



WBC REGIONAL MODEL OF UNIVERSITY-ENTERPRISE COOPERATION



European Commission
TEMPUS



WBC Virtual Manufacturing Network

WBC REGIONAL MODEL OF
UNIVERSITY–ENTERPRISE COOPERATION

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Preface 1



As pointed out by the European Commission and Member States (Bonn declaration, Lund declaration, Modernization Agenda...) universities as key players for the successful integration of the knowledge triangle, and transition of Europe into knowledge-based society, need to modernize, to be able to respond better to the market demands. They can do this by operating in close cooperation with enterprises, social partners, public and private organizations and supporting institutions, in a word almost the whole business world.

Thanks to university triple role, as source of the highest level of education of students, providers of quality research and facilitators of innovation, their modernization and transition to enterprising university has been acknowledged as a core condition for the success of Lisbon strategy.

The past years have been marked a period of intense activity and change in the Western Balkan Region in the areas of education and research, as a result of implementation of different EU instruments and programs, regional and national initiatives and incentives.

As longest-standing EU programme, TEMPUS supports the modernization of higher education in the partner countries of the Western Balkans, Eastern Europe and Central Asia and the Mediterranean region, promotes institutional cooperation and focuses on the knowledge triangle of education, research and innovation at university level, within priority "Higher education and society". Experience from previous TEMPUS initiatives and similar projects shows that there is a little awareness about necessity of university-enterprise cooperation and its benefits, as well as lack of clear procedures for the establishment of effective and efficient model of cooperation.

As a response, WBC-VMnet project is intended to promote knowledge triangle integration, to contribute to enhancement of capacity and modernization of universities in the WBC region, through establishing effective structures of cooperation among universities and regional enterprises. The most important result of the project is development and implementation of the new Western Balkans countries (WBC) model of university-enterprise cooperation, based on the best EU practice and specialities of the WBC region.

This publication, as a product of joint activity of project partners, presents, first of all, EU legislative and recent incentives and initiatives, as well as collected good practices as case studies from EU universities. It also offers opportunity to readers to research and to find relevant additional information by using web site links of Knowledge Triangle (KT) structures established at EU universities. In addition, current state of WBC countries is presented, focusing in particular on existing support structures and mechanisms established at regional universities, provided with useful links, too. Proposed model, described in this publication, consists of a set of recommendations and measures. It also explains some important structures and their organization, needed for establishing a sustainable and fruitful university-enterprise cooperation.

Public debate on draft version of publication, that is the new WBC model of university-enterprise cooperation will be undertaken in all WBC countries, in order to build consensus among stakeholders and key actors in the knowledge triangle, as well as to incorporate new ideas and changes in printed version of publication, as final. It is important step for successful implementation of regional model in the future. Evaluation of progress on implementing the WBC model will continue to be conducted throughout the project life span, in order to provide ongoing impetus for modernization of regional universities.

The authors would like to thank the following persons for their invaluable contribution in collecting information on cooperation of their university with business, presented concisely in chapter 5 as success stories:

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On behalf of Project Consortium



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Introduction 2



2.1 About the WBC-VMnet project

Within **the knowledge triangle** of education, research and innovation in the area of virtual product and process development, the WBC-VMnet project is intended to establish efficient and effective mechanisms and structures of collaboration between key actors for the knowledge triangle throughout the WBC region – HE institutions, enterprises (especially SMEs), research and innovation centers, local and regional authorities. The project will contribute to enhancement and modernization of **HE capacity** in the area of virtual manufacturing technologies, as condition for success of renewed Lisbon strategy.

In order to achieve this strategic objective of the project, six **specific objectives** are set:

1. To set up and equip regional Collaborative Training Centers (CTC) in four WBC countries (Serbia, Croatia, Bosnia & Herzegovina and Montenegro);
2. To enlarge VMnet network (Virtual Manufacturing Network) throughout the WBC region, bringing new experts and members of academia, research, business and governments;
3. To develop, assess and implement new regional model for university-enterprise cooperation;
4. To modernize and adjust vocational training programme to address the needs of small business and labour market;
5. To provide students with opportunity to gain practical experience in industry;
6. To raise awareness in the society about necessity of integration of the knowledge triangle for the region prosperity and to ensure quality dissemination of project results.

Project is designed to meet the needs of universities, research institutions, students, unemployed graduates, enterprises, especially SMEs, through the realization of the following:

- Development and implementation of new regional model of university-enterprise

cooperation, strengthening university role in transition of the WBC region to knowledge based society with impact on economic growth and competitiveness;

- Establishment of four CTC centres, as the university-enterprise links, enabling efficient and sustainable cooperation among the key actors of the knowledge triangle;
- Efficient networking of key actors in the knowledge triangle – VMnet network throughout the WBC region;
- Sustainable Training/service needs analysis (TSNA);
- Vocational trainings in the area of virtual product and process development (the most innovative and interested for enterprises and students), as well as multidisciplinary courses regarding to identified needs; further accreditation is considered;
- Industrial Fellowship Programme (IFP) for graduates and engineers from industry;
- Coordinated and improved Practical Placement Programme (PPP) for students, enabling them to gain practical skills in industry;
- A set of disseminating activities and events, such as information days, motivational seminars, thematic workshops, and brokerage events, public appearances etc.

Based on comprehensive analysis of collected EU models of university-enterprise cooperation, intensive communication and interviews in the WBC region, project partners and individual experts will assess and adjust developed **the new regional model**. In addition, they will undertake all necessary measures and activities for its successful implementation in the region, including communication with policy makers, promotional, disseminating and raising awareness activities, networking of key actors in the knowledge triangle, as well as the development of efficient and effective mechanisms for cooperation.

The last mentioned comprehends the establishment of four **Collaborative Training Centres** in each WBC, which will have the necessary human resources (retrained trainers and service providers) and equipment/software for the application of VM technologies in product development.

The second collaborative mechanisms will be the enlarged **VMnet network** throughout the WBC region, supported by communication tools on WEB portal. The portal will provide well-timed information on all important events interesting for network members. Updated systematization of knowledge will be available on WEB portal. The increase in number of VMnet members, for 300 new members and 5 new experts per year, is planned.

The Training/service needs analysis will be undertaken in Serbia, Bosnia and Herzegovina, Montenegro and Croatia, to identify enterprises' needs for advanced trainings and R&D services in the area of product and process development. Also, survey will cover analysis of labour market needs for vocational trainings of unemployed graduates in this area. The final goal is to determine knowledge and skills gaps, weaknesses and new competence requirements in regional enterprises, especially SMEs, and labor market.

Based on conclusions of wide-ranging TSNA analysis, identified areas of advanced trainings and services for regional enterprises, PC partners will conduct competition and selection of national and regional experts-trainers and service providers, within WBC universities and research institutions. At least **10 vocational trainings** will be developed and implemented by experts-trainers. Teaching material for the developed trainings will be redesigned and prepared for setting up at MOODLE platform, supporting e-learning.

All project partners will take part in development of **Industrial Fellowship Programme (IFP)**, establishing sustainable partnerships between universities, enterprises and graduates, leading to mutual benefits. Highly qualified graduates (or employed engineers), as industrial fellows, will spend minimum 6 months to 2 years at University research centre, for professional development, participating in specific research projects targeted to industry needs and company business. They will work as part of enterprise, supported by a team of university experts – professors, teachers, researchers, who will bring out technical expertise, research, and innovation to the enterprise or the company. Industrial fellows will serve as «gatekeeper»

for knowledge and technology transfer from university to their enterprises and provide excellent communication channels between them. IFP programme will define procedure for administration and management of the programme, conditions for qualifying of enterprise or the company, funding rules, requirements for graduates, obligations of university research centre and mentor, who will be responsible for the career development of graduates, and related services for enterprise, intellectual property rights (IPR), quality monitoring rules etc.

Project partners will develop sustainable **Practical Placement Programme (PPP)** for students, providing them with the opportunity to gain practical experience in industry within the area that is related to their academic studies, and to develop their professional technical and interpersonal skills. Students thus have the opportunity to use their knowledge in practice and to tune it to the actual needs of the industrial environment.

Established CTC centres and enlarged VMnet network represent the basis for continuation of activities after the project completion. WBC partners will use the equipment of CTC for education of students, vocational trainings, as well as for innovative services in virtual development of products and processes for regional enterprises.

Virtual manufacturing (VM) system, which represents integrated computer-based model for product and process design, simulation of production processes, rapid prototyping and tooling, reverse engineering, is applied with the aim of:

- a) optimisation: design of products and processes, selection of materials for new products, process conditions and their tuning;
- b) reducing lead times and
- c) reducing time-to-market costs.

Application of innovative VM technologies in the development of new and improvement of existing manufacturing processes in regional companies and SMEs will represent the key activator of productivity growth, and consequently of economic development

and prosperity for entire population of the WBC region. Considering the fact that 98,9% of active enterprises in WBC region (Serbia, Montenegro, Bosnia and Herzegovina, Croatia) have been categorized as SME, with needs and operative procedures completely different from ones at large enterprises, the project will be focused on the development of global system support for those enterprises.

2.2 Structure of the publication

Besides the presentation of the new WBC regional model of university-enterprise cooperation, developed within the WBC-VMnet project, the objective of this publication is to point out the necessity of modernization of the universities in WBC region, through the integration of the knowledge triangle, and the establishment of cooperation between key actors in the areas of education, science and business. The baseline for the framework were the EU legislation, the challenges, policy, on one hand, and individuality and diversity in the WBC region on the other hand. Therefore, the structure of such publication starts from the goals of Europe in this field, through the identified needs, state of development in the WBC region, and further through the presentation of EU good practices in order to give the readers and users of the publication, as well as the implementers of a new regional model the opportunity to analyze them as case studies.

Chapter 3 contains representation of EU legislation, policies and strategies, review of past experience, success factors, the EU incentives, recommendations and encouragements. In addition to this, there is a spreadsheet overview of main EU documents, produced by the EU Commission, working groups, or delivered within similar projects.

Chapter 4 describes the current state in the areas that make up the knowledge triangle in the WBC region, particularly in member countries of the Consortium of WBC-VMnet project, the constraints and challenges, identified needs, as well as a brief description of some initiatives within the current TEMPUS projects. Besides a brief description of key institutions in the areas of higher education, research, innovation, social partners, there are also web-site addresses of most institutions that were presented, so that the interested parties can find additional information at the listed addresses.

Fifteen collected EU practices are briefly described in **Chapter 5**, through the display of main features of university-enterprise cooperation. As in the previous chapter, the web addresses of centers, offices, key projects and programs that have been established and realized at EU universities are available to the readers of the publication. The objective of this is the dissemination of the best EU practice, raising awareness about the importance of integration of the knowledge triangle, i.e. the establishment of sustainable and effective cooperation of universities with enterprises.

Chapter 6 deals with the presentation of the new WBC regional model of cooperation between universities and enterprises, at the beginning of which are given the challenges and prospective views, as well as the benefits for key stakeholders. Bearing in mind the different level of development of the region, economic and historical background, the model is reduced to a series of recommendations for the establishment of aforementioned cooperation, primarily through mechanisms and structures as bearers of such cooperation. Future steps are given at the end.

As this is the first publication in the WBC region, which refers to the knowledge triangle and cooperation of universities and enterprises, we hope that it would contribute to raising awareness among stakeholders and key actors, as well as to start a series of initiatives, projects, programs for establishing effective and sustainable structures for development of such cooperation.

2.3 Applied methodology

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Apart from models of university-enterprise cooperation applying at University of Padova, University Ljubljana and Technical University of Denmark, as partners in Consortium of WBC-VMnet project, additional twelve models from different universities and research institutions throughout Europe were collected and analyzed by project team staff (PC and EU partners).

In the first phase, each project partner conducted preliminary selection of 5-10 representative universities that will serve as good practice model of University-Enterprise cooperation, based on:

- Previous and current cooperation;
- Features that characterize successful UNI-ENT cooperation;
- Reputation of university and/or research institution;
- Browsing the Internet with key words (University-enterprise cooperation, International Office, Business start-up, Spin Off, Career Service, Knowledge Transfer, Innovation, Joint Research...).

In the aim of standardization of good practice presentation by all project partners, as well as the subsequent elaboration chapter in this publication, **Questionnaire form** was developed by project team. When preparing Questionnaire form, project team took into account the experience on similar projects, recommended methodology and available reports [74]. Final version of Questionnaire form consists of sections and specific groups of questions, describing **main features** that characterize university-enterprise cooperation, as listed below:

1. A clear policy, mission and vision of university-enterprise cooperation

- University references concerning university-enterprise cooperation;
- Strategic plans to implement the policy as to university-enterprise cooperation;

- Involvement of enterprises in the management, decision-making structures and bodies of the universities, on central and faculty level.

2. Existence of functional structures/services for support, promotion and implementation of university-enterprise cooperation

- Career services centre;
- Offer-demand databases and mediation services in searching for jobs;
- Enterprise support service;
- International office for further professional training of students abroad;
- Industrial liaison office;
- Marketing unit.

3. Involvement of enterprises in upgrading and updating the curriculum

- Curricular committees with representatives of enterprises;
- Offering the trainings for enterprises;
- Centre for professional training and education;
- TNA analysis.

4. Transfer of knowledge and technologies, joint university-enterprise research

- Joint research projects;
- Technology transfer offices (university and companies);
- Technology parks, Innovation centres;
- Innovations in enterprises, based on R/D results of university/faculties;
- Research support services for company needs;
- Institute of applied research.

5. Giving support to enterprise foundation and development of entrepreneurship

- Development of spin-offs and incubators;
- Courses on promotion of entrepreneurship;
- Student entrepreneurs/student enterprise;
- Mentoring and supporting young entrepreneurs/mentoring schemes;
- Entrepreneurship education and training initiatives;
- Small business projects and similar support activities.

6. Mobility activities

- Student placements (national and international);
- Teachers from industry;
- PhD in enterprises;
- University teachers involved in enterprises' business;
- Involvement in EU networks and platforms.

7. University Involvement in local and regional development

- Connection and cooperation with regional development agencies and chambers of commerce;
- Active involvement in regional development strategies;
- Involvement in regional development projects etc.

Based on contacts with university representatives (e-mail, telephone, appointment...), readiness of the university to participate in polling and collecting relevant data about UNI-ENT cooperation was estimated. After preliminary contacts by the local teams of each project partner, a final list of universities to be involved in survey was determined. The selected EU universities and institutes were contacted and called to name the contact person who will be in charge of data collection and filling up of Questionnaire form on behalf of their institution. Besides the answers to a list of questions within each of Questionnaire subjects, it was also necessary to give suggestions and initiatives related to possible future activities in the field of university-enterprise cooperation.

Concurrently with collection data and completion of **EU good practices of university-enterprise cooperation**, a detailed analysis of current situation in that field in all WBC countries were undertaken, especially those implemented in Consortium of the project. For that purpose, all the available information were used, gathered from Academic and Research networks for SEE and WBC, Ministries of Education, Ministries of Science, Ministries of Economy, The Chamber of Commerce, Agencies for SME

development, National Employment Agencies and all the other stakeholders who will take part in the analysis as well as in development of the new WBC model, its assessment and adoption. All the initiatives realized in the previous, similar projects, from TEMPUS, EAR, FP6 programmes etc, were taken into consideration.

After comprehensive analysis of collected EU good practices, intensive communication and interviews with academic and business community in the WBC region, as main actors in the knowledge triangle, project partners and individual experts proposed **new WBC regional model** of university-enterprise cooperation, described in Chapter 6 of this publication. In addition, it is planned to undertake all necessary measures and activities for its successful implementation in the region, including communication with policy makers, promotional, disseminating and raising awareness activities, networking key actors in the knowledge triangle, as well as the development of efficient and effective mechanisms for UNI-ENT cooperation. The objective is to determine and recommend the means of the efficient and sustainable cooperation, and to animate the key actors in the knowledge triangle.

Detailed assessment of the proposed WBC regional model and its tuning will be carried out during the whole project period, through benchmarking process and representative case studies. It is expected that in two-years **validating and adjustment of the new regional model**, at the end of the project, a reliable and sustainable model of cooperation will be obtained, leading to modernization and strengthening the role of universities in the economic development and employment growth in the WBC region.



State of the art in the area of 3
university-enterprise cooperation-EU level



3.1 EU legislation, policies and strategies

3.1.1. Introduction

The presence and role of European universities is very important in multiple directions: **higher education, advanced research and technological innovation.** Such role has increased its relevance in particular in the last 40 years, with universities and higher education becoming accessible to exponentially increased numbers of people and rising up to the actual situation: about 4000 institutions, with about 435.000 researchers and attended by over 17 millions students. As a consequence, this relatively fast modification in higher education scenario has forced university to modify priorities, research, and, eventually, its role in society. European university has then the potential to play the key role as leading force in knowledge, technological progress and, ultimately, of economy, but up to now, such potential still has not been sufficiently exploited.

Over the same period, also **labour markets** have undergone relevant modifications, moving from industry to services and from production to research, design and development. New economical and production markets have then strongly influenced higher education, calling for the need for new competences and profiles.

3.1.2. Knowledge Triangle

An important snap-shot on present situation has been reported at the recent **“EU Forum for University Business Dialogue”** [2]:

“Universities, with their triple roles as providers of the highest levels of education, advanced research and path-breaking innovation, are at the heart of Europe’s knowledge triangle. They have the potential to be crucial drivers of Europe’s ambition to be the

world’s leading knowledge-based economy and society.”

In the field of cooperation between universities and enterprises, the productive interaction of the major stakeholder groups, depends on full awareness of each interest group and the main stakeholders:

- a) Higher Education Institutions;
- b) Enterprises;
- c) The European Commission.

To exploit its potential, university then need to reinvent and strengthen its position, in particular with regard to its relationship with industry:

- Tuning studies and academic education according to labour markets;
- Feeding local economies with industry oriented research;
- Define industrial collaborations to find private partners as alternative means of founding.

Throughout Europe and EU programs, exists successful cooperation between these three sides, but the problem lies in the level of cooperation that remains very unequal across countries, universities and academic disciplines.

3.1.3. Policies and Strategies

This need for modernization of universities has been clearly stressed at a political level by the European Council. Some milestones can be recognized:

EU’s Lisbon strategy - an important part of this strategy are Policies for Education and Training form. This important issue was asked from Heads of States and Government, when they asked for more then just a radical transformation of the European economy, but they wanted also a challenging program for modernization of education systems.

To achieve these objectives and demands, Ministers for Education adopted common objectives for the improvement of education and training systems and a work program. This program was known as the **Education &**

Training 2010 program and it is implemented through the open method of coordination and indicators and provides support to the exchange of experiences and good practices.

The Bonn Declaration - also appeals for the empowerment of all stakeholders throughout can be built the effective and sustainable university-enterprise cooperation. By this declaration there is a need for structured dialogue and decision, within and between relevant interested groups, and a better understanding of the dynamics of the knowledge society. By Bologna Process the position of higher education is in a crossroad of research, education and innovation, and in this position lays the competitiveness of Europe Community.

Additionally, at the informal meeting at Hampton Court in October 2005, and at the 2006 Spring European Council, it was highlighted how university plays a primary role as foundation of European competitiveness, and how actions were needed by the end of 2007 in the context of the renewed partnership for growth and employment.

A concrete action of such policy is surely the **Life-long Learning Program 2007-2013** (Erasmus strand) has a specific line for projects on university-enterprise cooperation.

In the **Vision 2020 for European Research Area** (Brussels, 2 December 2008) the Competitiveness Council stressed the vital importance of intensified interaction between policy areas, notably higher education, research and innovation.

These themes were also recently at the center of the conference **The Knowledge Triangle: Shaping the Future of Europe** (Gothenburg, 31 August–2 September 2009), focused on the central role the higher education in the knowledge triangle and for European competitiveness. The conference emphasized the need for continued political decision-making regarding the European Research Area and for development of the European Innovation Plan with main focus on the interaction between education, research and innovation at national and European policy level.

3.1.4. Legislation

European Commission has produced several legal documents on specific fields of EU activity: legislative instruments, preparatory acts, case law, etc.

Documentation can be divided according to specific field of application. In particular, with regard to **university-enterprise cooperation**, five main groups of actions can be identified:

- European Union policy in the field of research and innovation [46];
- Recognition of diplomas and qualifications in the European Union [47];
- Employment [48];
- Lisbon Strategy [49].

In particular the first one (**research and innovation policy**) collects a number of legislative instruments, preparatory acts and court judgments which cover almost all most important aspects of the issue:

- Establishment of technology institutes;
- Support to small and medium enterprises;
- Founding;
- Management of intellectual property in knowledge transfer activities;
- Collaborations with extra-European countries;
- Promotion of creativity and innovation through education and training;
- Establishment of proper research area boards and councils.

