive
- Faculties perceive each other as competitors; convincing them to cooperate in funded research projects is a challenge, especially since historically research did not target funded projects but publishing scientific papers
- IP protection is not generally regulated – in all cases, however, mainly the researchers and not the institutions apply for patents. This results in the situation that providing supporting services is not reasonable for the universities
- There is a lack of knowledge on how to deal with SMEs, the common company size in Serbia, Bosnia and Herzegovina as well as Montenegro. This is a hindering effect on good research and innovation cooperation. For example the research result's absorption level is lower on a national level than within international exchanges. Furthermore, SMEs perceive universities as closed systems, which cannot generate practical applicable outcomes.
- Company internships are based mostly on personnel contacts, the structures are not formalized. Often, internships are started through externally funded projects, which then are spread and extended to a broader amount of participating students.
- Strategically screening for potential cooperation partners is seldom. Mostly projects are created ad-hoc, driven by a number of enthusiastic individuals which makes them highly depending on personal networks.
- The staffing level of the implemented KTT units is relatively low (generally, less than three employees).
- There is a view that there is a conflict between academic and business worlds due to company's need to protect the IP and the academic need to publish. This is a symptom of limited knowledge relating to IP; there is a key need for IP expertise to be available to support academics when they are considering entering KTT partnerships. It was clear that the understanding of the scope of IP is limited amongst the academics.



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Ideas towards solutions

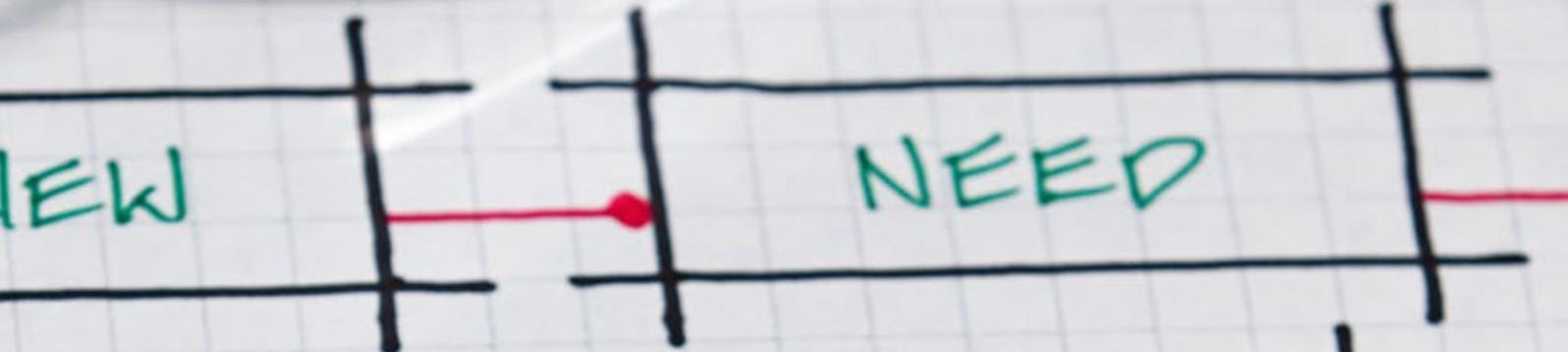
- Establishing an “enterprise culture” through the KTT active professors demonstrating the benefit of doing research with industry. This culture could be enhanced through a mentor-mentee network to assist those professors who are new to commercialisation and could encourage researchers to make use of the services offered by the KTT units.
- As soon as the right to protect IP is in the power of the universities, they should also provide university-wide support. This would include offering teaching basic knowledge about the topic of IPR, advice in specific cases, developing IP contracts and negotiating with partners. As long as IP protection is a professor’s privilege, it is not reasonable to implement supporting structures.
- Ensure that formal mechanisms for best-practice sharing are established within and between faculties. Those processes should include personal meetings and the opportunity of informal knowledge exchange between different stakeholders, for example four times a year having a professor’s round table. Also John Bessant’s idea of Innovation Labs (www.innovation-lab.org) can be helpful.
- Enabling information sharing through formal mechanisms about scientific and engineering research as well as KTT activities within and between faculties is a first step towards data availability. Those reporting mechanisms need to work horizontally and vertically and require minimal input from the researchers. A starting point would be a well-designed formalized data sheet whose completion is mandatory. A standard evaluation system could overcome the lack of information and the problem of resistance. In case all faculty members are obliged to inform about their projects, the competition could decrease. In addition, ‘eye catchers’ on the homepage can inform external partners.
- The KTT units’ role as a support structures needs to be communicated with the task to promote what they can do in order to support the researchers. Existing KTT customers (e.g. researchers and enterprises) might ease the access and increase credibility among potential new customers.
- Linked to the above, the role and objectives of each KTT unit need to be clearly defined in collaboration with those who are expected to benefit from them (e.g. researchers aiming to commercialise their results). This will ensure that they will not be seen as a ‘white elephants’ but will instead be seen as a valuable asset which has a clear role within the KTT activity of the university.
- Since some KTT units offer too comprehensive range of KTT services for the resource available, we suggest to define (1) KTT objectives, (2) customers (e.g. professors, students, entrepreneurs, etc.), (3) service prices (including free of charge ones) and deduce (4) relevant services out of the aggregation (might be only 3-5) makes a reasonable start for a strategic and structured effectiveness ensuring KTT. In order to establish the pricing system, vouchers can be distributed at the beginning, showing the services’ value and connecting the researchers to the KTT units. In addition, the direction from “imposing” service centers should be shifted towards fulfilling the researcher’s demand.

- Having a “Forum of Stakeholders” comprising experts from industry, government, universities, and non-government organizations (NGOs) can be a prime mover in ensuring the university’s quality of offer. It also shows the focus of the university towards its society. For example, it can be involved in curricula development.
- Enhancing internships in practice may result in two positive aspects: (1) the industry gets in touch with the university, and (2) the students may find a job in one of the companies. A duration of 6 months is adequate, enabling the students to work with and for the companies, thus creating an incentive for industry as well as the students and professors. Furthermore, formalizing the internship, e.g. with a standard agreement signed by all the parties (company, student, university) can reduce the risk of losing contact due to informality. An alternative to internships is promoting university-enterprise collaboration for Master’s theses.
- A direct incentive system (e.g. bonus on salary or less teaching obligation) for university members who enthusiastically and effectively work on KTT activities would foster the transfer activities. Excellent work should be promoted internally and externally. Moreover, the spin-out creation from researcher’s ideas is a route to publish scientific excellence.
- Increasing the staffing level to support the extension and the quality of services offered by the KTT units, as long as the services offered are relevant to the needs of those served (see above).

Summary

It is evident that there are still a number of gaps to close in order to achieve a good level of knowledge and technology transfer at five benchmarked WBC universities. Those improvement potentials can be seen especially in the visibility of the centralized transfer structures and establishing continuous relations with industry, not only within the faculties but also on a university level. There are already several attempts performed towards those ideas, such as the integration strategies, the education of highly qualified and motivated staff or the exchange with industry (through projects, internships or having practitioners as guest lecturers). Still, the investigation revealed several ideas which can help to overcome the described shortcomings. Those are, beyond others, structuring and formalization of KTT activities, monitoring and evaluation systems, and the formalised exchange with industry via student internships and the like.





STRATEGY
≡
PLANNING



4 Strategic Measures and Recommendations for Establishment of Regional University Platform

4.1 Introduction

Reform programs for Western Balkans region set the goal to increase the investments in R&D activities by 2020 up to 1.5% of GDP. In order to improve the impact of public R&D funding, future challenges related to transformation of research into innovation on the market must be considered. Strengthening and unlocking of region's innovation potential addresses EU related challenges and requirements defined in EU 2020.