Also, in agreement with **Lisbon strategy**, European Commission stressed that:

- A knowledge-based society and economy needs an adequate level of key competences;
- Increases in workers' skills and competences improve productivity, since a skilled workforce is better able to respond to the changes of a dynamic knowledge economy, while people with higher levels of skills and competences are more likely to be socially integrated, fulfilled and active citizens;
- Economic growth will be influenced by broadness of actions: investment in skills and competences has to be extended

to all classes, including low-skilled and disadvantaged groups, or older citizens.

Additionally, European Commission invited the member states to:

- Address the issue of sectoral skills in the context of developing skills and competences, as a part of the 'Education and Training 2010' Work Programme;
- Use future Community instruments in the field of education and training to support the development of sector-based approaches to skills and competences;
- Ensure effective collaboration between relevant ministries in the development of strategies for skills and competences;
- Build partnerships, at national, regional, local and sectoral levels with key stakeholders, including employers and trade unions, in accordance with national legislation and practice;
- Instigate collaboration between education and training providers to exploit existing ICT infrastructures, in order to widen participation in Life-long learning, and improve the level of e-skills of their citizens.

between universities and enterprises in the fields of training and technology. Through this Comett program, a large number of partnerships and grants between universities and enterprises were set up. For example, it was undertaken a partnership with European Centre for the Strategic Management of Universities, EDUCONSULT, Europe & Projects, Sanon Developement International, and the Austrian, Dutch, Finnish, French, Hungarian, Lithuanian, Norwegian and Portuguese national agencies.

This team of partners analyzed some 200 previously EU-funded project participants (in SOCRATES, ERASMUS and LEONARDO), with a goal to view and to explore the barriers of transnational university-enterprise cooperation and to identify the critical success factors. The final step of this team work was to develop recommendations for future models and strategies.

Since October 2005, universities have been recognized as providers of the highest levels of education in EU-level policy making, because they have the potential to be the world's leading knowledge-based economy and society.

Within the **Lisbon strategy** the Commission has proposed the modernization of universities and since then the **modernization agenda** has been the one of the subject of global knowledge-based economy.

By the 2006 Spring European Council the Commission proposed the establishment of the **European Institute of Technology**. The idea was that this Institute contributes to improving Europe's capacity for scientific education, research and innovation, by encouraging multi-disciplinary approach and developing the strong partnerships with business.

In the manufacturing field an important reference is given by **Manufuture**. The mission of Manufuture (European Technology Platform) is to propose a strategy based on research and innovation, securing high added value employment and winning a major share of world manufacturing output in the future knowledge driven economy [53].

The best summary of past experiences in cooperation between university and enterprise

3.2. Review of past experience, success factors and recommendations

3.2.1. Past experience

Since the 1980s the European Commission has promoted university-enterprise cooperation through various programs for the promotion of education and training. This was seen as a mean of increasing the relevance of education to the needs of the labor market, a mean of improving graduates' employability and of maximizing the use of knowledge.

In 1986 the European Commission was launched the **Comett program** to strengthen cooperation

has been recently provided, in 2007, by the project “**University-enterprise cooperation: building on new challenges from past experiences**” (in the framework of Socrates Accompanying Measure) [77]. It was run by the DAAD (the German Academic Exchange Service) in a consortium consisting of ESMU (European Centre for Strategic Management of Universities), and National Socrates/Leonardo Agencies from nine countries (Austria, Finland, France, Hungary, Lithuania, Netherlands, Norway, Poland and Portugal) and with the contribution of several European universities.

The project analysed the place of university-enterprise cooperation in EU education and training policies, to assess how universities have integrated this dimension in their strategic developments and activities, and to formulate recommendations on how the university-enterprise dimension can be further stimulated.

The project also presented a snap-shot of the state-of-the-art of university-enterprise cooperation in Europe, with a view to identifying key areas which deserve particular attention and future actions. Out of 400 respondents from 34 countries in Europe, various types of university-enterprise cooperation activities were investigated and an assessment made of progress in the last few years.

3.2.2. Features of university-enterprise activities

At educational level, the **Manufature** recommendations are to:

- Build strong links between industry and academia, by establishing joint postgraduate degrees, postgraduate industrial training and industrial real-life-driven courses, and manufacturing departments;
- Develop pattern to help to create SMEs that should foster a new industrial model in terms of the links with research centres and this group on enterprises;
- Integrate all manufacturing qualifications of EU Member States into European engineering curricula;

- Bring new teaching principles and industry-based case studies;
- Re-organise educational programmes around new engineering disciplines with a high potential impact on EU manufacturing competitiveness;
- Appropriate Manufature International School, leading to Masters and PhD qualification in industrial research, based on research institutes and leading manufacturing companies.

Assuring the future of manufacturing in Europe, the national and regional authorities must participate, either independently or in a complementary manner, by:

- Fostering the creation of clusters and integrating SMEs into networks;
- Developing competence in high-end manufacturing technologies;
- Establishing local centers of excellence in manufacturing, incorporating a Manufature network of educational and research communities, to permit the involvement of university researchers, knowledge transfer to industry and the formation of spin-off companies.

At a general level, as identified by “university-enterprise cooperation: building on new challenges from past experiences” project, university-enterprise cooperation can be split up into different groups according to different features. This characterization could be made according to the degree to which universities are involved in one or more of these clusters of actions and activities. The developments in the field of **university-enterprise cooperation** are characterized by a gradual development of the concrete **features** mentioned below. Universities do not usually start by having a policy with a mission and vision statement, moving on to a strategic plan and then starting implementing activities. It can happen at random based on internal developments and European and international cooperation.

1. A clear policy, mission and vision as to university-enterprise cooperation;
2. The creation and functioning of structures,

support services and persons committed to and specialised in promoting and implementing the cooperation between the universities and enterprises;

3. Curricular involvement of enterprises to upgrade and update the curriculum;
4. Joint research realized by universities and enterprises;
5. Support given to the creation of companies;
6. (Transnational) Mobility activities or schemes;
7. Involvement in local and regional development.

To this end, **critical success factors** in supporting strategies university-enterprise cooperation can be summarized as follows:

- Cooperation should be shown as being beneficial to both parties: a win - win situation for both parties at all levels and in all activities;
- Is supported by clear agreements or a charter of cooperation between parties concerned;
- Is best embedded into the overall policy and mission statement of the university and into strategic plans;
- Is coordinated and implemented by official bodies or structures which report on a regular basis to all the governing structures concerned;
- Is integrated at all levels of the university: at the political and strategic level as well as at the operational level, at the curriculum level, at Research and Development level etc.;
- Is incorporated in all faculties and all departments of the universities;
- Is closely linked and intertwined with the European and international cooperation strategy and mobility of the university.

Additionally:

- All stakeholders (students, professors, companies etc.) are involved in the development and the implementation of cooperation;
- University-enterprise cooperation policies and activities are regularly reviewed and evaluated and clearly assessed by all stakeholders;

- University-enterprise cooperation bodies or offices are run by people with experience from industry to manage them;
- Universities should develop partnerships with the world of enterprise while enterprises could help universities to modify curricula and governance structures.

3.2.3. Recommendations

Following the Commission's analysis results the EU needs to work harder in the future for the purpose of integration all three parts of the knowledge triangle. The Commission has stressed:

- The lack of innovation and entrepreneurial culture in research and higher education;
- The fragmentation of the EU's research and higher education system;
- A lack of investment, in particular private investment, in research and development;
- The lack of a critical mass and innovation in small and medium-sized enterprises.

At the European level, actions are then needed to create the necessary conditions to enable universities to improve their performance, to become more competitive and, eventually, to enhance enterprise cooperation. Taking stock of the debate and taking into account European specificities, the Commission has recommended a few **changes**, as listed below.

1-Provide incentives for structured partnerships with the business community: the strategic relationship with the business community has to be strengthened to harness scientific and technological knowledge. Structured partnerships with large as well as with small and medium enterprises bring opportunities for universities to improve the sharing of research results, intellectual property rights, patents and licences, but also for new entrepreneurs with on-campus start-ups or with the creation of science parks.

Links with business can bring additional funding, for example to expand research capacity or to provide retraining courses, and will enhance the impact of university-based research on SMEs and regional innovation.

In order to support universities to build up entrepreneurial attitudes, it will be recommendable to create local “clusters for knowledge creation and transfer” or business liaison, joint research or knowledge transfer offices serving as an interface with local/regional economic operators. This also implies that development of entrepreneurial, management and innovation skills should become an integral part of graduate education, research training and Life-long learning strategies for university staff.

2-Provide the right mix of skills and competencies for the labour market: university programmes should be structured to enhance directly the employability of graduates overcoming persistent mismatches between graduate qualifications and the needs of the labour market. Very important is also to stimulate an entrepreneurial mindset amongst students and researchers, and to help Life-long learning aptitudes.

3-Activate knowledge through interaction with society: universities need to communicate the relevance of their activities, by sharing knowledge with society and reinforcing the dialogue with all stakeholders. Working together with earlier formal and non-formal education and with business (including SMEs and other small entities) will also play a role in this respect.

4-Reward excellence at the highest level: to help development of challenging working environment for university and industry, it is necessary to increase competition, combining it with more mobility and further concentration of resources. This also helps attraction of the best academics and researchers and encourages development of new knowledge and accomplishment of new scientific results.

5-Make the European higher education area and the European research area more visible and attractive in the world: continuing globalisation means that education and research must be fully open to the world and become worldwide competitive players. This is possible through development of more structured international cooperation's, with research and industry. The existence of

more “European” courses, offered jointly by consortia of universities and leading to joint or double degrees at Master or Doctorate level, would also help to make Europe more attractive to students, researchers and companies from the rest of the world.

In general **actions for modernization of university** can help enterprise cooperation. These will necessarily include:

1-Break down the barriers around universities in Europe: geographical and inter-sectoral mobility needs has to be increased, both for graduating students and for researchers. Also by 2010 Bologna reforms should be achieved, with comparable qualifications, flexible, modernized curricula at all levels which correspond to the needs of the labour market.

2-Ensure real autonomy and accountability for universities: new internal governance systems are needed, together with actions to overcome fragmentation to target efforts collectively on institutional priorities for research, teaching and services.

3-Reduce the funding gap and make funding work more effectively in education and research: international and national political actions should pursue the goal of investing 3% of GDP in R&D by 2010 and to devote at least 2% of GDP by 2016 to a modernized higher education sector. Actions will have to balance core, competitive and outcome-based funding.

4-Enhance interdisciplinarity and transdisciplinarity: universities should focus less on scientific disciplines and more on research domains (e.g. green energy, nanotechnology), associating them more closely with related or complementary fields and fostering mobility and interaction between students, researchers and industry.

3.3. European Commission incentives and encouragements

3.3.1. Documents

In the last 30 years the European Commission has been very active in promoting cooperation between university and enterprise. In different communications and through various programmes for the promotion of education and training, the European Commission has promoted cooperation as a means of increasing the relevance of education to the needs of the labour market, of improving graduates' employability and of maximising the use of knowledge, with positive results both for research and for industry.

The first example is the Comett Programme, set up in 1986, to strengthen cooperation between universities and enterprises in the fields of training and technology. Thanks to Comett Programme, a large number of partnerships between universities and enterprises were set up and grants were awarded for staff exchanges between universities and firms. But in the recent years multiple actions have been proposed: a summary of the most interesting works of the last decade is reported in the **table 3.1**.

Relationship between universities and the business community is of strategic importance and for the public interest. Partnerships with the business community bring opportunities for universities to improve the sharing of research results, intellectual property rights, patents and licenses. They can also increase the relevance of education and training programs through placements of students and researchers in business.

3.3.2. Recommended changes

According to European specificities, the Commission suggests that the following changes are going to be a key to success in the process of university-enterprise cooperation:

3.3.2.1. To create a new curricula for employability

In order to overcome inconsistency between graduate qualifications and the needs of the labour market, the Commission suggests that university programs should be structured to enhance directly the employability of graduates.

Following changes to curricula and learning methods were adopted as primary:

- The inclusion of transversal and transferable skills in curricula at all levels of qualification;
- Better examination methods;
- To give opportunities to talents from non-traditional backgrounds, including adults returning to study;
- Greater interdisciplinary of education and research agendas.

Schools and universities must be encouraged to provide the appropriate types of education and training to develop the skills needed by new generations of "knowledge workers", who will need to combine expertise with entrepreneurial spirit.

3.3.2.2. To foster the entrepreneurship

Opinion is that a constant presence of business people on universities campus and a constant interaction of students to business would help create the required change.

Appropriate field for this can be in the postgraduate training programs, and a good example can be the Marie Curie Initial Training Networks that focus on entrepreneurial skills.

A great field for work are activities that should reach students from an early studies stage like, existing activities, e.g. conferences, internships and project work and these should be expanded, and extracurricular opportunities also were seen as useful, (start-up, spin-off companies).

3.3.2.3. To transfer the knowledge

A most universities need support to make the organizational changes and need to build up entrepreneurial attitudes if want to secure the

Table 3.1

Year	Title	Description and output
2001	The concrete future objectives of education systems [80].	The document recognizes the need to open up education systems to the influences of other parts of society: both those that are close to schools (parents, local institutions, and local businesses) and those that are more distant. It argues that local businesses are a resource in providing a perspective on the future needs for skills, as well as a potential introduction for learners into the way in which the business world works.
2002	Investing efficiently in education and training: an imperative for Europe [81].	The document call for an in-depth revision of curricula to ensure the highest level of academic content but also to respond to the changing needs of the labour market. This can be helped by various types of public-private partnerships, to mobilise additional human and financial resources.
2003	The role of the universities in the Europe of knowledge [41].	The communication underlines the need for global competitiveness demands that knowledge flows from universities into business and society. Cooperation between universities and industry must be intensified and geared more effectively towards innovation, start-up of new companies and transfer and dissemination of knowledge.
2005	Mobilising the brainpower: enabling universities to make their full contribution to the Lisbon strategy [55].	The communication stresses the need to increase and diversify university funding sources, as one of the most urgent priorities. Much stronger and lasting expansion has been possible in competitor countries thanks to a greater diversity of funding sources, with much higher contributions from industry and households. Private investment in higher education in the EU amounts to less than 0.2% of GDP, much less than in the US and in Japan. The Commission estimates that an increase up to 2% of GDP is the minimum needed for knowledge-intensive economies.
2005	Modernizing education and training: a vital contribution to prosperity and social cohesion in Europe [56].	The communication stresses again that strengthening collaboration between higher education and industry is recognised by most countries as a basic requirement for innovation and increased competitiveness, but that too few European countries have a comprehensive approach to this issue.
2007	Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation [42].	The publication stresses advantages arising from cooperation between university and industry, as mean to enhance knowledge transfer from research to production. Three actors are in particular mentioned: <ul style="list-style-type: none"> • Research groups: they need to focus in particular in innovation and in academic excellence; • Public administration: has to facilitate researchers mobility; • Industry: larger investments are needed in research and development sectors.
2009	Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation [2].	For a real change in the cooperation activities between university and enterprise it is necessary to radically modernize university. The document underlines main points to be addressed for a real conversion of university politics in order to act as a protagonist in the next year's society. (See also previous paragraph 3.2).

benefits, that are examples of work between the higher education and enterprises.

Development of entrepreneurial, management and innovation skills should become an integral part of graduate education, research training and Life-long learning strategies for university and their employees.

To support universities to make these organizational changes the Commission has adopted a Recommendation on the management of intellectual property in knowledge transfer activities and a Code of Practice for universities and other public research organisations.

A good example of this is the European Institute of Technology - how the EU can implement innovative governance models – for the purpose of the modernization agenda for universities. The final goals are to inspire change and processes of knowledge transfer in existing institutions, and to increase their links with industry.

In order to stimulate knowledge generation and ensure efficient transfer of its benefits to the manufacturing sector, a new value-adding approach to innovation must be nurtured in which the mutual benefit of collaboration between the academic and industrial communities is clearly recognised. The actors in this process are: **Universities**, where basic scientific and technical training takes place; **Research centres**, in which graduate and postgraduate students can build experience in dealing with the real problems; **Knowledge – intensive SMEs** which can transform the knowledge produced by applied research into products and services; and **Manufacturing enterprises**, equipped to incorporate the acquired knowledge into products and processes with the qualities needed to support enhanced competitiveness.

“The Knowledge triangle of research, education and innovation to function within favourable framework conditions, which reward the knowledge that input to work. In Europe, we need to become much better at producing knowledge through research, at diffusing knowledge through education and at using and applying knowledge through innovation” [65].

3.3.2.4. To encourage the Mobility: across borders and between business and academia

A very important and fundamental point is to simplify legal and administrative procedures for the entry of non-EU students and researchers.

An encouragement of this effort in 2005 the European Community was adopted the “researchers’ visa” package. This kind of directive and recommendation on the admission of third-country nationals to carry out scientific research was transposed into national law in 2007.

The second important issue is work on an attractive image for European universities in the world.

Also, an integral part of learning programmes in all disciplines should become followings: Internships, research mobility programmes and collaborative project, which allow students to work with or within a company.

A major effort should be made to achieve the core Bologna reforms by 2010 in all EU countries: modernized curricula at all levels which correspond to the needs of the labour market; and trustworthy quality assurance systems and comparable qualifications (short cycle, Bachelor, Master, Doctorate).

It is important to:

- Promote the value of mobility and to be recognised by university and business; in particular SMEs should participate more in internships;
- Adapt the Legal frameworks for the purpose of support mobility between university and business;
- Recognize and accredit the needs for mobility of academics, researchers or students to business.

By European Forum on cooperation between Higher Education and the Business Community, Mobility is giving following opportunities:

- Transfer of knowledge of the needs of industry to HEIs;
- Transfer of knowledge of how HEIs function to industry;
- Giving graduates’ first hand experience of the labour market;

- Giving and improving teachers' first hand experience of the labour market and using this in teaching;
- Encouraging entrepreneurial potential ambition in graduates through first hand experience of industry.

3.3.2.5. Universities and promotion for Life-long Learning

Continuing education would seem to represent a hugely important potential opportunity for universities and reorientation towards delivering Life-long learning is required.

Continuing education needs close contact between university and business and it is of prime importance that:

- Life-long Learning is to be integrated into the strategies of universities;
- The upgrading of skills has to be valued and recognised on the labour market and by employers;
- Universities cannot design and deliver alone the Life-long Learning that is why it has to be developed in partnership with enterprises.

The European Association of Universities adopted the European Universities' Charter on Life-long Learning, and this document sets out 10 commitments for Universities covering:

- Wider access to learning;
- Diversifying the student population;
- Increasing the attractiveness of study;
- Life-long learning in a quality culture;
- Stronger local, regional, national and international level.

With the growing emphasis on Life-long learning, it is essential to form strategic alliances especially for industry and educational organisations, to ensure complete skilling of employees as part of human resource development. It is not only in the interest of companies themselves to ensure continual training of their workforces; individuals also need to take advantage of regular opportunities to enhance their own skill levels both at work and in their own time [12].

3.3.2.6. To encourage the better university governance

As a precondition for effective collaboration between university and business, the University-Business Forum focused on governance at national, regional and institutional level.

This requires universities to overcome their fragmentation into faculties, departments, laboratories and administrative units and to target their efforts collectively on institutional priorities for research, teaching and services.

All of these represent new internal governance systems based on strategic priorities and on professional management of human resources, investment and administrative procedures.

Intermediary organisations or business associations, European, national or regional bodies or agencies are important actors as they can represent a good interface between universities and companies.

The success of many innovative regions in the US and in Europe has been based on a triangular partnership involving universities, business and government.

3.4. Future Steps

The Commission proposes two forms of follow-up action:

I – To continue the dialogue - The Forum will continue with the structure of thematic meetings and seminars on national and regional level and in addition, need to develop a web space for the sharing and disseminating of experience and for communication.

The Forum should be more open to actors from beyond the EU and should include a focus on lessons which can be learned from

partner countries. The Commission will, publicise the work of the Forum and invite their participation.

II – To develop new Partnerships - The Forum has argued for the creation of new forms of structured partnership between business and universities and such partnerships could be supported via relevant EU programmes, with a view to launching calls for proposals for exploratory actions under the Life-long Learning programme in 2010.

The Commission intends to invite stakeholders to explore future possibilities for cooperation between enterprises and schools and Vocational Education and Training (VET) institutions.

The Commission will encourage national authorities to establish similar national-level dialogue structures.

The Commission will launch a study to establish an inventory on existing best practices in the field of cooperation between universities and enterprises.



*Current state in 4
the WBC region*



4.1 Regional and national background

The renewed **Lisbon agenda** aims to turn Europe into a modern, dynamic, outward-looking knowledge economy. It acknowledges that this is the most effective means of delivering the economic growth and jobs required across Europe. Investment in education, research and innovation – **the knowledge triangle** – lies in the heart of successful economies and is relevant to all regions in the EU. It is widely accepted that there is a positive relationship between R&D investment, innovation and economic growth. Countries that invest in education, research and innovation have higher rates of economic growth and higher levels of productivity in the long-run, particularly where this is embedded in a well-functioning innovation system. This can be the case for both the prosperous and less-prosperous regions of the EU, as well as surrounding regions. Not all regions have the same level of capacity to undertake research and innovation, impeding their long-term growth prospects and contributing to disparities in prosperity across the EU.