During the development of this University Innovation Platform, objectives of Western Balkans Regional R&D Strategy for Innovation were taken into account, as well as findings and limitations identified within WBCInno project, described in previous chapter. Thus, for sustainable development and establishment of Regional University Innovation Platform, seven strategic measures are recommended:

1. Assessment and efficiency monitoring of KTT modes
2. Defining of priority research areas of university and capitalizing the knowledge and research potential
3. Commercialization of research results and their transformation to innovation
4. Efficient innovation management supported by a collaborative software platform
5. Development of co-operations between universities and enterprises
6. Encouraging students/researchers to establish start-ups and spin-offs
7. Strengthening university capacity to support the development of Business Incubators and Science and Technology Parks.

From WBC challenges...

- Traditional organization of WBC universities has created a fragmentation of resources, with the absence of agreed priorities and focus
- There is no strategic innovation platform to provide the capitalizing of knowledge and research potential, or its coordination and mobilization to facilitate the development of an innovative region
- Linkages with enterprises are sporadic and individual, since there is no university office or other mechanism which provides single-point of access to university services
- There is no efficient web-based collaboration tool to facilitate the promotion of existing university resources and new ideas of students, or for matching them with financial facilitators

To main WBCInno goal:

To develop the Regional University Innovation Platform ...

- ...supported by collaborative software tool for innovation management...
- ...with the intention of gathering new ideas from university staff and students...
- ...and boosting knowledge transfer and commercialization of R&D results.

4.2 Assessment and efficiency monitoring of KTT modes

Within the mapping and benchmarking analysis on WBCInno project, it was identified that at WBC universities there are KTT activities, but the main issue is the lack of monitoring system which is why there are some overlapping efforts at faculties and universities. Additionally, due to this lack of integrated monitoring system supported by information technologies, KTT services are not visible for potential users from academic and business world. If university management could monitor the effects of research, innovation and KTT activities, then institutional incentives and funding of those activities would also be promoted. This is why it is important, as one of the first steps in modernization of universities in this area, to establish the system for assessment and monitoring of KTT modes efficiency and activities of KTT units and university staff.

Within the WBCInno project, a set of metrics for assessment and efficiency monitoring were developed as Key Performance Indicators (KPIs) and they are presented in the tables below. Also, the processes of data collection, assessment and presentation have to be supported by integrated information system at university level.

Table 4: KPIs for investment in knowledge transfer, innovation and research

Metric	Description
Total research expenditures	The total research expenditures spend by the university
Staffing level	The number of employees working in the different university departments involved in KTT modes, divided into teaching, research, administrative and technical staff
Method of KTT data collection	Does university have research information system for data collection and statistics?
Investment in infrastructure	Annual investment in KTT infrastructure
Funds committed to IP management	Initial and maintenance costs for IP management
Number and value of joint ventures	Number of public-private partnerships in funding of research as joint ventures and investment value
Annual KTT units budget	Annual budget covering the costs of KTT units
Public funding for KTT staff	Annual budget from public funds provided to KTT staff
Self-financing of KTT units	Income from commercial services of KTT units to third parties

Table 5: KPIs for knowledge transfer through cooperation

Metric	Description
Number of R&D contracts	Number contracts where at least 1 firm funds the university to perform research (including contracts with public funding AND at least 1 firm)
Number of consultancy contracts	Number contracts where a firm funds the university to perform consultancy with the firm
Income from R&D contracts	The income that has been generated by the R&D contracts with the firms (including contracts with public funding AND at least 1 firm)
Income from consultancy	The income that is generated by the consultancy contracts with the firms
Duration of R&D contracts	The average duration of the contracts in R&D
Duration of consultancy	The average duration of the contracts in consultancy
Number of publications with firms	Number of scientific publications where at least one author has listed an affiliation with the university and a least one other author has listed an affiliation with at least one firm
Number of bachelor and master theses with firms	Number of bachelor and master theses with the involvement of 1 or more firms
Cooperation with companies	Number of companies that have some kind of cooperation with universities (regardless of the type of KTT activity)
Cooperation with business consultants	Number of business consultants in KTT activities
Cooperation between researchers and KTT units	Number of researchers who cooperate with KTT units

Table 6: KPIs for knowledge transfer through exploitation or commercialization of research results

Metric	Description
Number of trainings for researchers	Number of trainings for research commercialisation
Number of invention disclosures	Number of inventions or discoveries submitted to knowledge transfer offices staff or equivalent for assessment of commercial application
Number of patent applications	Number of patent applications submitted, divided into national and international level
Number of patents granted	Number of technically unique patents granted, divided into national and international level
Number of licensing agreements	Number of licenses, options and assignments agreed for all types of intellectual property
Total license income	Total revenue from all licenses, options and assignments that are generating income for the university
Number of researchers involved in commercialization	Number of researchers who received a support in invention commercialization from KTT unit

Table 7: KPIs for knowledge transfer through people

Metric	Description
Spin-off companies	Number of companies launched associated with the university
Income generated by spin-offs	Value of university revenue generated by the spin-off
Survival rate/viability of spin-offs	Ration of established spin-offs versus existing (operational) spin-offs
Growth rate of spin-offs	Number of international student exchanges
Student mobility	Number of licenses, options and assignments agreed for all types of intellectual property
Student projects with business	Number of student works in business environments
Academics mobility	Number of students and researchers spend time in industry with the purpose of PhD or Master thesis
Curricula development	Number of external (industrial) lecturers
Lifelong Learning	Number of training courses offered and delivered to company employees

These KPIs can be used for internal monitoring of efficiency of KTT modes and activities of KTT units. However, during the design of monitoring system for efficiency of KTT activities universities are advised to conduct the normalisation of indicators, i.e. recommended KPIs, so that they can be comparable with other HEI and PRO institutions at national, regional and international level. In that sense, there are several recommendations given below:

- Quantitative indicators should be presented in percentage or normalised, taking into account the size of university, number of researchers, time when certain services was developed, etc.
- Systems for efficiency monitoring should be adjusted to the monitoring requirements of the system that collects the data for relevant Ministries.
- The annual presentation of results should be enabled and all data that are not confidential should be published, in order to encourage and motivate the university staff to engage more in KTT activities as well as to improve the university's reputation among its business partners.
- Lower limit for response rate should be defined so that statistical results of the monitoring could be valid.
- In case that university is not integrated (such is the case with universities in Serbia), faculties and institutes as its parts should be obliged to collect data regularly and to follow the efficiency indicators for KTT activities at their institutions.
- In order to overcome the abovementioned KTT decentralisation problems at institutions that are part of university, it is necessary to develop an integrated system for assessment and monitoring of research, innovation and KTT activities at university.

4.3 Defining of priority research areas of university and capitalizing the knowledge and research potential

Universities in WBC Region were established mainly as umbrella organizations that are consisted of faculties and institutes as legal entities. This leads to great fragmentation of research areas and lack of focus, as well as to duplicating of research efforts and resources. During the last five years, based on new laws on higher education, in some countries in the Region (Croatia, Bosnia and Herzegovina, Montenegro, FYR Macedonia), the universities have become integrated. However, there is a long way to go before the joint university logistics and support for efficiency research development is developed.

Mapping of research and innovation potential of university

In order to identify the university resources that enable excellence in research and strong research groups whose results were recognized through SCI publication and international projects, it is necessary to conduct mapping of university's research and innovation potential.

Within the WBCInno project, the methodology for mapping and questionnaires were developed and applied at five Universities in the Region. The similar approach can be implemented on other WBC universities and within the implementation of this UIP strategic document.

The mapping results are used for further strategic decisions of the university management, such as defining of priority research areas, but also for promotion of university research potential and its linking with business sector. In that sense, it is recommended to publish the university catalogue on yearly basis, based on the WBCInno practice and catalogues developed within this project. Increasing number of universities in the world decide to present these kinds of results through web technologies in terms of online catalogues with advance search options (according to research areas, research results, etc.).

Identification of society and market needs in the area gravitating around university

As knowledge generators and research producers, universities should direct their activities towards the society and business sector needs, so that research results can be exploited in the proper way and give the expected impact through innovative products and services on the market. Cooperation between university and enterprises can be sustainable and long-lasting only if its offer can satisfy enterprises' needs and if it is timely and high quality, and leads to improvement of competitiveness. Market needs and business sector survey needs to be systematic and conducted at least once a year. The best way is to make it regular activities in some of the university units that will develop the methodology and accompanying questionnaires.

The engaged unit should clearly define the survey objectives, target group of respondents and minimum response rate, so that assessed results could be used in further analysis. Besides the identification of enterprises and market needs, if done once year or more, the results of these surveys can also be used to monitor changes and effects of this kind of cooperation, especially if assessed data are obtained from the enterprises. Also, their improvement of competitiveness and innovativeness can be monitored. In this way, new and fresh ideas can be obtained for applicative research and new research paths will open. And since they are directed towards the enterprises and market needs, their commercialization will be facilitated as well.



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Towards the European, regional and national policies

Prior to definition of priority research areas, universities should, besides previously mentioned activities, rely on goals, recommendations and trends defined in strategic policy documents (European, regional and national). As stated in the chapter 2, one of the important policy documents is Commission Recommendation [1], especially R4 relevant for broadening the dissemination of knowledge created with public funds through open access to research results.

Also, in new EU research framework Horizon 2020, three research priorities were defined: i) Excellent Science, ii) Industrial Leadership, and iii) Social Challenges. If university tends to finance the part of its research through EU funds, it is necessary to follow the topics relevant for this main ERA framework program in defining of university's priorities.

Smart specialisation as new European innovation concept was designed to boost regional innovation in order to achieve economic growth and prosperity [20]. Having in mind that every university relies on regional specificities and regional industry needs, the concept of smart specialization should be considered and research areas should be chosen through consultations with regional partners from business sector in order to avoid duplicating with other universities in WBC region.

Last year, two major strategies were developed on regional level, SEE 2020 Strategy [4] and Western Balkans Regional R&D Strategy for Innovation [6] and one of intermediate goals is "to improve research base and conditions for research excellence". Almost all countries in the WBC region have strategies for research and development, in which the national priorities are defined, so it is recommended that these policy documents are taken into consideration as well.

Priority research areas of university

Definition of priority research areas at university is demanding process and it is not the result of mere data collection and reading the policy documents, but it is based on the consensus of academic research community. If the policy makers at university level are to make objective decisions and define priority research areas for further development of the university, it is necessary to quantify in a way certain references categories for the research area that is recommended as a priority. These can be:

- Research excellence validated in accordance with following categories: number of researchers with track-records and high competence coefficient, number of research groups, total value of available research equipment for that research area, number of international projects, etc.
- Exploitation potential expressed through partnerships with enterprises, number of patents/licenses, potential end-users or investors,
- Conformity with existing policies, relevant for smart specialization concept
- Long-term investment in certain research field.

Once the short list of suggestions for priority areas is created, it is necessary to engage stakeholders at university and member faculties, and to conduct the public debate and thematic round tables so that the process is transparent and to take into account the opinion of wider research community. This process should also include the representatives of business sector, foresight experts, investors, ministry representatives and broader support for implementation of University Innovation Platform should be provided.

Capitalization of the university's knowledge and research potential

The main problem for university potential capitalization is the lack of information on what is really available at university and its faculties and institutes. Once this is identified through mapping and made visible through integrated information system and online catalogue, and this information becomes available to researchers, an excellent base for the concept of capitalization of university's research potential can be created.

Research teams working in similar or complementary research areas, should cooperate, exchange information and make joint efforts to achieve better research results. Additionally, they will not invest in duplicated equipment and resources, but they will enable the shared use of available resources. In cooperation with enterprises, they can also work jointly on projects.

This joint work among research groups cannot be placed on individuals, but significantly better results and effects would be achieved through institutional coordination at university level, e.g. by Vice-Rector for Science, etc.

We are witnesses of rapid development of multidisciplinary and converging technologies, so the above-mentioned need for cooperation among teams and their networking increases. Experts and researchers from different areas (technics, medicine, ICR technologies) can mobilise and engage in large interdisciplinary projects, funded either through public (national, EU) or private funds.

4.4 Commercialization of research results and their transformation to innovation

Most universities are increasingly expected to partake in technology transfer and commercialization, in addition improving the quality and volume of teaching and research. This leads to new challenges for universities:

- to accommodate potentially conflicting requirements of increased breadth, volume and quality of output, addressing the extent of commercialization required
- to visualize the contribution to economic development of university based research, and
- to manage the relationship between commercialization and other core activities

This is not a challenge that is unique to the WBC universities and EU partners have been addressing these demands for some time, with varying success. The challenges have also been investigated more formally in a number of studies.

Approaches to commercialisation of research results

Generally speaking, the approaches to commercialisation and their potential benefits for the different stakeholders have significantly improved in Europe over the last two decades. In Western Balkan countries, some first efforts have been made to increase the commercialisation of research from PROs and thus facilitate the process of technology transfer from research to application. It is noted that some universities in the WBC have had considerable success and are well advanced in some niche areas, however, the collaboration between PROs, including universities, and industry tends to happen on an ad hoc basis, driven by well-motivated professors, occasional opportunities and short-term objectives. Robust industry-science interactions are essentially missing.

There are 4 main approaches to the valorisation of research results which can be broadly grouped as follows:

- Open science model: valorisation is primarily effected through education and the publication of research results.
- Technology transfer model (management and use of IPR): PROs can retain IP and exploit it through licensing, which may be exclusive.
- Open innovation model or exchange of knowledge: this recent development is a consequence of the industrial revolution referred to as the knowledge economy.
- Creation of new activities (spin-offs): based on the results produced by universities and other PROs.

As discussed in the preceding sections, there is a range of acceptance, readiness for and development of KTT activities at mapped universities in Western Balkan countries within WBCInno project. Effective KTT requires a flexible and customised approach when setting up supporting initiatives – such as the Regional University Innovation Platform.

Monitoring of commercialization of research

The development of indicators to monitor the commercialization of research in WB region is a complex task and a 'one size fits all' model is unlikely to be effective at an activity level, but may well be appropriate at a university level to enable comparisons across the region. This is why the set of KPIs for exploitation and commercialization of research results (table 4) are recommended in this publication.

Currently, with the exception of some simple measures such as the number of patents, licenses and spin-off companies, few indicators are available to assess the effectiveness and success of different institutions in commercializing their research results and even these are not readily and publicly available.

The use of indicators to monitor commercialisation activities and particularly to promote publicly funded research and its outcomes is important for many stakeholders; for example, policy makers need information about the effect of public investments, support actors and their programs need decision making tools and PROs need information in order to adjust their priorities and plans [21].

Raising the awareness of and supporting commercialisation

In the Western Balkans, the awareness of the commercialisation potential of scientific achievements needs to be raised in the scientific community and a closer cooperation between PROs and industry is required to facilitate this. As researchers are not always familiar with the range of commercialization aspects such as IPR, standardization, models of technology transfer, business plan writing, viability assessment and marketing, support mechanisms are important to guide them on their way to bringing inventions successfully to market. However it is important to note that such mechanisms need to be focused on the needs of the professors and universities and not driven by third parties who do not know the detail of the culture and environment of the WBC region.