It should be mentioned that the aims of Lisbon strategy are also relevant for the **Western Balkan Countries (WBC)** which are expected to incorporate it into their reform agendas. In the knowledge triangle of education, research and innovation, universities play a special role in promoting European standards in education and training. WBC have been already included in the main European processes within areas of education and vocational training, research and usage of ICT technologies, at national as well as regional level. These countries conduct reforms in accordance with **Bologna and Copenhagen processes**, they have signed regional cooperation documents, they participate partially or fully in community programmes or special programmes of EU in the area of education, research and technologies (TEMPUS, FP6, FP7, Youth, Erasmus Mundus, LLL etc.), as

well as in the other forms of the regional cooperation, such as university and/or research networks of SEE: CEEUN, CEI UniNET, SEE-ERA.NET, ERI SEE etc.

4.1.1 Education side

Many WBC universities have not succeeded in making the transition from educational to research institutions and remain pure “colleges” of teaching. With the Bologna Process, this transition is required in order to harmonize with the European education area. Extensive cooperation between academic institutions from the Western Balkans and the EU Member States in the field of higher education is taking place under the Tempus programme. **TEMPUS** funds are of respective size to support the modernization and restructuring of universities in WBCs. According to the estimate of EU experts, links between university and industry must be strengthened in order to bridge the gap between business needs and university services in the area of education and research, to enable permanent transfer of knowledge, to increase financing of innovation. Therefore, it is essential to seek and unlock “technological brokers” – entities which deal with vocational education, research, transfer of knowledge and technologies, and boosting international cooperation.

Upon an initiative by the **Task Force Education and Youth of the Stability Pact** the ministers of education and higher education from the SEE region and Moldova signed a Memorandum of Understanding in 2004, in compliance with the goals of the Lisbon strategy and the “Education and Training 2010” programme. **The Education Reform Initiative of South Eastern Europe (ERI SEE)** is the main instrument for the implementation of activities within the Memorandum, established as a regional platform for co-operation in the fields of education and training, is intended to serve as an interface between the national reforms in SEE and current trends in EU. Through fostering regional co-operation and facilitating capacity building and know-how transfer, ERI SEE promotes common European

standards in education, also in the light of the ongoing EU integration process of the region [67].

In line with the emphasis of the Austrian EU Presidency on quality in education, the IX Conference of European Ministers of Education held in 2006, discussed the widening of the EHEA to the Western Balkans, the main themes in focus were the ongoing integration of the Western Balkan countries into the EHEA, the significance of qualification frameworks for education reforms in a Life-long learning perspective, and the role of the universities for the reform process as a point of synergy between education, research and innovation. The implementation of the Bologna objectives, the participation of higher education institutions in the new Community programmes, and the integration into the European Research Area (ERA), are vital for the higher education institutions of the Western Balkan region. Generated strategic paper a **“Pact for Education” for the Western Balkans** [60] has defined framework for the European support for educational reforms in the WBC region, intended to serve both as source of information and as a basis for discussion.

The Task Force **“Fostering and Building Human Capital”** of the Regional Cooperation Council (RCC) adopted Action plan [90] in this area for period 2009-2010, on the occasion of its meeting held in June 2009, in Zagreb. Here are main upshots, related to three sides of knowledge triangle:

1. Promotion of coherency and coordination between education, training, higher education, research and science by

creating a platform for dialogue and cooperation of actors involved in these sectors is the main aim of TF;

2. It is evident of the growing impact of the “knowledge triangle” on the economic and social development in SEE;
3. Following cooperative action should be undertaken by TF:
 - Lobbying on highlighting the role of education, training, science and research as main factors for sustainable economic development and knowledge-based growth as well as towards policy measures aiming at enhancing innovation capacities and fostering excellence in education and research in SEE;
 - Cooperation of SEE institutions and organizations with EU and international institutions in the area of building and fostering human capital;
 - Providing information related to potential hosting institutions for mobility of students, teachers, education managers and researchers from SEE region;
 - Promotion and management of an innovative networks by providing a structure for cooperation;
 - Facilitating of establishment and sustainable functioning of clusters of knowledge (CoKs).

4.1.2 Research side

S&T system in the WBC Region has not recovered fully yet, after years of international isolation, political instability and economic depression. Though research systems in WBC (Western Balkan Countries) have undergone substantial institutional

The “Pact for Education” for the Western Balkans as an initiative and result of the Austrian EU Presidency is in this sense a political initiative for the mobilization of existing obligations on the part of EU Member States and international partner institutions towards the region, which facilitates the timely integration of all the countries of the Western Balkans into the European educational area. The Pact for Education should thus increasingly support the respective national reform efforts and thus make a contribution to the European perspective of the region of the Western Balkans via education.

The integration of the countries of the Western Balkans into the European education and higher education area in the sense of sustainable and also qualitatively new partnerships between the region and the EU through sufficient pre-accession support and through the transfer of knowledge and expertise is for this reason a strategic objective of the Pact for Education.

and legislative reforms in recent years, they are generally characterized by an unfavorable RTD infrastructure (outdated or inadequate), limited links between universities and research institutes and enterprises, insufficient regional and international cooperation, massive brain drain, lack of national funding due to low level of GDP and transitory economies, as well as weak innovative capacity of the industry sector.

For WB region it means a lot of effort to overcome the current gap and reach requested EU RTD level for successful integration into ERA. Adopting the **“EU - Western Balkan Action Plan in Science and Technology” (WBAP)** [31] on Thessaloniki Summit in 2003 was an important step, which resulted in new initiatives, measures and incentives for RTD systems in the WBC. In order to facilitate S&T policy-related dialogue between the WBC, the EU Members States, and additional countries associated with the EU Framework Programme for RTD and the European Commission, a **Steering Platform on Research for the Western Balkan countries** was launched by Commissioner Potocnik in 2006. This dialogue platform is expected to play the central role in stimulating, monitoring, and supporting policy development in the WBC

and S&T cooperation throughout Europe. The Information Office of the Steering Platform¹ acts as an information point, which provides updates from different programmes and projects, disseminates event announcements, calls for papers and proposals and other relevant news items, reports on innovation infrastructures, needs-offer-matrix which discusses the most pressing needs of the countries and the different funding sources on offer. Since 2008, that Platform has supported by **INCO-NET** consortium (project with 26 partners lasting till December 2011), which provide analytical and practical support for knowledge-based dialogue with a view to implementing a number of joint activities to foster cooperation throughout Europe, activities of the Information Office are continued on an even larger scale.

Publication **“Science and Technology in the Western Balkans”**, edited by Elke Dall in April 2008 [73] consists of seven reports reviewing the condition of Science & Technology (S&T) in the Western Balkans. The objectives of these studies were to enhance understanding of the innovation systems in the WBC countries, and to give an overview of input and output indicators in the S&T systems, to identify significant

¹ www.see-science.eu

“During the last three days, the case has been made to increase efforts on all three fronts: education, research and innovation. I can safely say that we agree that efforts are required at all levels: local, regional, national and international. And I think very few would disagree that both the private and the public sectors must play their part.

...

There are at least three things we can do to strengthen research capacity in the Western Balkan Countries:

- Firstly, we must achieve greater research cooperation at regional level and within European-level programmes;
- Secondly, countries within the region should design integrated research policies; and
- Thirdly, modernization and improvement of research capacity must be made a matter of priority.

...

In conclusion, let me state it in one more way: through cooperative reform and progress in education, research and innovation, this region is developing its identity as a vital part of the wider European family.”

*Janez Potocnik, European Commissioner for Science and Research
Progress and the Knowledge Triangle in South Eastern Europe
UNESCO Policy Forum on South Eastern Europe Higher Education, Science and Innovation
Budva (Montenegro), 3 July 2008*

S&T institutions and other key players important for S&T policy making, and to present relevant S&T policies and strategies.

Besides mentioned platform there are other initiatives and programmes which are aimed to strengthen scientific potential of the WBC region, to address strategic social and economic needs and to facilitate integration of this region into ERA. The **Southeast-European ERA-NET** (SEE-ERA.NET) has been established in order to promote R&D cooperation among consortium members and to contribute to the WBAP implementation. A number of specific objectives, recommendations and implementation scenario have been proposed by SEE-ERA.NET consortium, described in White paper [86]. Consortium launched in 2006 a **“Regional Programme for Cooperation with South-East Europe”** (ReP-SEE), and in 2007 proposed **Joint Action Plan**, which provide unique instruments and measurement for enhanced S&T cooperation with the WBC region [44].

4.1.3 Innovation side

Innovation systems of the WBC are very weak and fragmented. Weak innovation demand at enterprise level and weak innovation support system are the biggest impediment for the greater contribution of research to growth and social development. Supporting actions at national and regional levels are aimed at developing inter-firm clusters and networks, enhancing pan-European cooperation among SMEs. On their road to Europe, the WBCs have made considerable progress in redressing their entrepreneurial environment for SMEs. In most of the WBC, the progress is made by enabling cheaper and faster start-ups. The WBC participate in **the Chapter for Small Enterprises** [66], which calls on subscribing parties to undertake economic reforms in ten policy areas. SMEs’ technological capacity, essential for competitiveness and innovation, is slowly being strengthened in the WBC region. A flexible, knowledge-based economy requires enhanced levels of innovation which would clearly be improved through better and more effective links between research and development centres

at universities and SMEs. Despite of the fact that the proportion of population with tertiary education is comparable with EU25, there are major weaknesses of WBC relative to EU, regarding to public R&D expenditure, number of Science&Engineering graduates, business R&D investments, participation in Life-long learning, number of employment in high-tech manufacturing and services. The lack of effective links between knowledge-producers and knowledge-users constitutes a significant weakness in the regional innovation system.

Thematic report **“Innovation Infrastructures in the Western Balkan Countries”** [38] deals with the situation of innovation infrastructures in the WBC countries and gives overview of established clusters, technology and innovation centers, technological and science parks, business-start-up centers/technology incubators and other related organizations. The general environment, important strategic documents and the main programmes and instruments for support have also been described.

In addition, within mentioned ReP SEE programme, study on **Innovation absorption capacity and transnational cooperation needs in SEE, with particular focus on the WBC**, has been undertaken by Euro consultants S.A [37] in 2007. This study presents policies and programmes supporting innovation (EU, regional, national), list of main innovation stakeholders in SEE and WBC, as well as innovation funding sources. Particular emphasis was put on the analysis of involvement of SMEs in the innovation process, their needs, opportunities and barriers.

4.2 Current state and developed KT structures in the WBC region

This section will briefly present the situation in the areas that make up the knowledge triangle – education, research and

innovation, at WBC universities, institutes and institutions that support businesses and encourage innovation, especially in those PC countries involved in the WBC VMnet project. Emphasis will be put on representation of the established mechanisms and structures as facilitators and the holder of that cooperation, national strategies, initiatives and support programs, centers of excellence, as well as the innovation structures.

4.2.1 Serbia

Since 2000, institutions of higher education in Serbia have been included in the reform and harmonization of legislation and processes in the areas of education, science and innovation, following the European trends, especially the Bologna Declaration and the Lisbon strategy. Since September 2003, Serbia has officially joined other European countries through the signing of the Bologna Declaration in order to create a unique European Higher Education Area. Applicable Law of Higher Education (adopted in September 2005), provides the legal basis for full implementation of the Bologna Declaration and the Lisbon strategy. Although the Faculties are, by this Law, separate entities within universities, universities as such have certain integrative functions, as defined in Article 46 of the Law, such as: Establishment of unified standards of work of departments and services and unified standards for creating data bases of all units, Strategic planning; Adoption of study programs; Quality assurance and control; Enrollment policy; election of teachers; Issuance of Diplomas and Diplomas supplement; International Cooperation, Investment Planning, Employment policy planning and the hiring of teachers and

associates; Establishment and development of A unified information system; Life-long learning.

In Serbia, the educational and scientific activity is performed in 7 accredited state universities (83 faculties), 8 private (46 faculties), 65 accredited colleges, and 56 scientific institutions fully independent from the University.

At the last Ministerial Conference in Louven, in April 2009, Serbia has submitted third Bologna Progress Report, which listed the following priorities and challenges in higher education [7]:

- To develop and implement national strategy for higher education beyond 2010;
- To adopt and implement National Qualification Framework;
- To make the system of higher education more flexible and responsive to the needs of the labor market and of the knowledge society;
- To provide more effective mechanisms of cooperation between HE institutions and employers;
- To introduce the concept of functionally integrated university;
- To reassess student workload;
- To increase the involvement of students in all aspects of Bologna Process implementation;
- To provide fair financing of public HE institutions;
- To establish the Ministry for both Higher Education and Science;
- To increase percentage of research and education funds w/r to the GDP.

Comparing to old legal framework there are some significant structural changes. The leading principles are - as stated in one of the introductory articles- are:

- Harmonization with the European higher education system and promotion of academic mobility of teaching staff and students;
- Participation of students in governance and decision-making, in particular in matters relating to teaching and quality assurance;
- Quality assurance and efficiency of studies;
- Unity of teaching and scientific research and/or artistic work.

Law on Higher Education of the Republic of Serbia, article 4

As it is concluded in **Science and Technology Country Report** [75], Serbia “has demonstrated serious commitments towards creating a favorable R&D platform for the future”. Thanks to adopted National Investment Plan, a number laws² legal framework has been provided for science, education and innovation development. Important novelty in both laws for education and science, introduced the mandatory process of accreditation for universities and institutes, as knowledge and research providers. Progress has also been made with intellectual property legislation, by adopting five new laws and by setting up Intellectual Property Office of Serbia.

In order to establish a knowledge-based society in Serbia, the development of a national innovation system is ultimate objective, as it is stated in this strategic document. **The National Innovation Audit in Serbia** [36] provides comprehensive data on the key aspects on national innovation system and has been undertaken for the first time in Serbia, within Enterprise Development and Entrepreneurship Programme funded by EU and managed by the European Agency for Reconstruction, in 2006. Here are some conclusions, with reference to perceived issues and needs in national innovation system:

- Enterprises need a range of well-functioning supporting services, such as: technology transfer advisory services, product development facilities, technology training, innovation management support;
- Significant weakness in national innovation system is lack of linkages between industry and knowledge institutions;
- The main barrier to more intensive science-industry cooperation and to provision of services to enterprises is lack of finance;
- There are issues related to information and awareness about offered services by the support organizations;
- In general, the financial self-sustainability of so called innovation providers is limited, although there are some institutes

² Law on the Innovative Activities, adopted in 2005; Law on the Scientific and research Activity, adopted in 2005; Laws on IP protection, adopted in 2004

operating successfully by providing services to enterprises;

- It is not clearly defined legal status of possibility of public research institutions to invest and establish spin-off companies.

4.2.1.1 State Institutions, strategies and programs

Ministry of Science and Technological Development of Republic of Serbia (MSTD) prepared new Strategy in June 2009, and organized public debate. **New strategy of scientific and technological development of Serbia in the period 2009 to 2014** was called “**Focus and partnership**” [76]. Focus because it defines a limited list of national priorities in science and technology, such are: Medicine and Human Health, New materials and nanosciences; Environment Protection and Climate Change, Agriculture and Food, Energy and energy efficiency, Information and Communication Technologies; Improvement of public policy making processes and Affirmation of national identity. Partnership because the development of science and technology is the main issue of society, not just of one Ministry, and the implementation of the strategy itself will bring together key players in all areas of Knowledge Triangle not only in Serbia but also abroad.

Organizational unit of MSTD, **Department of Technological Development, Transfer of technologies and Innovation** contributes to establishment of sustainable bridges between research institutions and industry, offering support for the creation and development of SMEs, especially innovative start ups, scientific and technological parks, business incubators, research and development centers, innovative enterprises, etc.

Having in mind pervasive impacts of ICT on national economies and global competition, Government of Serbia adopted **National Strategy for Information Society** development in 2005, as key pre-request for inclusion of ICT technologies into overall development strategy of Serbia, comprising institutional framework, recommendations, measures, strategic opportunities and treats.

VISION OF SCIENCE AND TECHNOLOGICAL DEVELOPMENT OF SERBIA:

“Serbia as an innovative country where scientists reach European standards, contribute to the knowledge of the entire society and the technological development of the economy”

...

Investing in science and technology is, for Serbia, the only way to create a sustainable economy and society.

...

The ultimate goal is to create a national innovation system.

*Bozidar Djelic, Minister of Science and Technological Development
Science and Technological Development Strategy of
Republic of Serbia 2009-2014*

The **National Strategy for the Economic Development of Serbia 2006 – 2012**, and the **Programme for Business Incubators and Clusters Development in the Republic of Serbia 2007 - 2010** were adopted at the end of 2006 [61]. Both documents define strategic measures and incentives of the Serbian Government for improvement of the entrepreneurial and innovation environment in Serbia. There was plan to set up at least 15 incubators in Serbia until 2010. During 2006, the **Business Incubator Support Centre** was established within Serbian Agency for SMEE with main focus on business incubation and help to start-ups. The establishment of the Serbian Association of Business Incubators in December 2006, was of crucial importance for further development of innovation infrastructure in the country.

Ministry of Economy and Regional Development launched the project “**Cluster Development Support**” project in 2007. There were numerous cluster initiatives supported via this project and there were 24 cluster initiatives operating at the end of 2008.

There are several **technology and science and innovation centers** (e.g. Technology Transfer Centre at the University of Novi Sad, Innovation Centre of Mechanical Engineering Faculty Belgrade, Novi Sad Innovation Centre), which have started to operate recently or are

in a setting-up procedure (feasibility studies, expression of interests). Three **S&T parks** were established (Institute Mihailo Pupin, Novi Sad and Nis) within the project “Feasibility Study for foundation of Science & Technology Parks in Serbia”. Business Technology Incubator of Technical Faculties Belgrade was established also and the research of the innovative capacities in the Serbian ICT sector was done.

Dynamic and effective interaction and cooperation among businesses, research community and education centers are crucial for economic growth and promotion of innovation processes.

This cooperation results in specific forms of concentration of interconnected companies, i.e. clusters, which exceed local, regional and national borders. The process of acquiring new technologies, entering new markets and creating new jobs is hardly achievable without institutional support.

Mladjan Dinkic, Minister of Economy and Regional Development, Republic of Serbia

4.2.1.2 University of Kragujevac

www.kg.ac.rs

The University of Kragujevac is the educational centre in the central Serbian region of Sumadija and Pomoravlje. It started its independent operation in 1976 and now it comprises of 11 faculties out of which five are in Kragujevac. University has approximately 1400 students and around 1000 teaching staff. So far 18 000 students graduated from the University, 600 earned their master’s degree and 300 successfully defended their doctoral dissertations.

The Serbian Academy of Arts and Sciences and the University of Kragujevac

*(www.kg.ac.rs/csanu.php) established a **joint Research center** in 1992. The Center comprises ten sections, mostly directed toward research in areas which have not yet been encompassed by the typical teaching and research of the university. The Center’s work is realized through the activities in research projects, publishing activities and organization of scientific meetings, lectures and round table discussions.*

The University Information Center

(www.kg.ac.rs/unic.php), was founded in 1988 and is located at the Faculty of Mechanical Engineering in Kragujevac. It is the center of the university computer network and regional center of Serbian academic network with over 700 PCs on line. It provides computer support, computer networks of the university and all faculties, as well as provision of high-tech network services, organization of end-users' training, desk-top and electronic publishing, etc.

In July 2007, the University of Kragujevac established the **Center for Career Development and Students Counseling** (www.razvojkarijere.kg.ac.rs), in cooperation with the Foundation of Crown Prince Alexander for Culture and Education. The main goal of the Centre is to establish a link between the employers and the recently graduated students, as well as to improve the level of employability of students, providing them with various opportunities for jobs, further education, scholarships, internship, voluntary work and practical placements in the leading innovative companies in order to develop practical skills and better position on the labor market. Besides, Centre also aims to provide a wide range of services to the employers so that the cooperation would be successful and a long-term one. It helps the employers best articulate their needs and be actively involved in shaping of their future staff. It also enables them to promote their companies as socially responsible ones. The Centre for Career Development cooperates with many institutions, such

as foreign cultural centres, chambers of commerce, professional organizations, other career centres etc.

The Centre for Virtual Manufacturing (CeVIP)

(<http://mfkg.kg.ac.rs/centri-fakulteta/centar-za-virtuelnu-proizvodnju/>) was founded in 2006 as scientific-research centre of Mechanical Engineering Faculty Kragujevac, in scope of the project titled "Virtual Manufacturing Support for Enterprises in Serbia". Growth of CeVIP is driven by increasing knowledge content in a variety of activities relevant for development of industry, especially SMEs. CeVIP is equipped with modern equipment and specialized software, unique in Serbia, which facilitates application of technology for Virtual Manufacturing (VM) in design of products, tools and processes, their optimization adapted according to specific enterprises' needs. Transfer and diffusion of these new technologies in economy is basic aim to support the SMEs in process of acquiring the innovations. In line with idea of network knowledge and transfer technologies, CeVIP has established **Virtual Manufacturing Network – VMnet** as efficient industrial-science link, which has already more than **800 members** from the WBC region (large companies, SMEs, R&D organizations, NGO, Agencies for SMEs, entrepreneurs, experts, managers, engineers, researchers, students etc.). Broaden of VMnet is supported within this WBC-VMnet TEMPUS project (www.wbc-vmnet.rs).