In May 2013, WBC-INCO.NET [22] jointly with SEE-ERA.NET PLUS [23] organised a workshop entitled *“How to commercialise research results in the Western Balkans”* in Novi Sad, Serbia. During the workshop participants exchanged knowledge and experience in the commercialisation of research results and concluded a number of important issues and outcomes. These are supported by the findings of the benchmarking visits to the WBC universities that were undertaken as part of the WBCInno project [15, 16, 17, 18, 19] and can be summarised as follows:

- IPR is a very important issue for the researchers; but it is also challenging for them to address this themselves since typically researchers are not experts in this area and need professional support and advice; the national IPR offices can be approached; some universities also provide guidance and assistance when it comes to the commercialisation of the research results. The chapter 3 “Intellectual Property Rights” of WBCInno publication “Methodology for Innovation Management” [24], gives a preview of all IP types along with application procedures for different kind of IP protection in all three partners countries of Western Balkan region.
- There is a need for a change in the people’s mind-set (for researchers, students, but also researcher’s clients) to be more open to innovation issues and to the valorisation of research results enabling the bringing of products/services to the market.
- There is currently a change of values in the scientific world: the old “currency” (scientific publications and citations in journals) is being replaced, or perhaps supplemented by the new “currency” such as patents, licenses and innovations. However, clear measurement and documentation is limited and mechanisms need to be put in place to routinely collect, analyse, record and disseminate such KPIs.
- Support structures for the valorisation of research results exist but they are perceived to be insufficient or in some cases are poorly matched to the needs of the researchers. Helpful institutions supporting the utilisation of practical results are e.g. the Agricultural Advisory Services in Croatia, commercialisation efforts are supported by the IPR offices, and on international level by the Enterprise Europe Network. Such mechanisms should be developed much more with existing national and local structures developing activities directed to PROs and the researchers, taking into account their needs and moving to a position of active support and facilitation of commercialization activities.
- Markets are generally relatively small and regionally focused in the WBC due to the regional situation and the size of the countries. This lends itself to the possibility of regional support structures where it is not efficient for such facilities to be provided on a university by university basis, particularly in those cases where commercialization activity is in its infancy. Some such facilities are already established,

but the development of further regional support could be beneficial, such as Regional Technology Transfer Office.

- Cross country learning and intensive exchange about current practice of utilisation and commercialisation of research results should be supported to enable sharing of best practice. This needs to occur both between universities and between universities and commercial partners, in order to close the gap between the scientific and the industrial world.
- While it is important for the researchers to learn from other researchers, both in the Western Balkans and other countries, it is also important to note that they will need to find their own technology and partnership specific way, but always facilitated and supported by appropriate supporting structures.

Summary

Commercialisation of research is desirable from a number of perspectives. Not only is it necessary from a university mission perspective but it also offers a route to support the economic growth of the region, and for the researchers and universities to be part of this. It is reward in itself for a researcher to see their ideas and work becoming the basis or part of a commercial success, but with appropriate structures and governance this can also yield monetary reward for researchers and institutions which is attractive to some.

Generally speaking, researchers do not naturally have a commercial focus, nor do they see business acumen as a prime requirement for the career they have chosen. Their prime interest and capability is that of idea generation, development and proof and what might be seen as the burden of the commercialization process is not attractive to them and indeed is often an obstacle to considering ways in which their work might be commercialised.

That said, it is recognized that in a number of cases highly motivated professors have driven the path to successful commercialisation of their research and have been appreciative of having had the scope to be able to do this without system level 'interference'. However, if commercialisation is not to remain the preserve of the few but is to be expected as part of normal academic life, then universities and the region need to put in place support mechanisms that are fit for purpose and meet the express needs of those who are expected to benefit from them.

It is clear from the evidence available in the five WBC universities that are part of the WBCInno consortium that it is possible to successfully commercialise the work of researchers, but to enable this to grow faster than might be expected through natural organic means it is necessary to ensure that researchers are supported appropriately and that expectations of delivery against agreed KPIs are clearly understood by all parties.



INNOVATION

4.5 Efficient innovation management supported by a collaborative software platform

Current state and challenges

Having in mind that the best ideas in innovation of products/processes/services are based on knowledge and research conducted at universities, for universities themselves it is very important to carry out generation and collection of ideas, their scoring and support to the best ones in a systematic way. The whole process of innovation management is followed with certain challenges:

- The more people is included in this process, the harder it is to monitor and evaluate quality of ideas and projects generated and developed, and to keep precise track of everybody's involvement and impact value.
- Students and young researchers have no possibility (tool/place/means) to present their ideas and suggestions from specific areas (start-up business, new research, improvement of existing education and research practices and systems, ideas for new international projects, and similar).
- Potential investors have no informations on possible new projects which they would invest in (venture capital).
- There is no efficient collaboration tool that would facilitate active sharing of opinions and ideas of students and researches across universities, and forming of interest groups for specific fields, that would significantly shorten time needed for meetings and email/phone communications.
- Innovation initiatives and their market success are very low.

In order to successfully deal with these challenges, universities can develop and apply contemporary collaborative platform for efficient innovation management. Besides, its main function will be to empower innovative and entrepreneurial spirit and way of thinking of students and young researchers, as well as efficient collaboration of all platform members.

The platform development should be based on the methodology that will define centralized and efficient innovation process from insights documenting, idea generation and management, through new product/service development, all until market success. Moreover, this methodology should involve different cross-functional stakeholders and team members, from areas of education, research and business.

Benefits for actors in innovation cycle

- Forming of innovation culture within scientific community and boosting entrepreneurial spirit of students and young researchers.
- Improved collaboration of university staff and students with industry.
- Select, evaluate and implement great ideas, and reject poor ones, in an effective way.
- Students and young researchers can promote their ideas and get noticed, ultimately resulting in new business ventures.
- Students will connect cross-university and across geographies, seamlessly collaborating on each other's ideas, projects and initiatives.
- Researchers will have the opportunity to focus on research areas demanded by the market.
- Investors will find new investment opportunities in a pool of fresh ideas, precisely evaluating prospects against market-oriented criteria.
- Investors will be able to invest only in right projects and abandon poor projects early in the process.
- BIs/STPs management can find innovative new businesses to support, thus creating new jobs.

Innovation management techniques

No single innovation management technique is appropriate for every case or every part of a single project. Each part of the innovation cycle will have different options to select from and it will be necessary to decide which is optimal for the circumstances. That said, there are a number of innovation management techniques which can be treated as generic models within the WBCInno project, though it is noted that a number of these need further refinement:

- Brainstorming: facilitating people to exchange thoughts anywhere anytime and being able to produce a maximum number of ideas in a minimum amount of time, applying the standard rules of the Brainstorming protocol.
- Idea management: structured way of filtering ideas utilizing agreed (and potentially weighted) assessment criteria to select those to pursue further
- SWOT matrix: understand different aspects of an idea and develop a decision on way forward
- Stage-Gate® New Product/Service Development: structured way of managing development and execution of a new idea, phase by phase, with clear accountability of activities, people and decisions as well as clear criteria based go/no-go decision points throughout the process ensuring that projects only continue where the likelihood of success is at an acceptable level.
- Knowledge Management: capitalization, organisation and dissemination of participants' knowledge, training, introduction and use of networks internal and external to the organization but within a secure (confidential) environment with clear IP protocols and agreements.

WBCInno collaborative software platform for innovation management

It has already been defined within the WBCInno project that one of the priorities for the WBC region is to develop a collaborative software platform as an efficient online tool for innovation management and this should clearly facilitate and support the proposals within this UIP document. Detailed description of methodology which served as the base for the development of WBCInno collaborative software based on Stage-Gate technology is given in WBCInno publication "Methodology for Innovation Management" [24].

The Methodology defines that the platform supports the whole innovation cycle, from idea management, through project monitoring all the way to the product/service launch to market with two applications located on the single platform: Idea Station and Launch Station.

The Idea Station is a DataStation application specially structured to collect ideas and provide their smooth flow through several phases which lead to creation of new projects, products and services. Its features allow processing of the great number of ideas, evaluation and selection of the most promising ones with realistic opportunities for commercialization.

The Launch Station is a tool that facilitates the development of new products and/or services allowing its users to keep track of the innovation project portfolio, from concept to the launch on the market. It involves all relevant stakeholders in the process, such as decision makers, project leaders and managers, team members, etc. whose work is efficiently streamlined using the Launch Station.

As presented in the Figure 5, Idea Management workflow consists of five different phases to govern ideas and lead them to projects on Launch Station:

- Idea Submission and Collaboration on ideas
- Review of ideas
- Scoring of ideas
- Approval and Prioritization of ideas
- Building Projects from Approved Ideas



Figure 5: Idea management workflow and roles

Five platforms will be established at five universities involved in WBCInno project, in the following domains:

- University of Kragujevac <https://ukginno.datastation.com>
- University of Novi Sad <https://unsinno.datastation.com>
- University of Zenica <https://uzinno.datastation.com>
- University of Banja Luka <https://ublinno.datastation.com>
- University of Montenegro <https://uminno.datastation.com>



4.6 Development of co-operations between universities and enterprises

Collaboration between universities and enterprises has been widely recognized and is the premise for knowledge and technology transfer of any form.

In Europe this trend has been stressed by policy makers, and addressed in numerous publications, policy papers and actions undertaken by governments. Enforcing the cooperation among universities and the business sector is also a key aspect of the Bologna process and has been stressed in the Ministerial Meeting in London in May 2007, where ensuring stronger relevance of universities' activities in context of their economic environment moved high on the political agenda.

The urge for universities to take up their role in the knowledge society by providing excellence in research and teaching, and to enhance knowledge generation as well as transfer, is a topical issue of European political agendas since more than a decade ago, and is a central subject of the Bologna and Lisbon Processes. To reinforce the knowledge triangle of Education-Research-Innovation, COM (2007)182 [25] recommends universities to *"create conditions for successful technology transfer through adequate staffing of knowledge transfer offices, promoting entrepreneurial mind set, promoting interactions between academia and SMEs (...)."*

Universities worldwide have taken up this challenge by implementing instruments and structures to promote research, knowledge transfer and cooperation with the business sector.

Current situation in WBC

With the aim of facilitating cooperation with enterprises and knowledge transfer, such activities and structures for university-enterprise cooperation have been implemented in recent years in the Western Balkan countries too.

As highlighted in other sections of this document (for example section 3.2), different support services and structures exist within the WBC universities, and as separate entities (such as BIs) funded by governments or international organisations. Despite significant progress in the recent years, there is considerable potential for improvement which would ultimately foster university-enterprise cooperation and hence, knowledge transfer. Within WBCVMnet project financed within the Tempus programme, new WBC Regional Model of University-Enterprise Cooperation was developed and implemented with seven strategic measures and mechanisms [26].

The business sector in WBC is composed mainly of SMEs and traditional industries. Despite the severe impacts of the financial crises on the WBC economies, a recent Worldbank report [27] notes that positive economic trends have emerged in the region. Most countries are making progress in improving their business environment, as evidenced by the latest 'Doing Business' report [28]. At the same time, the EU and WorldBank are promoting enterprise development in the region, and some new economic sectors are gaining strengths not least due to foreign investment⁷.

The WB countries are relatively small, and there is significant potential for regional cooperation. In this context, and potentially supported by the Regional UIP, universities may seize opportunities to create

⁷ <http://www.worldbank.org/content/dam/Worldbank/document/eca/WBRIS%20Overview%2010-21-13%20web.pdf>;
<http://www.wbif.eu/Private+Sector+Development>

alliances with the developing business sector, as well as with other universities and BIs in the region. Knowledge intensive industries are urgently needed to combat unemployment and foster sustainable growth. Universities can play a major role in this phase if the issue is addressed properly in a strategic manner.

Taking stock

Currently, assessing the activities of university-enterprise cooperation is made particularly challenging by the lack of reporting and monitoring mechanisms, leading to a lack of reliable data available at university level. Thus one important step forward, which is also highlighted in previous sections of this report, is the development of proper monitoring system (in line with the recommendations from WBCInno benchmarking reports presented briefly in section 3.3).

Raising awareness and creating a collaboration culture

It became evident during the Benchmarking studies carried out in the WBC partner universities that for the most part, universities do not consider their surrounding enterprises as interesting partners and vice versa. This lack of awareness about the benefits of collaboration and the evident lack of cooperation culture can only be overcome through a strategic effort addressing a number of issues at their very root.

- Firstly, a number of useful Measures and incentives used to motivate researchers for an extended involvement in R&D collaboration/contract research projects with enterprises is described in section 3.1 of this publication.
- Secondly it is important that universities take a more active approach with enterprises. It could be helpful to intensify collaboration with local multipliers such as industry associations and chambers of commerce which can help spread information to more SMEs. Joint events could be organized among researchers and enterprises, such as round-tables and brokerage events. Success stories should be promoted through the media as far as possible. More ideas for awareness raising similar activities can be found in WBCInno good practice report “Knowledge And Technology Transfer Between Science And Businesses: Academic KTT Offices’ Experience And Good Practice” [7].

Formalizing and promoting existing activities and processes without adding administrative burden

The benchmarking exercise showed that a variety of collaborative activities with enterprises are undertaken, however, in general they are not governed by well-established procedures and are often based on the initiative of individual researchers, faculties and departments. As highlighted in WBCInno report on EU good practice [7], general characteristics of successful partnerships between universities and the business sector are based mainly on the following:

- clear university policy based on proper legislation
- incentives systems (so that researchers get incentives and recognition for activities conducted with enterprises),
- well established collaboration procedures (at the university level),
- well established contacts in sizeable organisations who are interested in KTT,
- bi-directional exchange of knowledge and ideas.

Promoting the most promising and suitable ways of university-enterprise cooperation and knowledge transfer

According to experience and confirmed through the WBCInno benchmarking report [15, 16, 17, 18, 19], the most efficient ways for knowledge transfer are joint R&D projects, and to a lesser extent commercialisation of research results through licensing. Joint projects with enterprises are a particularly promising mechanism for collaboration in WBC, where high-tech companies and KT favourable framework conditions (IP

regulations, access to start capital etc.) are only just developing. WBC universities could learn here from several good practice examples identified in the EU. The University of Alicante (UA) for example operates in a comparable environment. Cooperation with enterprises was boosted considerably through a proactive approach of conducting technology audits in local enterprises. Hence, UA's TTO regularly meets with research groups at UA to be aware on their research focus, and visits local enterprises (of any sectors) to find out and propose where improvements could be made in processes and products through joint projects. Through the numerous projects, contacts and cooperation created from this activity, the university has been able to intensify also other ways of KT including spin-off creation and IP commercialisation.