Mission

The fundamental mission of University of Kragujevac is to educate, both through teaching and through research, the high quality capable young professionals in all study fields that exist at the university, so that they could be productive in their future professional activities. The aim is further to train scientists and artists to be able to have critical and creative view in applying their knowledge in achieving high standards in the scientific and cultural work, as well as to develop the scientific research at the university itself. The role of University is to contribute, through its educational and scientific work, to spreading of understanding and collaboration between nations and peoples, regardless of national and countries borders, to the benefit both of the humanity as a whole and each individual person. Considering the fact that University of Kragujevac is the only high education institution in a very large region, its mission is also to help economic, social and cultural development of this region by providing the scientific and technical support.

4.2.1.3 University of Belgrade

www.bg.ac.rs

University of Belgrade is the largest (and the most decentralized) among Serbian Universities. It was established in 1905 and today it has 31 faculties and 11 institutes, with around 90000 students and 5000 academic staff. Faculties may be divided into several groups according to subject areas of studies organized in them. Each faculty organizes undergraduate and postgraduate studies in the field for which they are entitled. Interdisciplinary and multidisciplinary studies are organized at the University level (source: TEMPUS report).

The Belgrade University Information Center

(www.bg.ac.rs/csrp/clanice/centri/ic.php) acts as an integrative information service at the University level, and contributes to the strengthening of the role of the University in the society. Its activities are aimed at stimulating the level of communication among the members of Belgrade University through dissemination of relevant information within the University community but also between the University and its broader environment. The main task of the IC is to incite, support and overview the development of the intranet and internet functions (web site). Moreover, IC provides other services, such as electronic publishing, digital libraries, distance learning and implementation of international standards.

The Center for Strategic Management and Strategic Planning (CESMUB)

(www.bg.ac.rs/csrp/clanice/centri/sm.php) was founded in order to strengthen the integrative functions of the University, as well as the planning, organization and implementation of strategic activities of the University. Activities of CESMUB are directed to promotion of new forms of links among faculties within the University, as well as the University with its external environment. As the University of Belgrade is the largest University in Serbia, there is a need for development and implementation of modern and effective organizational structure, as well as managerial system, which are the basic functions of CESMUB.

The Centre for Career Development

(www.razvojkarijere.bg.ac.rs/) has been officially founded by the University of Belgrade in 2006, as joint initiative of the Foundation of Crown Prince Alexander for Culture and Education, the University of Belgrade and the University of Nottingham. CCD as a professional university service has aim to support students and recent graduates in developing practical knowledge and skills relevant for employment, or continuing education upon graduation and to connect them to the business community.

The Center for Science and Technological Development (www.center.bg.ac.rs/) (CENTER)

was founded in 1999 by the University of Belgrade and the Development Fund of the Republic of Serbia. In the CENTER research activities are pursued in two organizational units: 1) Center for Plasma Physics and Plasma Technology; 2) Serbian-Japanese Centre for Scientific Simulations.

Institute Mihajlo Pupin (IMP)

(www.imp.bg.ac.rs) is the largest and oldest institute in the area of ICT technologies in the South-East Europe. It carries out applied research to meet the needs of large utility and traffic companies, trade companies operating in different fields of industry, state bodies and institutions, public security, financial organizations etc. The Institute's intensive international cooperation enables active participation of staff in the European research projects (FP, Interreg, COST, EUREKA, etc.), bilateral projects with other countries, and cooperation with the eminent European institutions such as the Fraunhofer Institute in Germany, with which the MPI founded a Joint Project Office. Within JPO, MPI is uniting ICT expertise and resources with prominent German R&D organization. A wide range of services covers customized IT solutions, software outsourcing, technology consulting, engineering, prototyping, and system design and integration.

The Vinca Institute of Nuclear Science

(www.vin.bg.ac.rs) is a multidisciplinary scientific- research organization which carries out fundamental, developmental and applied research in natural, technical and technological sciences. The Institute carries

out its multidisciplinary scientific research and activities in 13 laboratories, 5 centers and several supporting services and offices. Besides scientific centers there is Centre for Permanent Education.

The Institute for Multidisciplinary Research (IMSI) (www.imsi.rs) is founded to combine fundamental and applied research in several complementary research fields such as materials, environmental sciences and renewable energy, aquaculture, plant biology, biophysics, neurosciences and medical engineering. The total bibliography for the past 10 years is over 350 articles in the international peer-reviewed journals and over 15 chapters in the international books.

Innovation Center of Mechanical Engineering Faculty Belgrade

(www.inovacionicentar.rs) was established with aim to transfer generated scientific, technical and technological knowledge into new and/or improved products, processes and services. Their trained and experienced staff and PhD students perform different kind of researcher with industry and within national technological development and innovation projects, financed by Ministry of Science.

Innovation Centre of Faculty of Organizational Science (www.ic.fon.bg.ac.rs) deals with technology and knowledge transfer in domestic enterprises and industry, in the area of ICT technologies. For this purpose they use generated knowledge, professional potential and IT equipment of Faculty. Moreover, IC has cooperation agreements with two forging partners, leaders in the ICT technologies, IBM and RedHat. It provides better conditions for research and education of PhD students, as well as offer of vocational trainings for companies.

Innovation Centre of the School of Electric Engineering (www.icef.etf.rs) is an organization where scientific results are applied in a systematic and original way, as well as modern technological processes in order to create innovations, new products, technologies, processes and services. This Center offers adequate facilities and working conditions to postgraduates and to the employees, working on innovation projects at ICEF.

The Business & Technology Incubator (www.bitf.rs) has been established as a partnership between the four technical faculties of the University of Belgrade (Civil Engineering, Mechanical, Electrical and Technological/Metallurgical), the Municipality of Palilula and the Democratic Transition Initiative. The project has also received support from the Organization for Security and Cooperation in Europe (OSCE). The aim of the Incubators is to give support in the early stages of business development in the form of subsidized overhead (office and research space and technological and telecommunication infrastructure), administrative assistance (legal, accounting, etc.), as well as business counseling (planning, management, marketing, etc.).

4.2.1.4 University of Novi Sad

www.uns.ac.rs

University of Novi Sad (UNS) is established during 60-ies. It is as a center for higher education and research for the region of Vojvodina. It has often been referred to as a leader in Bologna process reforms in Serbia. University of Novi Sad has around 38 000 students and 3000 academic staff. Presently, it consists of 13 faculties. Nine faculties are located in Novi Sad (seven in one campus), two faculties are in Subotica, one is in Zrenjanin and one in Sombor (source: TEMPUS report).

Novi Sad Incubation Center (NOSIC) was established in 2003, as the seed of a future Science and Technology Park and a joint venture of the Vojvodina Investment Promotion Fund, University of Novi Sad, Free Trade Zone Novi Sad and "Alma Mons" agency for SMEs development. The objectives of incubation in Novi Sad were to provide all the resources that the technology or other entrepreneur needs to build a successful business. With 44 registered enterprises (spin-offs) in high-tech areas, established by university staff or researchers at the University, NOSIC plays an essential role in the Novi Sad economic development. On the other hand, it offers a positive image of entrepreneurship, promotes business incubation concept, contributing to changing a negative attitude toward personal initiative, innovation and risk-taking.

The Technology Transfer Centre (TTC) is located at the Faculty of Engineering and was established within Tempus project UM_JEP-16090-2001 USP, as the first step towards creation of the Science and Technology Park Novi Sad. Legally, TTC is embedded into a wider environment of NOSIC. The TTC interfaces the University with enterprises, chambers of commerce, regional development institutions and local authorities, as profoundly different systems. Also, TTC offers a consultancy for researchers engaged in technology oriented projects, willing to investigate market potentials of the developed products, intellectual property management etc.

The Student Career Development Centre (www.razvojkarijere.uns.ac.rs) of the University of Novi Sad provides information on open positions, internship, scholarships, volunteering and part-time jobs for students. Its aim is to connect academic and business community as well as to improve the level of employability of students. The centre organises presentation of companies, meetings and discussions with employers to facilitate internship placements. The Center also organises workshops, seminars and trainings aimed at employment skills development.

The International Relation Office was formed in 2001 as one of the mechanisms that were needed to facilitate the growing participation of the University of Novi Sad in Bologna-related activities, projects and reforms. Mobility of students and staff is the top priority of the office. Besides international relations activities at the UNS are carried out at other levels, such as student organizations, faculties and departments.

UNESCO Chair in Entrepreneurial Studies (UCES) (www.unescochair.uns.ac.rs) was established in 1992 with the aim to develop and promote entrepreneurial culture among students and young staff as well as in the wider environment (organization of public lectures on entrepreneurship and other forms of Life-long learning at UNS; workshops, seminars, conferences, training organized together with chambers of

commerce, NGOs and other stakeholders; publications, textbooks and different materials for entrepreneurship promotion).

The first **CISCO Entrepreneur Institute (CEI)** in Serbia and Southeast Europe was opened in Novi Sad in 2009, as a result of cooperation of CISCO, the USAID Serbia Competitiveness Project and the Faculty of Technical Sciences. The center delivers CISCO-certified entrepreneurship education on a commercial basis to Serbian entrepreneurs, SMEs and public sector employees in the following areas: Starting a Business, Growing a Business, and Business and Public Services Improvement through ICT.

4.2.1.5 University of Niš

www.ni.ac.rs

The University of Niš is the educational centre of the south-eastern part of Serbia. It started its independent operation in 1965. The University of Niš is a medium-sized and well-developed academic community comprising 13 academic units. The total number of students is around 27 000 and of the teaching staff 1500 (source: TEMPUS report).

Center for Quality Improvement stimulates and organizes quality improvement in the academic public, defines standards and criteria of quality functioning of the University of Niš, develops processes of evaluation, self-evaluation and education quality analysis, gathers information on quality from all system users, examines the causes of long and inefficient studying, develops mechanisms for quality assurance, supports international cooperation and scientific competitiveness and stimulates the professional development of teaching and non-teaching staff.

Center for Career Development was established in 2008 with the help of Foundation of Crown Prince Alexander for Education and the University of Nottingham, in order to support students of all levels in development of skills and abilities that are crucial for their employment, as well as to provide information on education and scholarship opportunities, both national and international. The main role

of the Center is networking of the academic and business community and providing information and services in support of more efficient multi-sector cooperation.

Research Center of Serbian Academy of Science and Arts and University was established in 1990 in order to improve the scientific cooperation between the Academy and the University. The themes of the research are specific problems in the fields of natural, medical, technical and technological sciences, and humanities. The Center is divided into 11 sections, according to the subjects of research.

Center for Multidisciplinary Studies has mission to stimulate and develop education and scientific work in joint areas of two or more sciences. This mission is accomplished through introduction, innovation, development and transfer of knowledge through the teaching process and scientific research, stimulating creativity and invention, as well as strengthening the existing and establishing new connections with other universities, enterprises and institutions in the country and abroad. Basic activities of the Center are two postgraduate courses: Quality Management and European Studies.

Center for International Cooperation prepares drafts for annual and long term plans for international cooperation of the University, supports university staff in preparing of proposals and implementation of international projects with necessary documentation, and establishes contacts with universities and other institutions on the international level.

Innovation Centre for Information Technologies (ICIT) (<http://icit.masfak.ni.ac.rs>) was established in 2002 at Faculty of Mechanical Engineering, with support of Ministry for science, technology and development. ICIT is focused on development of frameworks for application of ICT in industry and support of SMEs in implementation of innovative research results. ICIT successfully deployed more than 30 local and international projects in past three years, primarily in area of ICT education, innovation research & development and capacity building.

4.2.2 Croatia

In the last few years at the Universities in Croatia the situation has been changing positively, especially regarding the creation of a framework for a more active role of science in the process of cooperation with the economy, and thus the general development of the regions covered, as well as the whole country. To this end, Development Strategies of the certain Universities have been made so as to actively respond to new challenges, in particular the integration of Croatia into the European Union, its inclusion into the European research and higher education fields. Here is an overview of the current state of both the Universities of Rijeka, Zagreb, Split and Osijek, and the state institutions and agencies regarding general and innovation strategies, their

Mission

The fundamental mission of the University of Niš is to ensure, through the teaching and research processes, a high quality studies, adjusted to the needs of the local community and Serbia, studies that fulfill EU requirements. Studies are free of charge for all full-time students. University of Niš takes care of the students' standard. It also connects students with prospective employers through its Career Center. University also provides high-quality cultural and sport life to the students.

Further aspiration of the University is to provide professional training to scientists and artists and help them develop critical and creative approach to the implementation of their knowledge in their scientific research and cultural work. Being a higher education institution, a part of its mission is to support economic, social and cultural development of the region.

connections with the economy, and creating a framework for successful cooperation through the offices of science, transfer of technology and innovation, as well as science and technology parks.

4.2.2.1 State institutions, strategies and programs

Ministry of Science, Education and Sports – MSES (<http://public.mzos.hr/Default.aspx?sec=2428>) has launched a Croatian project of technology development which supports the Croatian economy through a variety of programs whose purpose is the improvement of the system of science, scientific infrastructure, encouragement of academic entrepreneurship and the development of stimulative environment for development and growth based on the knowledge of established enterprises. Science and technology politics of the Republic of Croatia 2006 – 2010, and Action Plan 2007 - 2010. for a more specific determination of the implementation priorities are a key instrument in the restructuring, development and modernization of science and technology in Croatia. The result of the Action plan is also the establishment of **the Council for the National Innovation System** with the task to consolidate measures aimed at the establishment and implementation of the National Innovation System - NIS within the MSES.

Following the guidelines adopted by the Government of the Republic of Croatia, **the program “Encouraging entrepreneurship based on innovation and new technologies”** was launched in May 2006, which is one of five sub-programs whose implementation is entrusted to the Croatian Business innovation center - BICRO Ltd. These programs are **RAZUM, TEHCRO, VENCRO, IRCRO** and **KONCRO**, each aimed at financing different categories of users, and designed in such a way to complete one another in the process of financing innovative technology projects, and thus raise the competitiveness of domestic enterprises and products, and create other conditions necessary for successful knowledge transfer.

The Business Innovation Center of Croatia Ltd. – BICRO (www.bicro.hr/en) is a specialized agency of the Ministry of science, education and sports, founded by the Government of Republic of Croatia in 1998. in order to implement government support programs to technological development and to act as the central institution for the development and improvement of innovation and technological system. The clearest idea of what BICRO represents is reflected in its mission, which is a successful and effective support to technological development and commercialization of research results by linking economy with science and by creating financial, material and other conditions for existing and newly established trade companies in order to increase competitiveness or introduce new products and services, and make the public aware of the value of knowledge, innovation and new technologies, and the importance of encouraging the creation of venture capital and public-private partnership. Its vision is to establish BICRO as a key organization in the national innovation system whose basic role is the development and implementation of state support so as to strengthen technological development as a driver of sustainable economic growth of the country.

The Government of Republic of Croatia established in March 2006. **the Croatian Institute of Technology Ltd. – HIT** (www.hit.hr) with the aim to become the central institution of the Croatian technology network. HIT provides support and directs the Croatian development and technology research, monitors and anticipates global technology trends, advises and provides support in matters of intellectual property and technology transfer, provides support and promotes participation in European research and development projects, and to promote the Croatian technological production and research-development potential on a global level. HIT's mission is to develop and implement programs and projects for the functional linking of scientific and research resources with other parts of the social economic system, which will create conditions for the emergence of new technologies and innovations in the

form of new products, production processes and services in accordance with the program of sustainable development and competitiveness on the global market. Croatian Institute of Technology is actively working on spreading education and awareness of the importance of these issues and thus acts as the coordinating point for technology transfer matters and commercialization of research results and protection of intellectual property within the Croatian scientific and academic community.

4.2.2.2 University of Rijeka

www.uniri.hr

The activities for achieving strategic goals at the University and its constituents' level were defined by the operational plan based on the document **Strategy of the University of Rijeka, 2007-2013**. Goal accomplishment is monitored continuously by the criteria (benchmark indicators). One of the tasks is the establishment of **innovation system** of the University until 2010. year, and the organization of a functional and sustainable **science-innovation center** until 2013. Strategic objective number 4 speaks about the active involvement of the University in the economy and community development, and for it has defined criteria such as the increase of the number of joint research projects, studies, project analyses (surveys), expertise and advisory services. Also, transfer of technology through the development of entrepreneurship and the commercialization of knowledge with the increase of the number of protected industrial properties.

University of Rijeka has decided to get actively involved in ERA and EHEA by establishing a functional institutional support system for the application and implementation of international projects. In accordance with the adopted Strategy of the University, and within the TEMPUS project "Capacity Building for Research in Croatia", **Center for Science** of the University of Rijeka was founded. The fundamental mission of the Center is to support University researchers and its constituents in the procedures of proposing and implementing international development

and science projects, especially projects of EU Framework Program.

Office for Technology Transfer, was established within the Tempus project CREATE "Stimulating Croatia's Entrepreneurial Activities and Technology Transfer in Education", and performs tasks related to the disclosure, evaluation, legal protection and commercialization of intellectual property created at the University.

The purpose of Science-technology park was set in the Strategy of the University. **Science - Technology park STeP Ri** (Science and Technology Park of the University of Rijeka) (www.step.uniri.hr) was founded in August 2008, as the first science-technology park in Croatia, by the University of Rijeka, Primorsko-goranska County and the City of Rijeka, in order to encourage faster development of science and entrepreneurship through the synergy of scientific, technological and entrepreneurial resources of the University and the region, and thus create additional values. STeP Ri objectives are:

- Assistance in the establishment and market affirmation of the newly established, so called spin-off companies founded at the University, and the formation and incubation of spin-off companies;
- Protection of intellectual property;
- Development of new products, models, prototypes, therefore new technologies in general;
- Licensing of new technologies into existing regional, national and international companies;
- Connecting the university community members, entrepreneurs and partners on the national and international level.

STeP Ri mission is to create a science-technological and business environment that inspires and encourages the development of science, innovation, creativity and entrepreneurial spirit by providing adequate infrastructure, professional services, consulting and access to strategic network.

Technological-Innovation Center Rijeka Ltd. – TIC (www.ticri.hr) is a science-technologic incubator. TIC helps entrepreneurs to set up

enterprise for development of products or services that are based on a higher or high technology and thus enable their growth and development. The idea emerged at the University of Rijeka in 1994, following the example of technology centers in Europe. Entrepreneurs who have a registered firm or those without one but with products or services that are based on innovation, high or higher technology can join TIC and thus shorten and ease the path of the idea, innovation, knowledge, product or service to market commercialization. To this end, Technology Innovation Center Rijeka founded FIPRO Foundation. The Foundation's goal is financing entrepreneurs with products/services of high and higher technology which have not been given due attention so far, although their business is riskier than other forms of entrepreneurship. The above disadvantages were partly mitigated by the existence of the Foundation for the financing of prototype development. TIC has been operating since 1998. Since then, 35 enterprises with more than 400 highly educated professionals have passed through TIC, 15 prototypes have been made, 20 seminars have been held, TIC has participated in two EU projects, and several innovative projects have been realized.

Engagement of the University, local community (Union of Primorsko-Goranska County's innovators, Center for innovation and technology transfer) and economy (Technology Center, Inc., Tech-nova Ltd.) as regards making conditions for effective technology transfer, and positive atmosphere in the form of encouraging innovation and innovators, is successfully continued by organizing the annual **International fair of new technologies and products**. The goal of the Fair is to connect the economy based on new technologies, science and innovation with young population and to promote technological achievements to the general public.

4.2.2.3 University of Zagreb

www.unizg.hr

Research Strategy of the University of Zagreb 2008-2013 among other things defines the objectives and tasks related to

the strengthening of cooperation between the academic community and the economy as regards joint projects and technology transfer. In September 2009, University also adopted the Innovation strategy, which further confirms and elaborates those guidelines.

The Technology Transfer Office

(<http://technology.unizg.hr/>), University of Zagreb, was founded in January 2008. so as to encourage and support, through their activities, the commercialization of innovative research results and new knowledge that emerge at the University. Office operation has been supported almost from the beginning through the Project of technology development by the Ministry of science, technology and sport, which is also financed by the World Bank. The Technology Transfer Office conducts the commercialization of innovative research results in accordance with the Regulation act of the Technology Transfer Office. The Office is designed as a service to researchers, and the help it provides includes: commercialization of innovative research results, intellectual property management in research and development projects, assistance in establishing cooperation with the economy, information and education (workshops, lectures) of researchers as regards protection and commercialization of intellectual property, collaboration with industry and academic entrepreneurship.

Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, founded the **Center for Technology Transfer Ltd. – CTT** (www.fsb.hr/ctt/index.html) in 1996. CTT mission and goals are:

- Improving the technological processes in the Republic of Croatia, primarily for the needs of Mechanical Engineering and Naval Architecture;
- Linking science and technology with economy;
- Launching innovative projects aimed at sustainable development;
- Life-long training of experts from the economy aimed at successful technology transfer processes and the increase of domestic industry competitiveness.

4.2.2.4 University of Split

www.unist.hr

On February 27th 2009, Senate of University of Split adopted the Scientific Strategy of the University of Split, wherein the need to increase the number and amount of science projects with the public sector and the economy was defined in its objectives and tasks. Also, one of the objectives of Scientific strategy is to enable the transfer of knowledge and technology through: the establishment of science-technology park, through licensing, promotion of innovative clusters, founding of spin-off companies, drafting of appropriate documents for intellectual property management, and establishment of the Technology transfer office.

The Technology transfer office – UTT

(www.utt.hr) was founded within the Tempus project CREATE “Stimulating Croatia’s Entrepreneurial Activities and Technology Transfer in Education”. Its objective is to become the meeting point of the University and economy, and to that end, the Office provides support to researchers in all phases of technology implementation: from the idea, invention, process of intellectual property protection to establishing enterprises and commercialization of intellectual property. As part of the European entrepreneurial network – EEN, the Office offers a wide range of services to entrepreneurs and scientists.

Office for Science

(www.unist.hr/Default.aspx?alias=www.unist.hr/znanost) was established in 2007 at the University of Split within the Tempus project “Capacity Building for Research in Croatia”. Office of Science was founded to enable the scientists and administrators to develop a scientific strategy of the university, to increase the involvement of Croatian scientists in research projects of the European Community, to help scientists with the application, management and completion of international projects, in particular the projects from The Seventh EU Framework Program.

4.2.2.5 Josip Juraj Strossmayer University of Osijek

www.unios.hr

The Strategy of international science-research projects at the University of Osijek till 2012.

defined the objectives and activities for their achievement. One of the objectives of the Strategy is to encourage inclusivity, not exclusivity of international cooperation - the establishment of interdisciplinary and international network of researchers at the University level, which includes the activities for increasing cooperation with the economy through planning and implementation of intensive knowledge transfer programs (so-called Knowledge Management).

The main components of the **Program for technology transfer development at the University of Osijek** are:

1. TEHNOPOLIS - the establishment of the technology park at the premises of the former Biotechnical science-education Center in Osijek;
2. Center for excellence in agriculture – the establishment of the center which includes experimental station for conducting experiments in the fields of agriculture and food technology;
3. Development of the Technology – development center in Osijek, which includes the opening of the Office for technology transfer at the University campus;
4. Adoption of Regulation act of technology transfer which regulates the technology transfer based on the results of publicly funded research.

Technology Development Centre Osijek Ltd. – TRC

(www.tera.hr) was founded in 2002. as a result of cooperation between Josip Juraj Strossmayer University of Osijek, city of Osijek and Osijek-Baranja County. The Mission of TRC is:

- Knowledge based development of economy by using significantly improved existing technologies (products, services, processes and procedures with added value);
- Commercialization of publicly funded researches of the University of Osijek;

- Organization and coordination of science-research and development projects for the needs of industry in collaboration with members of the University and other relevant institutions;
- Supporting regional development and retention of entrepreneurial and qualified workforce in the region;
- Business support to enterprises that have entered the Incubator of Technology – development center in Osijek Ltd. and outside it.

4.2.2.6 Innovative companies

Rudjer Innovations Ltd. – RI (www.r-i.hr) began operating in early 2007. as a daughter company of the Rudjer Boskovic Institute with the aim to encourage cooperation and partnership of research institutes, faculties and innovative communities with enterprises from the economy. Rudjer Innovations represent and protect intellectual properties of innovators and have an important role in technology transfer and innovative technologies application. The company connects science with the economy and industry, and through partnerships with academic, innovative community, and economy is open to the entire Croatian community, providing them with support through the commercialization of ideas, innovations, or results of scientific research. Technology transfer includes appropriate management of intellectual property and its transfer from science to industry so as the innovative ideas become a finished product.

4.2.2.7 Local communities

Regional Development Agency Porin Ltd. (www.porin.hr), has arisen from the Business Incubator of the same name, which was established in 1996. in Rijeka. Regional development agency is an institution for formulating and implementing projects that encourage regional economic development. Through work integration of regional economic entities, and local and regional institutions, through promotion of regional

resources and attracting foreign and domestic investments, it stimulates development of entrepreneurship, application of modern technologies and employment, as well as the quality of life in Primorsko-Goranska County. Basic activities are aimed at:

- Drafting and implementation of strategic documents for Primorsko-Goranska County, and monitoring of regional development for the Regional operational program PGC 2008-2013 and preparation of the County's development strategy;
- Raising the competitiveness of the region and economic operators through involvement in international and local consortia, systematic entrepreneurship (networking, internationalization, counseling, working with target groups, growth and development of SMEs, warranty instruments), institutional cooperation with domestic and foreign partners, systematic entrepreneurial infrastructure (business incubators, info center, EU info home);
- International cooperation through economic cooperation and the drafting and implementation of EU projects in accordance with most EU framework programs;
- Attracting domestic and foreign investors;
- Management and development of human resources through informal education for all target groups and their availability on the labor market;
- Promotion of the region and economic operators.

Technology Park Zagreb Ltd. – TPZ

(www.raza-tpz.hr/Default.aspx?sid=153), part of the Development Agency of Zagreb, is the first technology park, business incubator for high technologies in Croatia, established in 1994. Technology Park acts as an entrepreneurial incubator, and helps small entrepreneurs to realize their entrepreneurial initiatives in the early stages of growth and development. Mission of TPZ is:

- Creation of new entrepreneurs through the encouragement of entrepreneurship in the areas of development and high technologies in the City of Zagreb and through helping

entrepreneurs with the realization of their entrepreneurial projects;

- Opening new workplaces and encouraging the development of new, export-oriented products that are competitive on the international market;
- Helping innovators and young entrepreneurs in the realization and commercialization of their innovations and entrepreneurial projects;
- Creation of positive atmosphere in the society for the development of entrepreneurship and product development, and product development;
- The development of professional, technical and business confidence in the conditions of globalization.

The goals and tasks of TPZ:

- Participation in achieving the objectives of the Encouragement program for the development of the small businesses of the City of Zagreb;
- Expanding productive and technological capabilities of Zagreb;
- Attracting new, modern, high, clean and profitable technologies;
- Entrepreneurship encouragement and the creation of small private companies in the area of product and high technology development;
- Attracting entrepreneurial and capable professionals and enabling them to realize their entrepreneurial ideas;
- Making connections between science, innovation, business and market;
- Knowledge transfer from development institutions to industry, that is, information necessary for the development and entrepreneurship;
- Helping innovators to become entrepreneurs, etc.

Business Incubator Ltd. – BIOS

(<http://www.inkubator.hr/>) in Osijek. Mission of BIOS is supporting the development of small and medium enterprises through the provision of business premises and provision of business and other services in the most critical stages of enterprise development and thus participating in economic development of the region and

unemployment reduction in the region. BIOS objectives are:

- To participate in the economic development of the region;
- To promote local entrepreneurship and help with the development of new enterprises;
- To increase the number of enterprises that continue to operate successfully on the market;
- To reduce the likelihood of collapse of start-up companies;
- To reduce the time required for the establishment and growth of the enterprise and make these processes more cost efficient;
- To provide business, technical, educational and other services to incubator clients and small and medium enterprises in the region;
- To encourage innovation and development of new technologies;
- To encourage the commercialization of scientific research;
- To reduce unemployment and retain qualified workforce in the country;
- To open opportunities for young professionals and accelerate the creation of innovation;
- Cooperation of enterprises based on knowledge with the regional academic community;
- Research commercialization and technology transfer;
- Substitution of imported products with domestic ones, and education of entrepreneurs, i.e. adoption of appropriate professional skills and abilities.

4.2.3. Bosnia and Herzegovina

In the period 2005-2009, Bosnia and Herzegovina (BiH) recorded significant progress in the Bologna process implementation. The biggest merit for this goes to the state Universities in BiH, the

international community, as well as the more active involvement of the BiH Council of Ministers in matters of coordination of higher education. Since the academic year 2005/2006, at all public Universities in BiH, the implementation of the first cycle, in accordance with the Bologna principles began. The reform of curricula and their adjustment to double-cyclic system of studying have been made, and preparations for the third cycle (PhD studies) have begun. BiH is on the last place in the field of science and technology from all the countries of Southeast Europe. In the last few years in BiH, the situation is developing in positive direction, in the terms of creating the framework for the more active role of science.

4.2.3.1 State Institutions, strategies and programs

Bosnia and Herzegovina (BiH) is a state composed of two entities: the Republic of Srpska (RS) and Federation of Bosnia and Herzegovina (FBiH). Furthermore, FBiH is administratively divided into ten cantons. The special administrative unit is the District of Brcko (DB). In Bosnia and Herzegovina today, there are 8 public universities, of which two are in the RS: University of Banja Luka and the University of East Sarajevo, and six in the FBiH: University of Sarajevo, University of Tuzla, University of Mostar, University Dzemal Bijedic in Mostar, University of Bihac and the University of Zenica. At the end of 2008, in BiH, there were nine private universities (3 in the FBiH and 6 in RS), and several independent faculties and high schools (colleges). Within the public and private Universities in BiH currently operate 140 faculties, 10 academies, 16 senior high schools, 4 religious faculties and 4 international studies.

Management structure in the education sector is very complicated in Bosnia and Herzegovina. In the BiH Federation the responsibility for education, including higher education, belongs to the **Federal Ministry of Education and Science**, where each of the ten cantons has its own Ministry of Education and Science. In the Republic of Srpska, the responsibility

for education belonged to the **Ministry of Education and Culture of Republic of Srpska**, and scientific research activities to the Ministry of Science and Technology of Republic of Srpska. In addition, there is a state-level **Ministry of Civil Affairs of BiH - MCP**, which has a Department for Education and the Department of Science and Culture, whose role is to coordinate activities in the field of education at the state level, to coordinate the plans of government entity bodies and to define strategies at the international level in the area of education, science and culture. Financing, management and organization of Universities in the RS are based on the Law on Higher Education of Republic of Srpska.

The Government of Republic of Srpska adopted the **Action Plan of support for the establishment and development of business zones in the Republic of Srpska 2009-2013**. The launch of two business zones with fully built infrastructure and two zones with partially developed infrastructure is planned.

Last year, Ministry of Civil Affairs of BiH, adopted **Strategic directions of development of education in Bosnia and Herzegovina with the implementation plan, 2008th-2015th**, a document that gives the main directions of development of education in Bosnia and Herzegovina up to the year of 2015. **The Strategy for the development of science in BiH 2010-2015**, a document that gives strategic guidelines and action plan for the development of scientific activities in Bosnia and Herzegovina for the period of 2010 to 2015 is under construction.

The reform at all Universities in BiH has been undergone, with the aim of becoming the part of European higher education community. All public Universities in BiH participate in projects within the EU funds through the Tempus, Erasmus Mundus and the Framework Program for Research and Development (FP6 and FP7). Austrian Development Agency (ADA Austrian Development Cooperation), Open Society Fund BiH and the BiH Ministry of Civil Affairs have supported the establishment of National contact points system for the EU Framework Programs in Bosnia-Herzegovina (NCP FP BiH). NCP FP BiH system consists of a main office in Sarajevo and regional offices at

universities, which enables the implementation of activities in the entire territory of BiH.

The development strategy of BiH for the period 2010 - 2015, which is in the developing process, the analysis of the importance of science and research, development of technology and innovation as the main conditions for achieving the competitiveness of medium developed countries is planned.

4.2.3.2 University of Banja Luka

www.unibl.rs/sr

University of Banja Luka has thirteen faculties. University of Banja Luka and certain faculties have concluded a great number of contracts of cooperation with higher education and scientific institutions in the RS, FBiH and the number of countries such as: Bulgaria, Italy, Japan, Macedonia, Norway, Poland, Russia, Slovenia, Serbia, Thailand, Ukraine, Finland, France, Croatia, Montenegro, Spain and other European countries in the framework of international projects. In addition to international projects faculties, participate in a number of projects financed by domestic institutions.

In December 2007, the Ministry of Science and Technology of Republic of Srpska together with the Universities of East Sarajevo and Banja Luka, initiated the project entitled **“Capacity building of science-research and higher education institutions in RS for participation in international programs (Center for project management)”** which aims to strengthen the resources of higher education, research, and all other institutions in the Republic of Srpska for participation in European programs for science and higher education and to improve the quality of their international cooperation.

Project Management Center was established within the Ministry, and its responsibility is to work on technical assistance to all potential users, such as state and private universities, research institutions, public sector, NGOs, small and medium enterprises, and others, through direct engagement of the Center’s staff in designing project proposals for the European Commission

calls for tenders, preparing and completing the project proposals, financial management of projects, direct consultations with participants in the project, the distribution of necessary information, consultation with foreign partners and collecting the necessary knowledge and experience on international projects. The Center works on promotion of the Seventh Framework Program and the preparations for the inclusion in other European programs for science and research, in cooperation and coordination of activities with the National Office for the Framework Program in Bosnia - NCP FP BiH, which is located in Sarajevo. The Center’s Staff work on the education of potential users (workshops, seminars, direct presentations and consultations in institutions). This is the first center of this type in Republic of Srpska in Bosnia-Herzegovina, which provides all users with full service.

With the support of the University of Banja Luka, Republic of Srpska Government, Government of Norway, the City of Banja Luka, Republic Agency for development of small and medium enterprises, **the Foundation “Innovation Centre of Banja Luka”** was established. In achieving its objectives, center focuses on three main elements: business incubator, consulting and training. Establishing the business infrastructure will enable small enterprises to become active and profitable on the market. The Foundation will be the place where foreign companies will come for possible joint ventures with local companies, whilst the cooperation with the University of Banja Luka will enable it to become the centre of development activities. Within the Innovation Centre, the company will be established, which will specifically support the development and robotization of small and medium enterprises.

Agency for Cooperation, Education and Development - ACED organizes practice for students of the Faculty of Agriculture, University of Banja Luka within their project activities **“Development of entrepreneurship in agriculture”**.

4.2.3.3 University of East Sarajevo

www.unssa.rs.ba

University of East Sarajevo has seventeen faculties. The University has completed and launched a series of projects for the development of the University. The establishment of the Agency for the Development of East Sarajevo is under construction.

4.2.3.4 University of Sarajevo

www.unsa.ba

In order to develop and improve the scientific disciplines that are studied at the University of Sarajevo, scientific research and art research activities are done at universities/academies – members of the university, in the areas of medical, technical, natural sciences and mathematics, biotechnical, social sciences and humanities, and art. Within the 23 member institutions of the University of Sarajevo, there are currently a total of 25 institutes and centers, and a large number of laboratories. As associated members of the University four institutes have also been established. Faculty of Electrical Engineering team, University of Sarajevo, realized the application Database of researchers and research organizations in BiH.

4.2.3.5 University of Zenica

www.unze.ba/

University of Zenica is the youngest organized higher education institution in BiH. The University has launched a series of projects for the development of universities, including the internal university project „**Constitution and development of scientific and technological park Zenica**“. These projects aim to make the most direct transformation of University from teaching towards entrepreneurial. University of Zenica appears as one of the founders and strongly supports the activities of the constitution and development of the park.

Center for innovation and entrepreneurship started operating in 2008. The main activities of the Center are:

- Promotion of innovation and entrepreneurship within the student and teacher population;
- Maintenance or participation in conferences, counseling, practicum (workshops), fairs and the like;
- Cooperative function between the University and the labor market as regards creation and development of new curricula;
- Development of innovative and entrepreneurial activity within the student body through its seminar and final graduate exam papers that are needed by the industry of the region;
- Help in creating research for master's and doctoral dissertations that are needed by the industry of the region and BiH;
- Development of business plans and establishment of innovative enterprises through prototypes` development;
- Support programs to the development of spin-off and spin-out companies within the academic community and support to SMEs in the region in their strong business growth and development;
- Helping innovators and entrepreneurs in the region with the realisation of their ideas;
- Helping with the cluster organization of SMEs and technology transfer from the developed parts of the world.

4.2.3.6 University of Tuzla

www.untz.ba

University of Tuzla has seven faculties. University of Tuzla has established **the Business Start-Up Center of the University**. The Center aims to promote and develop the idea of entrepreneurship with students on graduate and postgraduate studies and graduates of the faculty of the University of Tuzla. The Center provides the students with business planning education through trainings and consultation, as well as with business consulting services in order to support the students and graduates to design and develop ideas based on knowledge and to start their own business. Within its existing laboratories, University provides incubation for innovative business

ideas that are based on knowledge gained during studies. Target groups are: seniors of all faculties of the University of Tuzla, the young people who have recently graduated and have not found employment yet, but who want to acquire entrepreneurial skills and graduate students.

4.2.3.7 University Džemal Bijedic in Mostar

www.unmo.ba/

The two institutes have been established at the University: **The Institute of Mechanical Engineering and The Institute of Design and material and construction testing of Civil Engineering Faculty**. The Institute of Mechanical Engineering was the carrier of scientific work, the holder of knowledge transfer, the bridge between industry and universities, the connection between the production process of fundamental research and higher education. In the Department of Design and material and construction testing the laboratory has been equipped for geomechanic testing, power unit testing, and testing of concrete and its components, chemical and construction testing, as well as geodesic measurements. This creates the conditions for the strengthening of the Institute and the inclusion in the teaching process and development projects.

4.2.3.8 University of Mostar

www.sve-mo.ba

University of Mostar is a participant of the project **“Quality Management Procedure for Promoting University-Enterprise Cooperation”**, Tempus programme n ° CM_SCM-C024A06-2006.

The initiative has been started to establish the Technology Park Mostar. The objectives of the Technology Park Mostar are:

- To assist in the establishment, growth and development of technical companies which are currently needed in the region and those that can export their products and services;
- To raise the competitiveness of the entire region, based on technological development;
- To promote and derive innovation;
- To support and stimulate research in

cooperation with the faculties of natural and technical sciences;

- To develop personnel resources through seminars, courses and workshops;
- To organise technical education for the youth;
- To polarise technical and engineering professions.

4.2.3.9 University of Bihac

www.unbi.ba

University of Bihac has seven faculties. Technical University of Bihac has launched several projects aimed at improving the teaching process and knowledge and technology transfer in the industry.

4.2.3.10 Local communities

Development agencies have an important role the development of local communities. Some of the agencies in BiH are listed below.

Republic Agency for development of small and medium enterprises in Banja Luka

was founded with the aim to support the establishment and development of small and medium enterprises and entrepreneurship in Republic of Srpska. Republic Agency for development of small and medium enterprises formed several regional development centers in the Republic of Srpska.

The objectives of the agency are:

- Increasing the participation of SMEs in the overall industry of Republika Srpska;
- Modifying the structure of activities with the increase of participation of productive activities and services in the gross domestic product;
- Increasing technological development, competitiveness and opening new markets for small and medium enterprises;
- Increasing the number of enterprises and newly employed workers in these enterprises;
- Education for entrepreneurship and training of entrepreneurs;

- Establishment of regional cooperation with neighboring countries in order to exchange experiences and realize regional comparative advantages for entrepreneurship.

Agency for local economic development

ZEDA seated in Zenica was established by Zenica municipality. The Agency has been operating since 2004. The aim of the agency is to become the most important development institution with the main objective to follow the development priorities of the municipality, to create partnerships for the implementation of development projects, to prepare them and coordinate their implementation.

The main activities are:

- Development of business environment;
- Supporting the creation of new enterprises;
- Increasing the competitiveness of small and medium enterprises;
- Development of business services market with the organization and support of high-quality entrepreneurs.

Sarajevo Regional Development Agency SERDA

has a mission to create a positive environment for sustainable economic development in Sarajevo macroregion, and then to strengthen and promote development in the region through mobilisation of available resources.

4.2.4 Montenegro

University of Montenegro (www.ucg.ac.me), based in Podgorica, actively cooperates with the enterprises of Montenegro. It can be said that cooperation is more represented on faculty basis than the University. University has legally regulated some forms of cooperation. For example, the actual and most important cooperation is cooperation with the **Union of Employers of Montenegro (UEM)** and the Institute for the Black Metallurgy AD Niksic.

University of Montenegro and the UEM adopted the agreement that regulates their cooperation

with the recognition and respect of statutory and program assignments. The main task of the business-technical cooperation is adequate and timely exchange of information on requirements and possibilities of profiling and employment of young professionals who are studying at the University.