Business Service Offices at WBC universities

The Business Support Offices (BSO) are established at five WBC universities within the WBCInno project, with the aim to make research and innovation potential available to business environment. They offer single-point-of-access to university resources, equipment, trainings, research findings, patents and licensing for business partners, while ensuring a close link with the academic departments of their university. Their activities are:

- collating the data about research and innovation potential of university
- promoting the university research and services using and updating the Catalogue on research and innovation potential of university
- establishing and maintenance a resource database as HTML catalogue, with on-line browsing and preparing specific reports (at administrator and visitor level)
- providing a single-point of access to university resources, equipment, trainings, research findings, patents and licensing offered to business world
- establishing private-public partnerships and promotion of modernized services of university
- developing partnerships with enterprises connecting researchers and students with business partners
- supporting liaisons with business incubators and science and technological parks
- encouraging students to creative thinking and articulating ideas;
- maintenance of innovation management web-platform
- joint market participation with other KTT university units
- participation in improvement of the university regulatory documents and procedures,

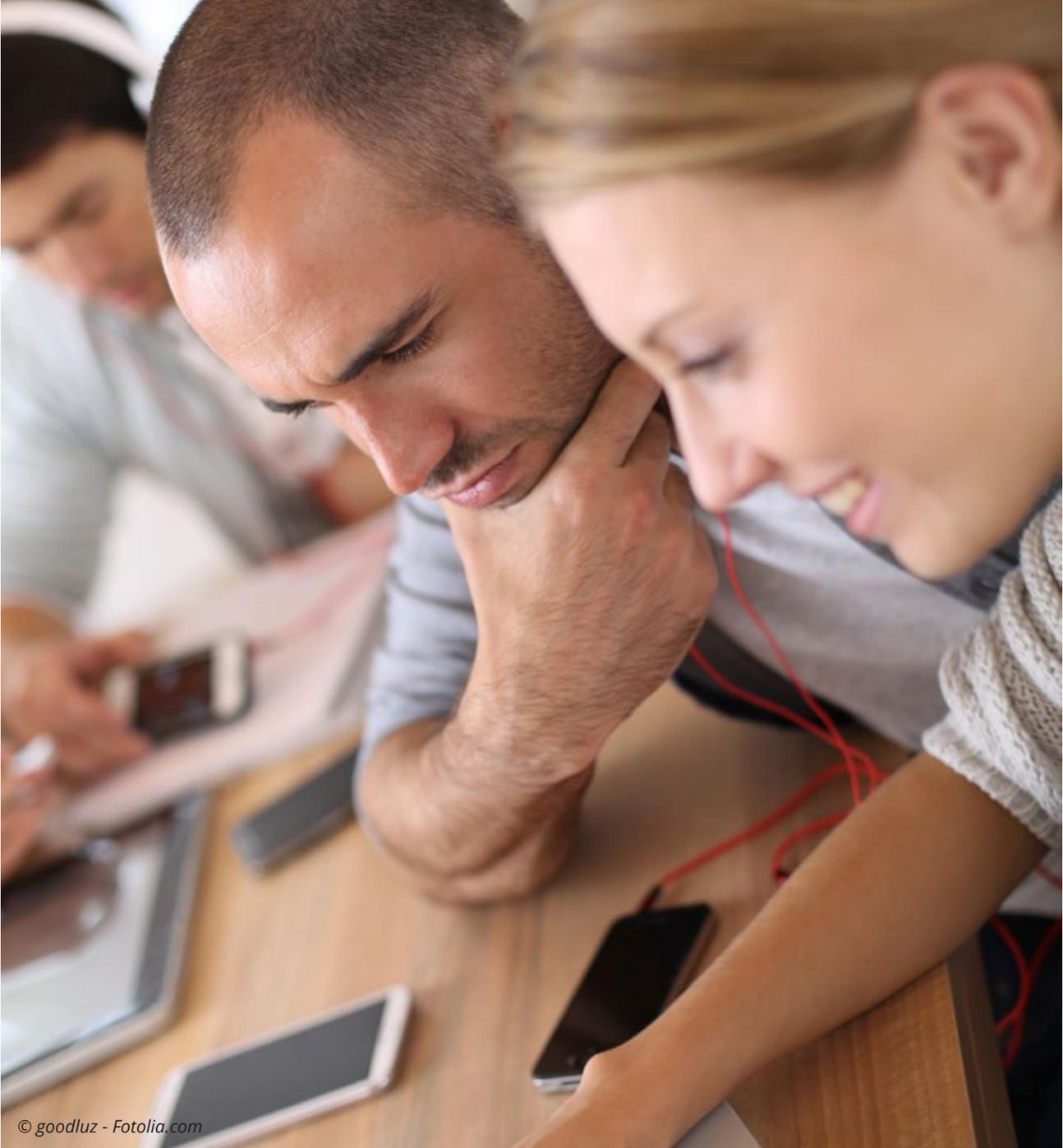
Cooperation in all aspects

The potential of sharing information, experiences and resources (research and KTT units staff, facilities, etc.) should not be underestimated. Even more so in the context of the WBC where countries and institutions are relatively small and significant efficiency can be gained through collaboration. Faculties and universities ought not to compete, but should share and cooperate for the benefit of society at large. Ideas for embedding cooperation could be gained from networks of TTOs that exist in many countries, and even shared local /regional TTOs that exist in other small countries.

Key players in cooperation

Definitely, the universities are those who should design, initiate and maintain this cooperation. Since they have knowledge and new technologies, high-tech research, they need to initiate the cooperation with business world. The mission of every university is, or should be, to actively participate in the development of economy and knowledge-based society.

As important element of university system, students can and should be involved in establishing cooperation with enterprises. Firstly, through practical placement they can promote their faculties, new gained knowledge, realized applicative research, etc. They can bring new ideas to host enterprises as well as suggestions how to apply new technologies in their processes. Besides, within their seminar papers and bachelor and master thesis, they can do a research on a concrete problem in industry.



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It is not sufficient that only university staff and students work on establishing the cooperation, it is also necessary that enterprises take an active part in the process, as well as their associations, clusters and support organizations (Regional Development Agencies, Chambers of Commerce, Science Technology Parks, Business incubators etc.).

The role of the state, government and its agencies is of essential importance, as an element of so-called Triple helix framework. By developing strategies, policies, incentives and programmes, they should encourage and enable efficient and fruitful cooperation and maximum impact on economy and society in general.

To conclude, it is important to overcome the most urgent barriers for University- enterprise cooperation in WBC, such as promoting the attractiveness of scientific and technological research for local enterprises, a lack of experience in reaching out to enterprises, and a lack of a strategic and coordinated approach across the universities. The WBCInno Project addresses these issues through different activities, involving training of university staff, stocktaking, sharing of information, and creating a common collaboration platform. It is planned that by the end of the WBCInno project we will have become a significant step closer to bridging the gap between enterprises and industry.

4.7 Encouraging students/researchers to establish start-ups and spin-offs

Why universities should promote spin-off creation

Over the past decade, universities have become under pressure to take up their 'third mission' and engage closer with their societies, reinforcing their contribution to economic development. It has become a university's social responsibility to promote entrepreneurship among students and staff, especially in the light of high unemployment faced in many countries.

While creating start-offs may not be an easy task for universities, experience shows that this activity entails a great number of benefits when pursued in a strategic way. Engaging in spin-off creation helps close the gap between the university and business sectors and brings the university closer to the 'business reality'. This in turn opens up a wide range of new possibilities for collaboration with other actors, while at the same time contributing to the improvement of the teaching and research offered at the higher education institution (HEI). Businesses based on university research are knowledge and technology oriented, bearing significant potential to diversify the economic sectors in any given country.

Benefits for universities engaging in spin-off creation

- Image / standing: it contributes positively to the corporate image of the university, and thus increases the potential to attract highly qualified staff and students, funding, contacts with enterprises, etc.
- Networks: the activity opens the doors to work closer with financial institutions, Business Angels and other sources of early stage funding. It will also lead to closer collaboration and enhanced access to facilities for business incubation at several stages, including STPs, business and governmental organisations working in the field. Moreover, opportunities for cooperation with other enterprises are likely to arise.
- Enhanced qualifications of staff and students: ample experience is acquired along the process of creating spin-offs, resulting in benefits for other regular activities such as teaching.
- Motivation for researchers: certainly one of the most satisfying accomplishments for a researcher is to see their work implemented in a commercial environment.

Potential monetary and socio-economic benefits

- For the researchers: participating in benefits of the company, and/or the royalties of any IP exploited therein
- For the University: social capital; royalties, participation in company income or other technology transfer related income (e.g. IP licensing)
- For society at large: economic development, job creation, shaping the business environment, availability of funding for new enterprises, new R&D activities;

For the potential benefits to be realised, a strategic university-wide approach is imperative. A clear university policy and strategy is required, addressing among others: IPR ownership and exploitation policies, compatibility of researchers engagement in enterprises, creating incentives, establishing support structures, creating strategic alliances and guarantee access to crucial facilities (incubation, funding, etc.), defining the engagement policy with enterprises.

Universities and Incubation Facilities in WBC region

From the benchmarking study conducted in the framework of the project it became clear that spin-off creation in WBC is currently not sufficiently regulated or monitored at university levels. Some universities do have spin-off/start-up support facilities in place, such as the BIs and a few STPs in preparation phase. Nevertheless, as with a number of other initiatives, these are not sufficiently regulated, supported and addressed through university-wide policies (see also WBCInno Strategic Development Plan for Business Incubators and Science and Technology Parks in the Western Balkan Region [29]).

Furthermore, there are a number of Business Incubation facilities in the WBC funded by local governments and international organisations, which to date are not well connected with the WBC universities. Universities are advised to seek collaboration with other BI facilities, to exploit synergies and ensure efficient use of existing resources (in terms of facilities, qualified staff, networks, etc.) and for the benefit of all involved actors.

Entrepreneurship and doing business in WBCs

In WBC, studies such as the Global University Entrepreneurial Spirit Students' Survey [30]⁸ suggest that the proportion of students who would consider starting a business is quite high (approximately 40%, a few years after graduation, in particular in less developed countries), but that the actual rate of company founders is less than 5%. This shows clearly that there is a need to promote student entrepreneurship within universities, through targeted courses, showcasing success stories, role models, etc. Therefore, the universities would be well advised to utilise lecturers from industry to support these areas or engage staff with experience in the world of business.

As mentioned earlier in this document, most countries are making progress in improving their business environment and access to funding and facilities. This indicates that there is momentum for universities to start pursuing spin-off creation more strategically.

Clear university policies, strategy and mission

This section aims to highlight the main issues that need to be addressed by WBC universities to regulate and promote entrepreneurship and actively participate in the creation of spin-offs. Some of the recommended baseline factors are:

- Mission statement regarding the promotion of entrepreneurship and spin-off creation
- Engagement policy with external enterprises and other actors such as BIs or STPs
- Policy for spin-off creation, normalizing the relation between the university and the spin-off (such as the universities participation in potential benefits, liability etc.), and all involved actors.
- Staff promotion/ remuneration policy taking into account entrepreneurial activities;
- IPR Policy: regulating ownership of IP, participation in potential benefits, who bears the costs for IP protection, establishing IP disclosure and support mechanisms
- Regulation of the responsibilities of the diverse interface structures that already exist such as TTOs, BIs, STPs etc.

Entrepreneurship culture in students

In addition to ongoing liaison with the regional BIs, motivation for students' entrepreneurship can be enhanced through a number of actions, such as:

- Awareness: "Entrepreneurship Ideas" competitions targeted at students and researchers; "Entrepreneurs-To-Be" days

- Training workshops and courses: entrepreneurship courses (start-up of a company; business planning), with external lectures from industry, or HEI staff with experience;
- Financial and infrastructure support (BI space) for competitive student teams
- Industrial diploma and master theses (students often receive additional remuneration);
- other formats for company interaction with students.

Incentive systems for university staff

- KTT activities, including engagement in spin-offs, should form part of the criteria used for remuneration and promotion decisions.
- Incentives for research/teaching staff can entail, for example, partial relief from teaching and other tasks or additional remuneration.
- HEIs may think about the possibility of granting sabbatical leave to staff who want to dedicate 100% of their time to the spin-off. Possibly this shall be based on national HEI laws. In Spain for example a law introduced recently allows HEIs to grant leave of absence for a maximum of 5 years to staff engaged in spin-offs. In this case, while on leave, the position is guaranteed and seniority is maintained.

Access to support mechanisms

The following support mechanisms should be available to HEI entrepreneurs, however it is important to exploit synergies with existing BIs and university structures already offering such services.

- Initial guidance through qualified staff with experience in the different areas: IP protection, evaluation, commercialisation, business plan creation, networking, finance, seed funding, etc.
- Incubation facilities for start-ups to be able to network with experts/advisors and receive basic guidance from qualified staff in business issues.
- Access to funding. HEIs can help entrepreneurs explore different funding sources available at national and international levels (including EU funding programmes), investment forums, contacts to the financial sector, business angels, risk capital funds, etc.

WBC universities are advised to take a strategic approach to spin-off creation, to promote the entrepreneurship culture (showcasing success stories), and to establish adequate incentive systems. Special attention should be paid to the existing support mechanisms within and outside the universities, to avoid duplicating efforts and to build upon existing capacities. Regional networking can help to share experiences and strengthen the individual HEIs networks.



4.8 Strengthening university capacity to support the development of Business Incubators and Science Technology Parks

While Business Incubators (BIs), Science Technology Parks (STPs) and universities in the Western Balkans region are part of the overall national innovation systems, structured cooperation between these elements is far from optimal and it is necessary for all parties to work towards improved capacity to collaborate in order to improve the support of BI and STP development.

Even though the importance of establishing a framework for cooperation between the universities and the support structures such as BIs and STPs is recognised, it is also important to ensure that universities have sufficient relevant capabilities, capacities and infrastructure to support this work.

It has been reported elsewhere in this project (Strategic Development Plan for Business Incubators and Science and Technology Parks in Western Balkan Region [29]) that *“Higher education institutions should, first and foremost, work on their internal legislation and strategic documentation that would improve or introduce, depending on the current situation, regulating the establishment of the business support structures, defining the ownership structure, types of activities, type of partnerships with external actors, inter-sectorial mobility and incentives, recognition of practical placements of students in the overall studies”*. It is also imperative that individual universities engage directly with their academics to ensure that a sound understanding of existing capabilities and support needs is played into the development of such structures before they are specified, designed, or implemented.

The universities are currently major players in research and innovation and some have extensive experience in developing this work into small business ventures, a number of which have grown to become significant global players. As such, their involvement and support in the development of incubators in WBCs is of significant relevance.

Support to BIs/STPs tenants

Furthermore it is crucial that university staff engaging with BI and STP tenants (and potential tenants) have a sound understanding of the needs and challenges likely to be met, as well as having an understanding of key aspects of the reality of starting and running a business. While there are some staff who are well versed in such aspects, universities would be well advised to develop and organise training events for those less knowledgeable. Such training could also be adapted to become part of the student curriculum and also for continuing professional development (CPD) for those thinking of or entering new business ventures.

Since BI tenants are generally start-ups and micro enterprises, they often do not have their own resources for high-tech innovation and they also often lack the know-how to optimise their business success. As such, cooperation between BIs and universities/research centres can be extremely beneficial through use of resources and expertise available at WBC universities, their research units, and their KTT support centres. It is important that these university based facilities are developed to be more externally inclusive, enabling ready support to those in BIs. Of course, it is also imperative that the BI occupants are aware of the support available as explored above.

It is essential that in establishing ways in which universities improve their support of BIs and STPs an on-going conversation takes place between themselves and the existing and emerging BIs and STPs. This will not only serve to ensure that support mechanisms are appropriate, but will also raise awareness of the benefit of university capability

Organisation of trainings and events

A key area where universities can support the establishment and growth of BIs and STPs is their life-long learning (LLL) offer. As BIs and STPs develop through their lifecycles, people within them will have development needs and will also be able in many cases to contribute to development and delivery of LLL packages for those BIs and STPs who are at an earlier stage of the lifecycle. The universities are in a strong position to act as facilitators in the design, development and delivery of such programmes and the key is to ensure relevance and focus of the offer.