According to the agreement on business and technical cooperation **University** agrees to:

- Inform UEM with study programs organized at the University units, the number of students in the final years and their success;
- Enable UEM to present plans for employment of graduated young professionals;
- Inform UEM about the needs of students for the performance of professional practice, including professional training of students from other universities (exchange-students);
- Consider UEM suggestions regarding study programs;
- Plan upon request of UEM rational forms of knowledge innovation of employees to make them acquainted with new scientific, technical and organizational achievements;
- Plan training and other forms of education within its jurisdiction, which are of interest for the development of economic environment and the implementation of the concept of learning throughout life.

UEM agrees to:

- Follow the development of its members and their need for professional personnel and inform the University about that;
- Present its members the information on study programs, recommending scholarships for talented students;
- Conduct procedure review study plans, at the request of the University, with its members and provide timely comments and suggestions;
- Track and inform the University about the success of young professionals who are hired after studying at one of the members of UEM;
- Prepare and conduct training needs for employees and presented them to the University;

- Provide at the request of the University conducting of professional practice of students in its member country or with partners abroad.

University and UEM agree to mutually exchange information about the needs of service delivery for development of projects, use of laboratories, workshops, office space for seminars and other occasional needs.

Taking into account the results achieved in the course of several years very successful and useful cooperation between a certain number of University units and the **Institute for the Black Metallurgy AD Niksic**, they officially signed **the agreement on scientific and educational cooperation**.

Cooperation takes place through the following forms:

- Teaching-practical exercises for students and postgraduates;
- Services required for the development of master's and doctoral theses;
- Expertise;
- Working on projects, new materials, and new products.

In accordance with the agreement the Institute shall be obliged to put at the disposal the research equipment, expert staff for practical work and work in progress reports on the results of University research individually and in groups as a whole.

Faculty of Metallurgy (FMT) (www.mtf.ac.me) provided on its own basis the cooperation with companies, as well as Montenegrin municipalities where engineers are required to strengthen the staff capacities. Companies and institutions plan to successful students of FMT offer variety of forms of support through scholarships, vocational training and employment opportunities.

Faculty of Economics in Podgorica (www.ekonomija.co.me), the oldest and largest University of Montenegro, similar to processes that occur at the level of the whole society, is undergoing a period of significant change. In terms of quality improvement and cooperation FE has established numerous contacts that have already been made under various forms of cooperation with the most successful companies in Montenegro

and their signed agreements on long-term business cooperation.

In addition, FE has a very rich and formalized cooperation with relevant institutions such as:

- Agency for Small and Medium Enterprises;
- Agency for Economic Restructuring and Foreign Investment of the Government of Montenegro;
- Republican Secretariat for Development of Economy;
- The Republican Employment Agency;
- Republican Fund of the Pension and Disability Insurance;
- Association of Independent Trade Unions of Montenegro;
- Union of Employers of Montenegro;
- Chamber of Commerce of Montenegro;
- Montenegrin Association of Management and Entrepreneurship;
- Development Fund of Montenegro.

University of Montenegro, directly or through its unit cooperates with many scientific and educational institutions in the country and abroad. Cooperation with foreign countries is realized within the framework of international university associations and networks, as well as through bilateral agreements.

Since 2002, The University of Montenegro carried out several projects within the framework of the program of the EU: TEMPUS, SOCRATES, and ERASMUS-MUNDUS. University of Montenegro achieved significant cooperation with the UNESCO, the Council of Europe, American Council, OM WUS Austria, British Council, DAAD, etc.

4.3 Perceived problems, needs and offers

Based on comprehensive analysis of regional and national background, results of previous initiatives and similar projects [12, 36, 37,

38, 52, 57, 66, 88], performed by consortium members involved in development of new regional model and preparation of this publication, following summarized **problems and needs** have been perceived, in the areas of education, research and innovation, as well as SME potential and their needs, relevant for the WBC-VMnet project and its aim to integrate knowledge triangle:

a) University-enterprise cooperation

- There is the lack of effective linkages between knowledge institutions (HE and R&D) and industry. Although universities and enterprises have policy in their mission statements that mention the need to cooperate, efficient legal and policy arrangements that provide a sound and supportive environment for university–enterprise cooperation do not yet seem to have been established;
- Universities find it difficult to attract social partners (Chambers of Commerce, Regional Development Agencies...), who do not consider university–enterprise

cooperation as part of their portfolio;

- There is little awareness of the mutual benefits of cooperation with industry;
- Actual cooperation between university and industry takes place with large companies – often branches of multinationals, because these have a critical mass of qualified staff who can find a common language with teachers and researchers, they have better equipment and infrastructure, longer-term strategies and more money;
- Despite of fact that universities consider SMEs to be the most relevant and interested partners for cooperation (98,9% of regional enterprises are SME), cooperation with them is not so active since they tend not to have the same long-term perspective, usually look for immediate practical solutions and provide low financial rewards.

b) Higher education and training for SMEs

- Universities are focused on academic knowledge, since curricula are so much theoretical and insufficiently oriented towards

In the current Tempus partner countries, as elsewhere in the world, enterprises need graduates who can combine good professional knowledge with the social skills that are required in a professional environment. Companies often complain that university curricula are too theoretical, too academic and insufficiently oriented towards professional practice and experience. They look for graduates with good life skills, such as communication skills, team-working abilities, leadership skills, reliability, creativity, commitment, problem-solving skills, negotiation and decision-making skills, independent learning skills and flexibility. Closer cooperation between universities and enterprises can help students to develop these skills.

Enterprises want short-term success on the market and are open to cooperation with universities in order to have access to potential future employees. They are also interested in know-how and expert knowledge on innovative products and processes. Universities are much more oriented to the long term, and are interested in innovative teaching and research in general. They have little entrepreneurial spirit, as their institutional environment does not require it.

Major drivers for university–enterprise cooperation include the need to transfer knowledge and technology and the need to recruit adequate human resources to be competitive and innovative in a global economy. The joint development of education and training for the labour market – promoting employability – is of common interest.

Despite efforts to formalize relationships, personal contacts rather than institutional policies seem to have been the best guarantee for success and sustainability of projects up to now. Cooperation has had little impact on the institution as a whole. There are few support structures and platforms, and little dissemination of good practice for cooperation between universities and enterprises.

*Linking the worlds of work and education through Tempus;
European Commission Directorate - General Education and Culture,
European Communities, 2007;
ISBN: 978-92-9157-486-5*

professional practice and experience; there is lack of IT skills, entrepreneurial culture and customer focus which are needed to help the students to translate ideas to products that are commercially viable;

- Employers are generally not involved in the definition of higher education programmes; jointly developed programmes can improve the employability of students and ensure their relevance to the needs of the labour market;
- The rate at which individuals are engaged in Life-long learning is less than half of the EU25 average;
- State support for small business training is still limited to business startup, management and administration. There is little in-house or own-funded training effort within enterprises. There is a need for significant additional promotional and training effort, but this will require firstly improving in-house capacities of the innovation support organizations;
- Small business training needs analysis does not exist or is based on 'ad hoc' surveys only, without systematic collection of data on the training needs or training consumption in SMEs, so offered training is not sufficient to meet enterprise requirements;
- Quality assurance mechanisms for the training sector is significantly underdeveloped;
- The greater part of the region SME sector is unable to participate in or benefit from ongoing training developments, for reasons of accessibility and costs, so that

public funding is currently the main force driving the training market.

c) Innovation and competitiveness of enterprises

- There is a low level of awareness of the concept of innovation and its role in economic growth and competitiveness among general public, policy-makers and many enterprises;
- Cooperation between universities and enterprises is generally at a very low level in terms of technology innovations and transfer, since there are few support structures and platforms, and little dissemination of good practice for existing cooperation;
- Main barrier to the provision of services and trainings to enterprises and to more intensive knowledge and technology transfer is lack of finance.

Within **REPSEE programme** (www.see-era.net) a study on innovation absorption capacity and transnational cooperation has been conducted, aims to identify and analyse existing research, technological development and innovation cooperation in SEE region, in particular in the WBC countries. The innovation issues that have been examined include:

- Innovation role;
- Innovation activities;
- Innovation needs (infrastructure, services, collaboration & networking, financial support);
- Involvement and interest in collaboration, networking or mobility activities.

In many cases, universities in WBC are teaching institutions with only a low level of RTD activities, resulting in questionable quality of university diploma, minor international competitiveness of graduates and low attractiveness of research career in general.

This problem can only be seen in a wider context, since it is the result of other developments and factors like e.g. devastation of RTD infrastructure, international isolation, low level of public funding, gap to international developments (Bologna process), traditional role of universities etc.

Still, also the WBCs face with the requirements set by the Bologna process. In order to accomplish these objectives, universities in WBC need to undergo the transition process. Here, the renewal of university curricula and adoption of international standards is a core objective.

A corresponding questionnaires was circulated to the main innovation stakeholders in WBCs:

- National structures supporting enterprise and innovation policies and programmes, (Ministries of Economy and/or Labour, Ministries of Science and Education);
- Business and innovation support institutes (Agencies for business or SME development, Regional Development Agencies, Business Support Centres);
- Research, technological development and innovation (RTDI) centres (Technology transfer centres, Technology parks);
- Technology and business incubators;
- Chamber of Commerce and Industry;
- SME networks or clusters.

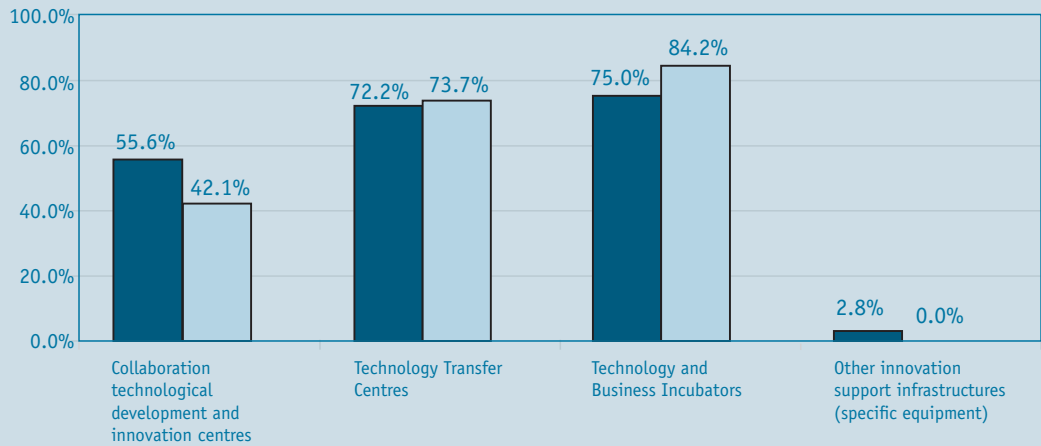
The survey results, fully presented in report [37], shown that:

- Collaboration and networking is the strongest innovation need, whereat exchange of experience and know-how is the main, followed by networking for innovation promotion;
- Technology transfer, training and human resources development are the main innovation support needs;
- Financial support needs are mainly towards the creation and development of innovative start-ups;
- There is particular interest for innovation networks, joint innovation activities and mobility;
- The types of collaboration of most interest are transnational collaboration, interregional, regional and science-industry collaboration.

■ SEE Countries

□ WBC

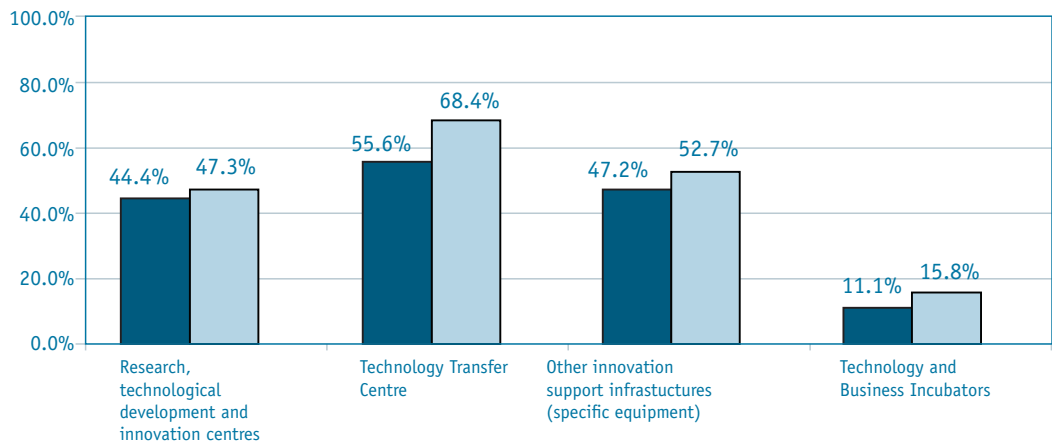
Collaboration and networking for innovation needs [37]



■ SEE Countries

□ WBC

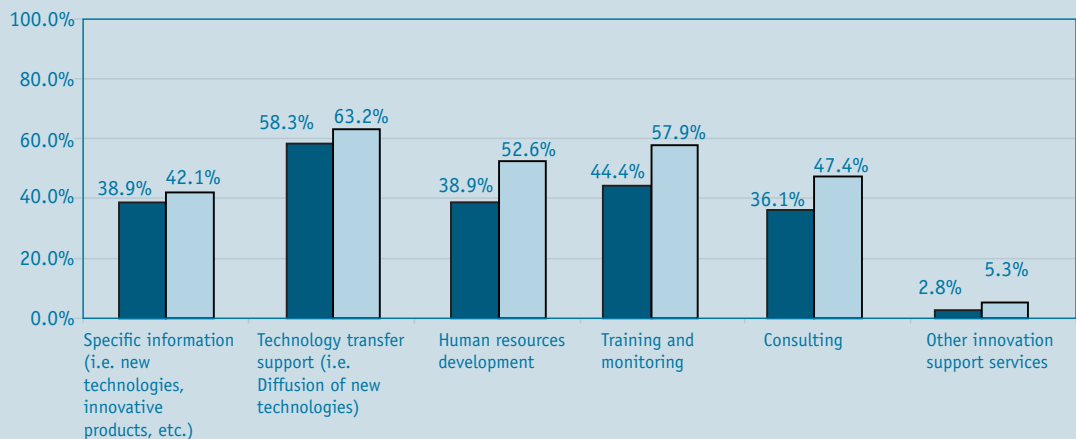
Innovation support infrastructure needs [37]



■ SEE Countries

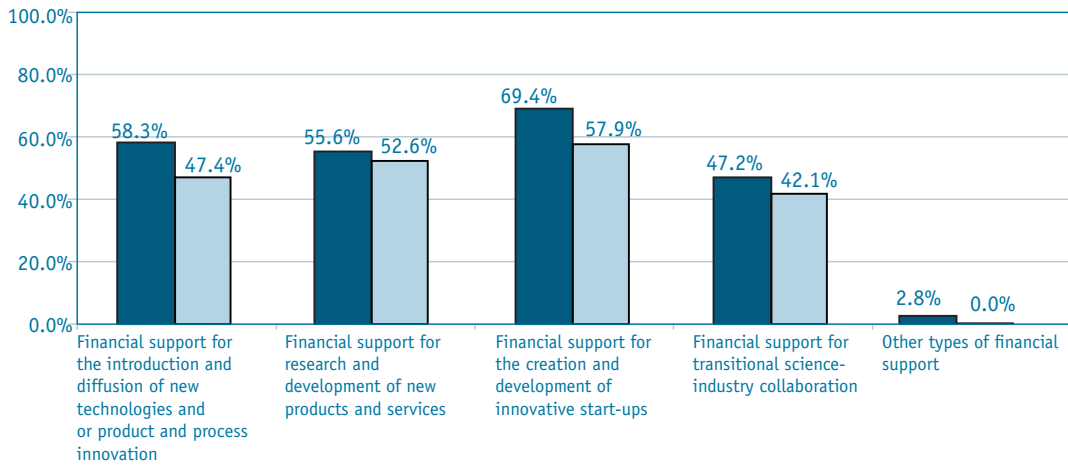
□ WBC

Innovation support service needs [37]



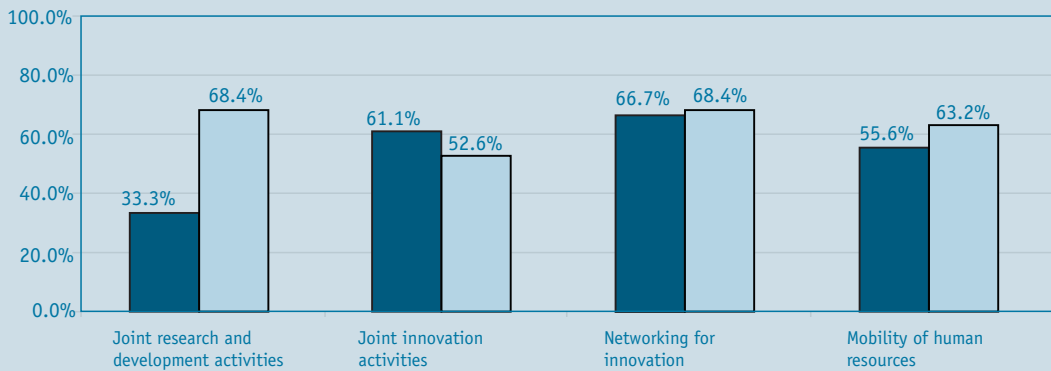
■ SEE Countries
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Financial support for innovation needs [37]



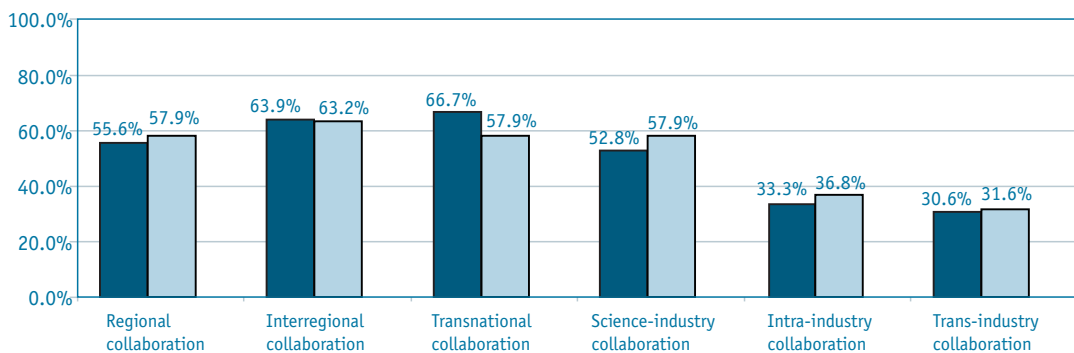
■ SEE Countries
 □ WBC

Interest in collaboration, networking or mobility activities [37]



■ SEE Countries
 □ WBC

Type of collaboration interest [37]



One of the activities in the **WBC-VMnet TEMPUS project (144684-TEMPUS-2008-RS-JPHES)** was the development of methodology and the implementation of a comprehensive TSNA analysis (Training & Service Needs Analysis), which was carried out in all countries of the WBC region, involved in the Project consortium (Serbia, Croatia, Bosnia and Herzegovina, Montenegro), in the second half of 2009. The proposed methodology included 5 steps, in accordance with accepted EU TNA methodology. The research covered a sample of 49 enterprises in Serbia, 31 enterprises in Croatia, 18 in Montenegro and 19 in Bosnia and Herzegovina, from different sectors. Besides considering the needs of enterprises and their employees as regards missing trainings and advanced services in innovative development of products and processes, the research included the target group of the unemployed, which gave insight into labor market needs and the opportunities of increasing employability of university staff. For this purpose, standardized questionnaires for the survey of employers, employees and the unemployed were developed. During the research realization, more than 800 questionnaires in the WBC region were collected, and thus the following has been identified:

1-The needs of enterprises, through:

- Insight into strategic objectives of the enterprises;
- Analysis of organizational and innovative potential;
- Assessment of their positioning on domestic and foreign market;
- Analysis of skills and knowledge of employees in the development of products and processes, as well as the implementation of standards in business;
- Workplace analysis, i.e, the expected competencies of those who should carry out activities in that workplace.

2-Existing and required skills of the unemployed.