Universities are also in a strong position to organise brokerage events aimed at groups of BIs and STPs, where representatives can meet to learn about each other activities and develop opportunities for cooperation both between the companies and between the companies and the universities. This may also lead to initiation of joint project proposals that can be submitted to relevant funding bodies.

Logistic support to development of STPs

There is no STP in the WBCs that is fully functional, operative, and financially sustainable with full logistic support to their tenants and high tech innovative enterprises. While some have outstanding working space, they are missing trained staff and logistics. It would be beneficial if WBC universities develop and/or enable relevantly experienced staff to provide this kind of support in the early stage of STP development, noting that some universities are already well established in these areas of support, though capacity may need to be increased, while others will need to develop such mechanisms in line with their own needs, as well as those of BIs and STPs. It should be noted that developing sustainable cooperation between universities and BIs/STPs in these ways also contributes to the modernization of university itself.

Benefits for university from cooperation with BIs/STPs

It should also be noted that a rich source of BI and STP tenants is the university sector itself, either through staff developing their business interests, or graduates who start their own businesses. The universities should recognise and indeed celebrate these avenues and include this as a natural pathway for both cases. This could include encouraging and supporting academics to seek development of business ideas through the BI/STP route, as well as including the development of business ideas as part of the standard undergraduate curriculum. This latter aspect could be enhanced considerably (particularly in those less KTT active universities) through the utilisation of guest lectures from other more active universities and from the BI and STP tenants themselves. Furthermore promotion of the incubation concept and (business) idea generation activity among university staff, students, researchers and graduates should become a part of expected activities.

Throughout this report, and particularly in the action plan of chapter 5, there are a number of recommendations which are intended to underpin the development and commercialization of research within the WBC universities. With very little additional work, BIs and STPs can (and should) be included in these processes as appropriate, ensuring that they are specified in such a way as to enable support strategies and structures to be effective for BIs and STPs, as well as for the universities.

It is important to note that development of university based infrastructure, capability and resource which is aimed at supporting BIs and STPs will also benefit university based KTT activities. It is also likely to be such as to have a draw through effect for those whose research is yet to be at the commercialisable stage, encouraging them to view commercialisation as a viable and supported aim.





5 Action Plan

The action plan below is deliberately written in generic terms so that it may be used for any individual Western Balkan university, even if they are not part of this consortium. Clearly some universities will find that some of these actions have effectively been completed, either in whole or in part, while others will not yet have commenced the particular journey.

For those five WBC universities within the WBCInno consortium a number of the actions below already have a starting point in that this project has addressed the area to some extent. This will at least give a starting point to debate and in some cases will give a sound basis on which to build.

It is also noted that the recommendations of this report overlap into the areas covered by other reports and publications within the WBCInno project. It is not believed that any are contradictory, though some in this report may add a level of detail not considered elsewhere.

Table 8: Action Plan

No.	Action	Priority ⁹		
		A	B	C
1(a)	Develop a formal proposal for KTT KPIs for the University and facilitate the acceptance of this by the Rectorate.	A	B	C
1(b)	Develop a proposal for KTT KPIs for the faculties which are commensurate with the University KPIs above, seeking input from professors and researchers. Facilitate formal acceptance of this by each Faculty Management.	A	B	C
1(c)	From the agreed Faculty KPIs, develop and propose KTT KPIs for research groups and individuals.	A	B	C
1(d)	Ensure that KPI records are collected in a non-intrusive way (possibly via the UIP collaborative software platform) and are aggregated automatically to enable faculty and university performance to be reported readily on a regular basis.	A	B	C
2(a)	Complete a review of Professors, Researchers and those engaged in the KTT modes to develop an understanding of any training and events which would support them in developing and growing their KTT activities.	A	B	C
2(b)	Analyse the findings of the review and develop a programme of events to satisfy circa 80% of the demand, utilizing relevant experts including those from other WBC universities and Europe as appropriate.	A	B	C
2(c)	Deliver the developed programme of events, probably over a two year cycle, ensuring that they are available to other universities and residents of BIs and STPs, effectively enabling a package of Life Long Learning.	A	B	C

9 Should be defined by the individual university

3(a)	Carry out a review of Professors and Researchers, including the full range from 'very KTT active' to 'not yet KTT active', as well as those involved in fledgling and established BIs and STPs, to develop an understanding and priority list of the support mechanisms which would be most valuable to them in developing and supporting their KTT portfolio.	A	B	C
3(b)	Based on the above findings, develop a detailed 'requirements specification' for KTT unit specific to the University, complete with estimated resource requirements and costing. Priorities might include: <ul style="list-style-type: none"> • IPR support, • financial record keeping, • internship management, • company/university network management (from an administrative perspective, not through taking over personal contacts), • managing a mentor/mentee network incorporating established KTT performers and those who are less experienced, • bid writing/editing, • promotion of university capabilities, • scanning for and intelligent filtering and routing of funding opportunities. 	A	B	C
3(c)	Develop a proposal for the establishment of the KTT unit and facilitate university approval.	A	B	C
3(d)	Establish the KTT unit.	A	B	C
3(e)	Put in place a mechanism for regular or ongoing review of the effectiveness of the KTT unit including monitoring of KPIs and feedback from users regarding the usefulness of the services offered.	A	B	C
3(f)	Carry out an annual report of the KTT unit and modify its support offer if required.	A	B	C
4(a)	Carry out a review of Professors, Researchers and those involved in fledgling and established BIs and STPs to develop an understanding of their expectations and desires of a UIP collaborative software platform, including aspects such as: <ul style="list-style-type: none"> • graphical user interfaces (GUIs), • level of data required, • access restrictions and requirements and • level of constraint which any platform might impose. 	A	B	C
4(b)	Ensure that the outcomes of the above (4(a)) are fed into the design, implementation and upgrade of the UIP collaborative software platform.	A	B	C
5(a)	Carry out a review of University Professors and Researchers, including the full range from 'very KTT active' to 'not yet KTT active', to develop an understanding of the aspects which most motivate them to carry out KTT activities, including those aspects which are currently absent but would motivate them if they were present.	A	B	C
5(b)	Analyse the findings of 5(a) and develop a proposal for enabling improved motivation factors for those who partake in KTT activities.	A	B	C
5(c)	Lobby appropriate bodies including Faculty Management, the Rectorate and appropriate regional bodies to enable those key motivators which are currently absent to be enabled.	A	B	C

6(a)	Where not already in existence (for non-consortium universities) establish a Catalogue on research and innovation potential of the university.	A	B	C
6(b)	Review the proposals regarding priority areas for research in light of the established Catalogue and develop a proposal for the next five years which will give a timeline and targets for research group and individual performance. This should include active KTT staff as well as those who have yet to develop a portfolio.	A	B	C
6(c)	Facilitate agreement with staff and University/Faculty/Department Management regarding the plan of 6(b), modifying as appropriate and achieving buy-in of all involved, noting the close linkage with the other items in the action plan.	A	B	C
6(d)	Implement the agreed prioritization plan, complete with appropriate financial, managerial and administrative support.	A	B	C
6(e)	Establish and implement an annual university wide 'show and tell' event, open to local businesses and the public as well as university staff, to enable the wider community to gain an understanding of the Research and KTT work of the university.	A	B	C
7(a)	Develop a university level mission statement regarding the support and promotion of entrepreneurship and spin-off creation.	A	B	C
7(b)	Develop and implement a clear university KTT policy based on appropriate legislation.	A	B	C
7(c)	Develop a policy for spin-off creation, normalizing the relation between the university and the spin-off (such as the universities participation in potential benefits, liability etc.), and all involved actors.	A	B	C
7(d)	Develop and agree a university wide IP ownership and beneficiary policy.	A	B	C





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***Modernization of WBC universities
through strengthening of structures
and services for knowledge transfer,
research and innovation***

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