TSNA results showed that a high percentage of the surveyed follows trends in their area, approximately 95%, mainly through the Internet, participation in trade fairs, professional literature and cooperation with universities (research teams, centers...). Managers of enterprises provided the following

reasons as obstacles to innovation, in order of importance:

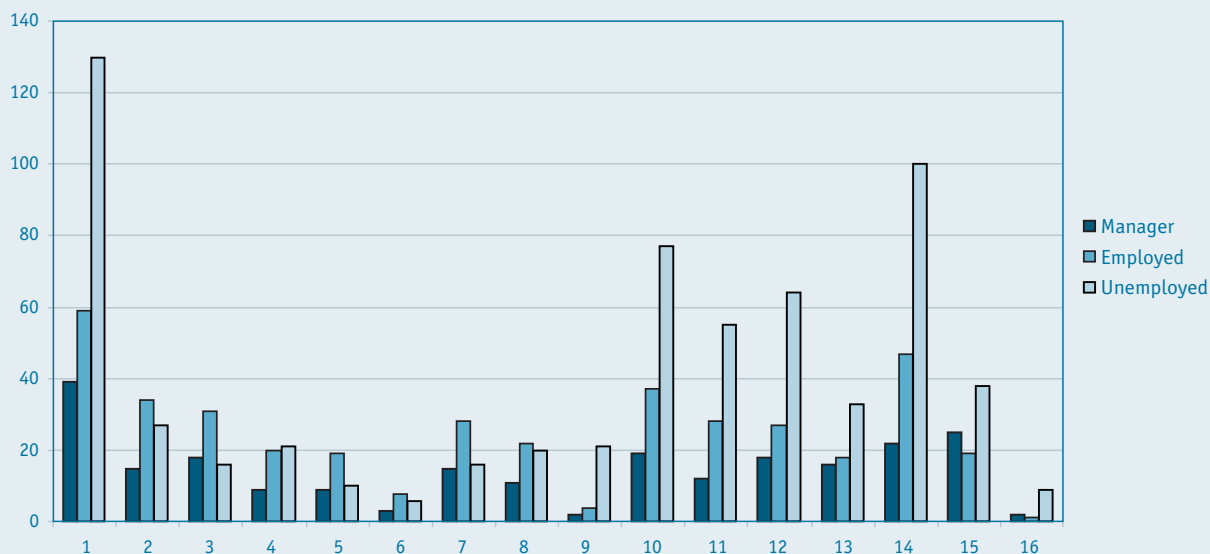
1. Lack of funds;
2. Lack of subsidies for innovation;
3. Lack of resources for innovative technologies (machines, computers, software);
4. Lack of expertise in the enterprise;
5. Unavailability of foreign sources of knowledge (external services).

Weak information about the trainings available in the region was detected, because more than 70% of the surveyed answered that they weren't familiar with who carried out the trainings they needed, while only 17% declared that the trainings offered met their needs. 72% of managers plan their own development in the application of new technologies through collaboration with local teams of experts, and 96% of them would send their employees to trainings related to new technologies in the development of products and processes. About 90% of people surveyed thought it very important to have professional literature and software for the development of new products and services, and were planning to appear on new markets.

Among the offered list of potential trainings, which would be developed within the WBC-VMnet project, and offered by Collaborative Training Centers in Kragujevac (Serbia), Rijeka (Croatia), Banja Luka (BIH) and Podgorica (Montenegro) for employers, managers and the unemployed, there is the greatest demand for the following trainings:

1. Specialized trainings related to the type of business of the firm;
2. Learning foreign languages;
3. Informative seminars about new trends;
4. Introducing new quality certificates, and related trainings;
5. CAD/CAM technologies;
6. Development and optimization of the production processes supported by virtual manufacturing;
7. Project design and management;
8. Business communication and negotiation.

Results of TSNA analysis in Serbia, WBC-VMnet project



LEGEND

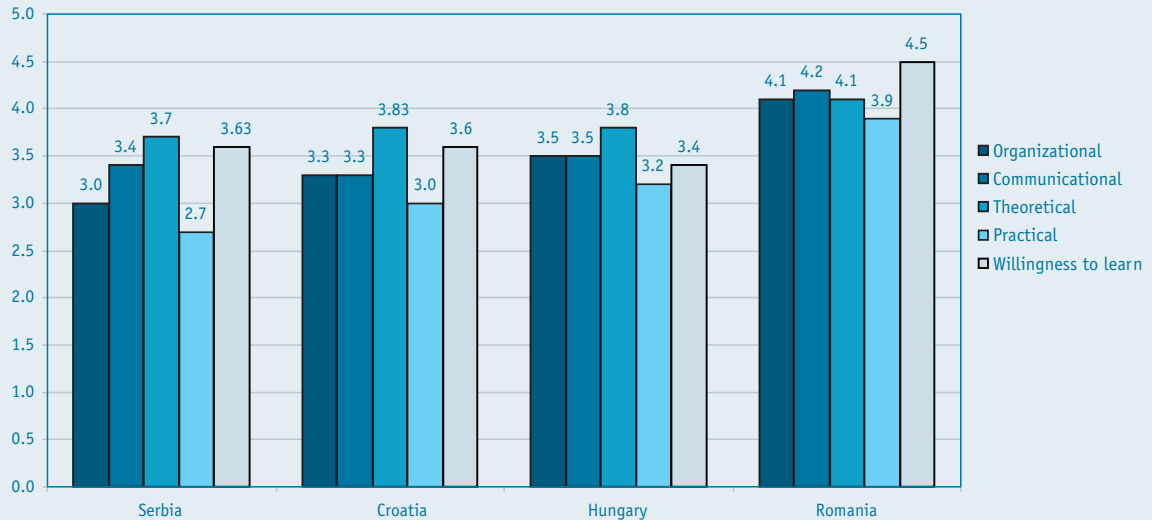
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|--|---|
| 1. Specialized trainings related to the type of business of the firm | 8. Industrial design |
| 2. Advanced CAD modeling | 9. Bioengineering - applications |
| 3. CAM modeling and NC programming | 10. Informative seminars about new trends |
| 4. From design to virtual manufacturing to the users | 11. Project design and management |
| 5. Design of tools for plastic | 12. Business communication and negotiation |
| 6. Concurrent engineering | 13. Practical business marketing |
| 7. Development and optimization of the production processes supported by virtual manufacturing | 14. Learning foreign languages |
| | 15. Introducing new quality certificates, and related trainings |
| | 16. Others |

Full Reports of TSNA analysis in Serbia, Croatia, Montenegro and Bosnia and Herzegovina, are available in electronic form on www.wbc-vmnet.rs.

Within the TEMPUS project **“Higher Education Learning Partnerships–HELP”, 144596-TEMPUS-2008-HU-JPHES**, whose holder in Serbia is UNESCO Chair for Entrepreneurial Studies at the University of Novi Sad, and partners the Center for Strategic Economic research “Vojvodina-CESS” and Carlsberg company – Serbia, a research entitled **“Assessing the needs of the economy for a workforce with specific skills”** was conducted. Goals of the conducted research were to investigate whether the economy was satisfied with existing university personnel, that is their knowledge and skills, and to consider the needs of the economy for specific trainings and ways of their organization.

The research was conducted on a sample of 48 enterprises from Serbia, 45 from Croatia, 50 from Hungary and 50 from Romania, from various sectors and sizes. Results showed that the practice and awareness of the organization of trainings in enterprises was relatively developed, but that the companies marked the practical and organizational skills of university staff rather low. On the other hand, these skills were also rated as most important for successful operation of enterprises, but also as most deficient. When answering the question why the enterprises did not organize training programs for their employees, 44% of the surveyed stated the lack of adequate training programs as the reason, and 37% the lack of funds. The survey also showed that the enterprise’s greatest difficulty was to find quality training programs to enhance the practical and the organizational skills of their employees.

Rating the skills of employees with University degree, HELP project



TEMPUS WBC-VMnet project - Changes that will be introduced at institutional level (2009-2012)

Developed and tested new model for regional university-enterprise cooperation will be introduced in WBC academic and business community, during the project life span. For the efficient application of the proposed model, the project envisages development of collaborative infrastructure (four CTC centres, VMnet network and WEB portal) which will support the introduction of state-of-the-art approach in the development of new products and processes in the regional enterprises and companies, based on VM technologies.

VMnet will connect universities and institutes, as integrated knowledge capacities, with enterprises and SME, which will be a significant support in the development of sector innovative system (clusters). Thanks to the support of the governments of WBC countries and policy makers, networking will stimulate accelerated convergence of triple helix components and will contribute to the establishment and strengthening of regional innovative system. Established CTC centres and enlarged VMnet network represent the basis for continuation of activities after the project completion. Databases and systematised knowledge on dynamic WEB portal, e-learning courses on MOODLE platform will be used by all VMnet network members with entitlement to access, which will depend on annual membership.

PC partners will use the equipment of CTC for education of students, vocational trainings, as well as for innovative services in virtual development of products and processes for regional enterprises. Numerous activities for providing CTC centre self-sustainability have been proposed. Knowledge acquired through performed vocational trainings, seminars and workshops will represent the permanent property of participants, but also of employers who will indirectly use that knowledge for increasing product quality and competitiveness at the market.

Improved level of vocational trainings and R&D services for unemployed graduates, non-university teachers, students, innovative enterprises and SMEs, in line with their needs, will increase their motivation for cooperation, with mutual benefits. On the other hand, better understanding of needs of SME and labour market by HE, as knowledge producers, will give a quality and applicable educational and research result, which will be easily commercialised.

That will set off participation in financing from business community and regular application of innovations in regional enterprises. Networking of HE institutions and enterprises, in geographical regions of the WBC, can be a good basis for creation of joint, sector structure of SMEs as associations or clusters.

*Good practices in the area of 5
university-enterprise cooperation*

A) Title of Good practice, i.e. name of University, URL address

B) Description of a policy, mission and vision of university in the field of university-enterprise cooperation explain: existing university procedures, strategic plans and decision-making structures.

C) Short presentation of existing mechanisms and structures that present support to promotion and implementation of university-enterprise cooperation, for example: career service center, placement service, enterprise support service, industrial liaison service, database placements/job offers, International office for international placements/careers and marketing unit at the university. Please enter all useful links for existing centers, offices etc.

D) Section which describes support of university to enterprise foundation and development of entrepreneurship through upgrading the curriculum and transfer of knowledge and technologies like: Center for professional training and education, TNA and skills deficit analyses, courses on promotion of entrepreneurship, joint research projects, spin-off companies and business incubators, technology centers (parks) and institutes, mobility activities.

E) Explanation of university impact in local and regional development for example: cooperation with regional development agencies and chambers of commerce, involvement in development of regional strategies, involvement in EU regional development projects.

5. Good practices in the area of university-enterprise cooperation

A) Graz University of Technology - www.tugraz.at

5.1

B) Two of eight main policies in the field of R&D at TU Graz were the development of IPR management and an improved technology transfer to industry at the time when all Austrian universities implemented the new Universities Act 2002. In this policy the inventors are involved in all phases of the exploitation process, since an exploitation of a technology without the inventor is almost impossible.

TU Graz Mission and Vision Statement clearly says, that Graz University of Technology produces top performers and managers much in demand and contributes to the sustainable development of society, economy and environment in a responsible way. The majority of the University Council members have been holding executive positions in industry.

C) The R&T House of Graz University of Technology supports communication and co-operation with the business and scientific world, politics and society. It consists of 3 Offices:

1. *Research and Technology Office (RTO)*;
2. *Technology Transfer Office (TTO)* acts as industrial liaison service providing a range of knowledge transfer services;
3. *Technology Exploitation Office (TEO)* is the competence centre for the commercialization of know-how and intellectual property.

www.fth.tugraz.at

www.fth.tugraz.at/bft

www.technologytransfer.tugraz.at

www.ipr.tugraz.at

Career Info-Service (CIS) jointly organized by Technology Transfer Office and the Graz University of Technology Alumni Association deliver a range of information and employer branding services for HR departments of businesses so they can address specific target groups among this potential workforce and inform young graduates about present job and career opportunities: career start page (job platform), direct mailings, employer branding opportunities for TU Graz partner companies.

www.career.tugraz.at

International Relations and Mobility Programmes Office serves TU Graz members receive comprehensive information about possibilities to spend a semester or an academic year abroad. Since TU Graz has partner institutions both in the European and non-European area, students can participate in numerous mobility programmes, such as Erasmus, Joint Study and ISEP as well as be eligible for the „Grant for short-term scientific works and subject-specific courses“.

www.international.tugraz.at

www.lifelonglearning.tugraz.at

www.sciencepark.at

D) Based on this strategic commitment **TU Graz Principles**, both a Life-long Learning (LLL) Office and an Office for Languages, Key Competencies And In-House Training were established. Based on the existing excellent know how Graz University of Technology seeks to increasingly establish itself as a provider of continuing education opportunities taking into account the fact that learning is a Life-long process.

Life-long Learning Office approaches young graduates as well as experienced professionals with a technical and scientific background interested in vocational education and training. LLL Office organizes a number of University Graduate and Certificate Programmes, Courses and Seminars and Summer Academies.

Science Park provides entrepreneurship trainings for potential academic incubator projects including student teams if there is a valuable business idea; it also organizes Business Plan Competitions. It also taps a pool of so-called business mentors which give hands-on advice to entrepreneurs. Its objectives are to support university graduates of all fields of knowledge who have good business ideas in the pre-start-up- and start-up-phase by coaching, infrastructure, mentorship, financing and funding support.

Technology Exploitation Office provides training in IPR issues.

There is a range of project formats to co-operate with industry and business, including: Student exercises; Team projects; Projects with diploma theses and dissertations; Feasibility studies/technological and scientific services and counseling; Contract research projects/R&D collaboration; In-licensing of a TU Graz invention/patent; Joint ventures.

Undergraduate students, graduate students and PhD students are frequently involved in projects with business and industry. In some cases they may be employed by the enterprise. Hundreds of TU Graz graduates over the last decade have started an enterprise of their own. Moreover a number of TU Graz inventions have been licensed to the private sector and been incorporated in new products and processes.

E) As Styria is a R&D intensive region with a high degree of inter-organizational networking, TU Graz is involved in all regional clusters, a number of boards of the Chamber of Commerce and other networks. Two examples shall be given:

- **Innoregio Styria** is an innovation network initiated by the Styrian industry, which is supported by companies, academic and non-academic research institutions, as well as by central regional players;
- Technology Transfer Office of Graz University of Technology has assisted the Styrian government in the design of “ERDF Innovative Measures” Regional Programme of Styria 2000-2006 called **TECHNOFIT** (Technology-Information-Future-Transfer).

TU Graz has partner institutions both in the European and non-European area (Partnership Agreements, Co-operation Agreements, Memorandums of Understanding/Letters of Intent).

In general terms it can be said that the majority of business partners of TU Graz are SMEs. Many of them start collaboration with joint master theses and other small scale projects, but many high-tech SMEs have been involved in large R&D projects with TU Graz including joint Competence Centers.

A specific initiative has been set to target regional SMEs: In 2002 Technology Transfer Office of Graz University of Technology established the so-called **ARGE (Arbeitsgemeinschaft) TECHNOFIT**. In this initiative the transfer offices of all main technological/engineering institutes of Styria (3 Universities and the largest R&D institution) agreed upon a coordinated, standardised approach for the support of SMEs in Styria with no or little experience in the field of R&D.

A) **University of Brighton** - www.brighton.ac.uk

5.2

B) The University of Brighton is a community of 21000 students and 2600 staff, within five campuses in Brighton, Eastbourne and Hastings. It makes major contributions both to the national system of university education and to its local and regional communities. The corporate plan for the next five years links with a number of detailed strategies, policies and plans. It reflects balance of continuity and change, seeking to meet new challenges, especially of Life-long learning, of social inclusion, and of knowledge exchange. At the heart of the University of Brighton's mission is partnership with the professions and business. They have a significant economic and social engagement agenda and also strive for progression routes for all.

Representatives of enterprises are involved with university governance and with local management but they are not typically those with whom University of Brighton engages on a commercial basis. Corporate plan includes targets for growth. This is then supported by Faculty and School plans which also focus on targets. There is limited implementation detail but they do have a number of processes and structures in place to support the implementation of these including a Business Services Office (now known as Economic and Social Engagement Department) and the Collaborative Training Centre.

C) Business Services Office is responsible for promoting the university and developing partnerships with business and public service organizations, and provides access to the knowledge and expertise of the university to solve real business problems. They deal with connection of all kind organizations (business, government, public) with university services and facilities, including specialised

www.brighton.ac.uk/business/index.php?PageId=1

training, research, consulting, intellectual property management, licensing, knowledge transfer programs and support for entrepreneurial ventures. The department is also responsible for raising the profile of the university among business and industry and is always keen to expand their networks.

Business Services Information Desk (BSID) provides a single point of access to services offered to business and the public services across the whole university, identifying the most appropriate solutions for: Research and consultancy expertise; Professional development and tailor-made courses; Opportunities for collaboration and partnership; Facilities, meeting rooms, laboratories and specialist equipment.

www.brighton.ac.uk/ctc/

The Collaborative Training Centre was launched on 1 November 2005 to utilise the opportunity offered through the EPSRC Collaborative Training Account to grow the current level of collaborative work with local industry. The CTC currently has a central role in:

- The delivery of **Knowledge Transfer Partnerships (KTPs)** across the university, managing the liaison with commercial partners, managing and writing grant funding proposals;
- Managing the development and delivery of **Continuing Professional Development (CPD)** short courses and the MSc/MA, mainly focussed on the faculties of Science and Engineering and Management and Information Sciences;
- Brokerage, management and delivery of science, technology, engineering and mathematics (**STEM**) outreach activities into regional schools across the STEM subjects;
- Coordination and direct support of **'industrial' placements** across the Faculty of Science and Engineering.

D) On University of Brighton, enterprise representatives are involved in curricular committees on a school basis. The most cohesive Center for professional training and education is CTC, but many schools have their own activity which inhibits cooperation and cohesion. University of Brighton has **Business Development Managers** seeking new partners and has a range of existing partners. They are moderately strong on KTP with a history of >100 partnerships. They have strengths in a number of areas of collaborative research bids. Students of University of Brighton are employed by companies and organizations of all sizes from SMEs to multinational corporations to small consultancies and government departments.

The University of Brighton has a long and successful track record in the field of consultancy. Their clients include small businesses, local and national government and national and multinational firms. Projects range from 1 day to the longer term.

There is mentoring and support to student entrepreneurs in the creation of student enterprises through **Beepurple**. Beepurple's main aims are to stimulate entrepreneurship amongst students, staff and alumni, and develop the enterprise skills of its members. The

www.beepurple.co.uk

beepurple network is a programme delivered by Business Development and Enterprise Office at the University of Brighton.

Student placement varies between courses supported by the Schools and at a Faculty level. Undergraduate and postgraduate students from a range of disciplines and degree courses are available for placements for 1 to 12 months. It is compulsory on some, simply encouraged on others. University trainers are involved in companies as employee trainers in some cases, as partners in others.

Knowledge Transfer Partnership (KTP) is a partnership between a company, university and a graduate. The company benefits from a highly qualified graduate working as part of the company for two years, to bring a strategic change to the business. They are supported by a team of experts – professors, senior lecturers and researchers, who bring technical expertise, research and innovation to the company. There is a broad range of specialists including the areas of engineering, I.T., pharmacy, business and marketing, environment and land remediation, building and product design and innovation. The graduate is employed by the university on a two year contract, but spends the majority of their time working in the company as part of the company. KTP offers to graduate opportunity for career development, implementing strategic projects in a real business situation, development of responsibility and technical/business skills.

www.brighton.ac.uk/ktp/

E) The University of Brighton manages a range of projects to support businesses from SMEs to larger firms. These projects are designed to meet the specific needs of business and include:

ProfitNet (Profit Through Networks) is working with nearly 400 companies across Sussex delivering knowledge management tools and techniques within following sectors: manufacturing, construction/technical services, creative industries, hotels, start-ups, social enterprises, and IT. The network members meet monthly to share experiences; pick up best practice; and receive specific know how on topics of interest to their sector group. The aim of the programme is to provide local industry with a hands-on and practical approach to growing better businesses. It is funded by a variety of sources including Hastings Borough Council, HEFCE, East Sussex Economic Partnership and East Sussex County Council and is free to companies.

www.brighton.ac.uk/profitnet

Knowledge Exchange for Product Development as a joint venture between University of Brighton, University of Portsmouth and Buckinghamshire Chilterns University College, aims to develop and substantially increase access to technical knowledge, skills and services available to the product design and manufacturing sectors across the south-east region of the UK. It also provides access to the skills and services available to improve product design for a range of potential clients including start ups as well as more established firms.

Community engagement at the University of Brighton is led by **Community University Partnership Programme (CUPP)**. CUPP facilitates the development of projects and networks that link the university, local communities and community and voluntary sector organisations, for mutual benefit

www.brighton.ac.uk/cupp

www.brighton.ac.uk/cupp/helpdesk/index.htm

www.brighton.ac.uk/cupp/SCE/

www.brighton.ac.uk/cupp/projects/

www.brighton.ac.uk/cupp/coastalcommunities/index.html

and with the priority of addressing inequalities. They are involved in four areas of engagements:

1. *Cupp Helpdesk* - point of entry to the university for local community, voluntary and statutory organisations enquiring about research and other possible collaborative opportunities;
2. *Student Community Engagement* - all community engaged work by students of the University of Brighton undertaken in community settings as part of their accredited curriculum;
3. *Brighton & Sussex Community Knowledge Exchange (BSCKE)* - BSCKE has been an initiative to support the development of innovate high impact projects that contribute to social transformation and bring real issues into teaching and research;
4. *South East Coastal Communities Programme (SECC)* - Partnership with several higher education institutions working with coastal communities of the South East to develop capacity for long term benefits to health and wellbeing.

5.3

A) *University of Novi Sad* - www.uns.ac.rs

B) A clearly defined procedure regarding university-enterprise cooperation is incorporated in the Statute of the University of Novi Sad (UNS), Novi Sad, Serbia. University of Novi Sad promotes, develops and establishes the university-enterprises cooperation both within the country and outside with the aim of exchange of experience, knowledge, improving education quality and joint applied research activities as well as two-way mobility of employees. University of Novi Sad establishes contacts regularly with interested companies and creates protocols and contracts about bilateral (or multilateral) cooperation, exchange personnel and organization of seminars, info days or students practice. Members from enterprises are not currently involved in the management structures, decision-making structures and bodies of the UNS.

C) Technology Transfer Centre (TTC) was established at the University of Novi Sad and this has been the first step towards creation of the **Science and Technology Park Novi Sad**. Legally, TTC is embedded into a wider environment called the University Innovation Centre, established by UNS in cooperation with Serbian Ministry of Science and Technology. Furthermore, the **Novi Sad Incubation Center (NOSIC)** plays an essential role in the Novi Sad economic development cluster programme. Having Novi Sad Incubation Centre space and supporting services dramatically increase the yield and make business start-ups an important part of the Science and Technology Park.

There is a database of job openings at different enterprises provided by **Center for carrier development**, which also organizes contact between students and companies. International relations activities at the UNS are carried out at several levels: student organizations, departments, faculties and the University (Rectorate). At the University level there is a central **International Relations Office** that was formed in 2001 as one of the mechanisms that were needed to facilitate the growing participation of the University of Novi Sad in Bologna-related activities, projects and reforms. Mobility of students and staff is the top priority of the International Office. **Marketing units** exist only at the level of faculties. Some of these marketing units are very well organized, like the marketing unit of the Faculty of Technical Sciences. The main activities of these units are web presentation and micro web site, print and TV ads, events and conferences, fairs, Faculty Open days. At the level of university, only PR Office exists.

www.razvojkarijere.uns.ac.rs

www.ftn.uns.ac.rs

D) The enterprise representatives (IRITEL – Belgrade, ICM Electronics – Novi Sad, etc.) have involved in creation of curriculum of Master Program in Applied Electronics, which is supported by WUS (World University Service) Austria. Many entrepreneurship trainings at the university are organized by the framework of the **Best Technological Innovation Competition** and **UNESCO Chair in Entrepreneurial Studies** at the University of Novi Sad. Professional training and education is provided, as well, by **Student Career Development Centre**, Faculty of Technical Sciences and **CISCO Entrepreneur Institute**. TNA and skills deficit analyses will be performed within the project HELP (Higher Education Learning Partnerships). Joint research projects between the University of Novi Sad and industry partners are realized through: bilateral (or multilateral contracts) among some faculties and interested companies, innovation projects founded by the Ministry of Science and technological development of Republic of Serbia, EUREKA projects founded by European union which obligatory need to have partners from both sides academia and industry.

Support to the foundation and development of spin-off companies is performed through Novi Sad Incubation Center (NOSIC) which plays an essential role in Novi Sad economic development cluster programme. Almost all study programs (except medicine and arts) promote entrepreneurship among students and wider communities. Also, the Best Technology Innovation competition is one of ways by which the UNS has started to train would-be and existing high-tech entrepreneurs in order to change the current entrepreneurial knowledge and innovative culture. Student placements are organized by the Executive Council of the Autonomous Province of Vojvodina, and “dr Zoran Djindjic” fund (particularly in Germany and Austria). Different specialized student organizations organize student exchanges and work placements, as well the Center for Career Development and Student Counseling. Some faculties have teachers who worked in industry or they are engaged as consultants or employee’ trainers in companies’ operation. **Enterprise Europe Network in Serbia** offers information about EU market possibilities as well EU and domestic RTD possibilities.

www.een-srbija.rs

www.almamons.co.rs

www.vojvodina-cess.org

E) The University of Novi Sad has developed a very useful cooperation with Republic agency for SMEs (especially with the branch in the Province Vojvodina “Alma-Mons”, with Republic chamber of commerce, with Centre for Strategic Economic Studies “Vojvodina-CESS” of the Executive Council of AP Vojvodina. Some of professors from the University of Novi Sad have been involved in development of regional and national strategies. The University of Novi Sad is a partner in many EU projects such as FP7, TEMPUS, EUREKA, SEE-ERA.NET, etc.

5.4

A) Universite Paris-SUD 11 - www.u-psud.fr

B) Within the Universite Paris - SUD 11 there are no defined university procedures concerning cooperation with enterprises. Each University has its own procedure and convention that define intellectual property and legal rights and obligations of each part. However, since 1999 there has been a law that defines some rules concerning innovation and research. The law simplifies the creation of subsidiaries and **Economic Interest Groupings (GIPs)** bringing together research institutes, universities and companies. Some points of strategic plan are as follows: creating a company, consulting, creating company incubators and developing service for the exploration of research work. Enterprises are not involved in the management structures, decision-making structures and bodies of the universities.

C) University Paris-Sud 11 was invested for the employability of its students by creating a special department to assist and prepare them in their training course leading to employment. **The Professional Integration Service (SIP)** of Paris Sud 11 is a central service of the University. It acts as an interface between students, teachers, researchers of all its components enterprises. Its mission is to unite, to initiate and implement initiatives towards the employability of students at all levels of training. The Professional Integration Service provides to companies the means to present themselves among the students and to recruit them. The Professional Integration Service offers to University students, assistance in seeking jobs or internships, and training to learn to value their Curriculum Vitae. **The “Observatoire de l’Insertion Professionnelle”** is part of the Professional Integration Service. Its main task is to observe, analyze and disseminate information on the employability of graduates of University Paris-Sud 11. There are no Database placement/job offers accessible to enterprise and students.

www.paris-sorbonne.fr/fr/rubrique.php3?id_rubrique=1697

D) Enterprise representatives are not currently involved in curricular committees and there are no developed entrepreneurship trainings at the university. There is a **Service for Adult Education**. That provides various trainings, workshops and consultation services,

establishes and administers contracts for courses provided by enterprise representatives. TNA and skills deficit analyses conduct every six months through interviews and questionnaires. Joint research projects are often realized through partnerships between large companies (such as EDF, Alstom, Schneider Electric, etc.) and research laboratories and establishments (such as CEA, INPG, etc.). These partnerships can be organized as Groups of Economic Interest (GIE) or poles of competitiveness (localized in and supported by the region). **Technology park TEMIS in Besancon** represents the leading institutions of this type in the field of micro technologies. University (ENSM, faculty of micromechanics), research laboratories (public and private) and companies are present in this scientific park. Courses on promotion of entrepreneurship are usually organized at the Faculty of Economics, and students from other faculties can choose some of these courses to expand their knowledge. Students often do their internships in other EU countries. Almost all university professors have large industrial experience and it is very often that professors teach industrial staff. University Paris-Sud 11 has been already involved in European networks, such as the European technological platforms (ARTEMIS, eMobility, etc.) and the EUREKA clusters (ITEA1, MEDEA+2, etc.) and are represented in European Commission R&D programs (Framework Programmes FP6 and FP7).

www.temis.org/home.html

E) University Paris-Sud 11 and French regions work closely together in competitiveness poles. The University is involved in **SYSTEM@TIC PARIS-REGION Competitiveness cluster**. In this cluster the University has an opportunity to cooperate with SMEs, local, regional and national agencies and economic development bodies. The University is also actively involved in development of regional strategies for Paris Region. University Paris-Sud 11 is a partnering institution in the following EU regional development projects: **MINERVE** for nanotechnologies, **POLA** for lasers, **PCRI** for computer science research, **The Biostructure Centre in the Soleil synchrotron environment** and **Pharmatechnopole** for medicines.

www.systematic-paris-region.org/fr/

A) Technical University of Denmark - www.dtu.dk

5.5

B) DTU sees the collaboration with businesses and other external parties as a very important task in connection with ensuring the transfer of technology and knowledge to society. **DTU's Office for Research and Innovation** provides advice and guidance on research, innovation, education and industrial collaboration to students, employees, industrial collaboration partners and other interested parties.

www.dtu.dk/English/About_DTU/Organization/Supportfunctions/AFI.aspx

C) DTU has several centers that support cooperation. Among others:

- **IPU** offers public and private companies highly qualified

www.ipu.dk

www.dtu.dk/Om_DTU/Organisation/vitis.aspx

www.jobbank.dtu.dk/?lng=eng

www.dtu.dk/English/Industrial_Collaboration/Research%20collaboration%20with%20businesses.aspx

www.dtu.dk/English/Industrial_Collaboration/PhD_programme_firm.aspx

www.dtu.dk/English/Industrial_Collaboration/Business%20start-up/Scion-DTU.aspx

www.dtu.dk/English/Industrial_Collaboration/Business%20start-up/DTU%20Innovation.aspx

www.vaeksthus.dtu.dk/English.aspx

process and product development, consultancy assistance, and collaboration with experts in the fields of central engineering and communication technologies. IPU promotes research and carries out technical/scientific development projects that are significant to the Danish society and the Danish business community. IPU transforms recent know-how and 53 years of experience in collaborating with the research and business communities into consulting services and products;

- **DTU ViTis**, whose goal is to ensure the transfer of knowledge from DTU to industry and the Danish community. Through collaboration with the management, institutes and the administration of DTU, ViTis is responsible for the marketing of a wide range of the knowledge based activities at the university;
- **Carrier center**, which supports the business community in carrying out projects together with the students at DTU, and reduce the amount of unemployment for newly graduated students from DTU;
- **DTU job bank**, Students and graduates can use the job bank at the DTU to promote them self in regards to the industry and to get further information about different sectors;
- **DTU's department for research and innovation** is in charge of counseling in regards to possibilities and guidelines for research collaboration with DTU;
- DTU is an approved technological service institute and each year carries out collaboration with more then 200 different companies in Denmark and abroad.

D) DTU collaborates with a wide range on companies in the education of PhD students, these projects can be financed in the following manners:

Collaborate finance - Companies which require solution of a specific problem has the possibility to part finance a PhD education at DTU.

Industrial PhD – This system is managed by the ministry of science, technology and development, and the purpose is the advance development and innovation in Danish industry.

Scion - DTU is Denmark's first and largest university-based science park. Scion-DTU provides the most excellent physical environment, service and support, especially for start-ups. Also offers a nurturing and inspiring environment for growth across personal and professional boundaries.

DTU Symbion Innovation is a venture company that focuses on the very early stages in the lives of new businesses. DTU Symbion Innovation offers entrepreneurs access to an organization which encompasses all the resources and competences necessary in order to go from idea to a commercially interesting business.

Vaeksthus+ is DTU's initiative to encourage and facilitate entrepreneurship among, students and researchers.

E) DTU has a long tradition for and much experience in the collaboration between public and private companies. DTU is the leading center in Denmark for research-based public sector consultancy. DTU offer relevant, highly qualified research-based consulting on technical, scientific, and social issues. DTU develops and adapts consulting based on current social and administrative requirements. DTU consultancy supports the legislative and administrative work of national and international authorities. DTU is a big supplier in the realm of public service tasks and sector development. At DTU, approximately 1800 employees work on public sector assignments. Of these, approximately 470 are directly involved in research and consultancy. DTU is an active partner in the globalization issue and because of this an international focus will always be a part of any task carried out at the university.

A) Rheinische Fachhochschule Köln – University of Applied Sciences - www.rfh-koeln.de

5.6

B) Rheinische Fachhochschule Köln (RFH) – University of Applied Sciences has clearly defined university procedures concerning cooperation with enterprises or public owned organizations and they are clearly defined in legal documents. RFH has department for the cooperation development and winding up of the relevant processes. Part of their university's strategy is the promotion of the co-operations with the industrial enterprises or public owned bodies. Strategic plans are the master plans standing how the university and enterprise will achieve their mission and objectives. In the part of the strategy implementation, they set joint policies into action through the development of programs, budgets, and procedures. In the scope of business matters RFH has also the CEO of the university. If it concerns the common projects and contracts with the industrial enterprises, the arrangements and contracts define the exercise of the executive power and decision-making procedure.

C) RFH University has the centers and services which support the promotion, implementation and consultation in the matters of the university-enterprise cooperation. RFH University has supporting services and centers which help students and graduates on the way in the professional independence (entrepreneurship). Example is the project **RALLYE** (Rheinische Allianz for Young Entrepreneurs).

On the web-side of the **Student's representation (ASTA)** there are the area and database for job and placements offers. Also they work close together with the local labor office (working agency) and lead statistics about the placements of graduates.

Their **international office, advice and service center** consult their students and graduates in juridical, social and administrative

questions regarding stay and work abroad. If it is about concrete job search, they work together with the regional labor offices (working agencies) or private job placements agencies.

The marketing and multimedia information center is responsible for the marketing questions. The organization is organized functionally and partially in matrix form. The activities of the center encompass a wide spectrum of tasks (the configuration of web pages, creation of university's merchandising articles, university's video and audio production, up to the publications of the topical information which concern their university, interface to the local press).

D) RFH University has developed with the FORD Company a Curriculum, by which company offers their employees the possibility to educate them self and later on to take over the appropriate tasks in the company. Enterprise representatives are involved in such programs. With other companies RFH University has developed similar Curricula and allow the student to acquire a company certificate after the regular exam.

Entrepreneurship trainings are one of the parts which their **carrier centers** offer. If it concerns the vocational (professional) training, RFH University has sub-units (branches) which offer just this kind of the continuing education. Some of these continuing education programs are realized in narrow collaboration with the regional labor offices (working agencies), so that RFH University also offers retraining measures and courses. Regular evaluations of the lecture are carried out every semester. With regard to the deficit balance in a subject of study, RFH University offers classical seminars and addition courses on the special subjects.

Joint research projects arise by the extension or supplement of the preceding common projects between the institutes and the firms, and are realized by the arrangements with the companies. RFH University has the own **Research and Development department (R&D)** and institutes which support research project with industrial enterprises (also with public bodies).

RFH university supports the foundation and **development of spin-off companies and business incubators**. Student placement is organized in that way, that RFH University has developed joint curriculums with the other universities. Only common programs and Curriculums allow that kind of student mobility. A great number of RFH's lecturers also works for industrial enterprise or has big experiences in the free economy. The lecturers of RFH University are working as "external trainers" for some companies.

E) RFH University has close cooperation with the chamber of industry and commerce in Cologne (IHK zu Köln). Basis of this activity is **Vocational training law**, which intends such an engagement of the industrial enterprises and educational facilities in mentioned bodies. RFH University is actively involved in the development of the regional strategies. They are supporting actively university-enterprises collaborations and co-operations and the educational

strategies, as for instance retraining measures developed with the regional labor offices (working agencies) as a part of the reduction of the unemployment due to continuing education & Life-long learning. RFH University is from time to time, in dependence of the kind of the project and the project realization, involved in different EU regional development projects.

A) *Staffordshire University* - <http://www.staffs.ac.uk>

5.7

B) A strategic plan considering a university-enterprise policy implementation is developing through **Enterprise and Commercial Development (ECD)** leads the applied research, enterprise and knowledge transfer activities of the University and develops mutually beneficial collaborations between academics and large and small organisations within both the private and not-for-profit sectors. Through the delivery of expertise based upon knowledge, technologies and intellectual capital based within the University, ECD can assist enterprising organisations seeking to transform, innovate and develop business resilience. ECD has access to a wide range of innovation support programmes such as Knowledge Transfer Partnerships, Innovation Vouchers and Proof of Concept Funding. The Staffordshire University clearly defined the university procedures concerning cooperation with enterprises and incorporated it into a legal document under the title **Student Employability and Enterprise Policy**.

www.staffs.ac.uk/about_us/university_departments/ecd/index.jsp

C) Faculties, schools and employer-facing areas such as **Careers Centre, Sales & Student Recruitment, Placements , Enterprise & Commercial Development** and **KTP** work together using a customer relationship management system to maximize the available pool of potential experience-based learning opportunities and promote to employers the services within **Job Zone**.

www.staffs.ac.uk/visitors/careers_centre/index.jsp

www.staffs.ac.uk/about_us/university_departments/ssr/index.jsp

Staffordshire University's Work Experience Programme aims to provide over 100 structured work experience placements each year, to local young people across a range of departments.

www.staffs.ac.uk/faculties/health/partnerships/placements/

D) The University aims to formally embed enterprise into the curriculum so that all students have the opportunity to enhance their enterprising capacities. Moreover, Staffordshire University students will be encouraged to view starting and running a business as a genuine career choice, and where appropriate will gain access to practical support to make this happen.

www.staffs.ac.uk/about_us/university_departments/ecd/index.jsp

www.staffs.ac.uk/commercial/knowledge_transfer/ktp/index.jsp

Enterprise and entrepreneurship in the curriculum – aligned to the relevant award. The University is developing a strategy and action plan to further embed an enterprise culture. The development strategy has three strands: enterprise in the curriculum; supporting academics to deliver enterprise education; developing academic enterprise.

www.staffs.ac.uk/commercial/recruiting_services/

www.staffs.ac.uk/study_here/courses/business-startup-tcm4213275.jsp

www.staffs.ac.uk/commercial/enterprise/business_villages/index.jsp

www.staffs.ac.uk/commercial/enterprise/enterprise_fellowship/

www.staffs.ac.uk/commercial/enterprise/speed_scheme/

www.staffs.com/page.asp?pid=225

Staffordshire University has come up with a novel way of supporting fledgling businesses through the first two vital years. It has designed a Foundation Degree in **Small Business Start Up**. Participants on the programme study and run their business at the same time. They are provided with high quality workspace within one of the existing **University Business Villages**. This immediately gives an advantage of a prestigious business address, excellent IT facilities and support and access to wider University services. The teaching input is geared towards acquiring the knowledge and skills required to create a successful enterprise. The Business Villages contain successful established enterprises who can be clients of, or suppliers to the new companies.

The Enterprise and Fellowship Scheme at Staffordshire University is the best promotion of entrepreneurship.

Staffordshire University has established the program which should facilitate and support students in the creation of student enterprises. **The SPEED Scheme** provides comprehensive support to turn students' business ideas into a commercial reality whilst giving them the skills they need to run their own company. The scheme is a collaborative programme which is University based across the West Midlands and a national SPEED website which can provide with up to date business news and events, access to other students from across the UK who have started a business with the support of SPEED.

E) Staffordshire University also contributes to regional and sub-regional decision making by representing the university on multi agency partnerships to inform regional policy within the region. These consist of **Staffordshire European Partnerships (SEP)** (which provides updates on EU programmes within North Staffordshire).

The External Project Team are the first point of contact for staff who want to develop new EU partnerships to strengthen existing collaborations to benefit their research or enterprise projects, new partnership relationships albeit with Universities/Public sectors or Small Medium Enterprises (SMEs) from within Europe takes time and energy; the EPT help with making regional contacts, by facilitating meetings and network opportunities with regional policy officers.

5.8

A) Masaryk University - www.muni.cz

B) A complete set of the relevant internal sublaws have been recently finalized, and their full implementation across the Faculties is an ongoing process. The Faculties have their autonomous strategies and their positions are quite diverse and they may use the services of the central unites. The general strategies will quite probably

emerge and stabilize in a horizon of 2-3 years. Some members of the Board of Trustees are from enterprise sector, but this body does not have any direct impact on the management of the university.

C) The Technology Transfer Center offers services related to knowledge and know-how transfer, all issues related to IPR, and tries also to act a sort of industrial liaison service. However, the general tradition, readiness and awareness within the individual departments are quite far from satisfactory.

www.muni.cz/ctt

The MU Career Centre was established on 1 January 2008 and focuses on strengthening between students and prospective employers, especially once graduates leave the university and enters the job market.

www.muni.cz/rect/991630

Database placements/job offers are in progress. There is a **Public Relations and Marketing Office** within the Rector's office of Masaryk University.

www.muni.cz/rect/994200

D) The Technology Transfer Offices offers both regular credited courses "Research and Development in praxis", and tailor made trainings for groups of researches. The courses and trainings foster the entrepreneurial awareness and they cover essential soft skills and management practices. There are also similar seminars run in cooperation of Faculties of Business and Administration and Faculty of Law.

The Masaryk University is currently launching an **technological incubator INBIT** (devoted to biomedical technologies and maintained by the South Moravian Innovation Center in the university campus).

www.muni.cz/research/knowledge_transfer/technology_transfer

Spin-offs are supported but only at the legislative and organizational level. There are no regular funds for "proof of concept" or IPR issues yet.

www.muni.cz/fi/339916/methodical_management

The mobility activities are centrally carried out by the **Office for International Studies**. The Office is responsible for international mobility as a whole as well as for consultation and advice in the preparation of projects in the Life-long Learning Programme and in other international programmes (CEEPUS, AKTION, ERASMUS MUNDUS, etc.). The international mobility, however, is not included in the Curriculum, i.e. for MU students it is not obligatory to take part in the mobility programmes.

www.muni.cz/study/lifelong

Life-long Learning is included in Masaryk University's Strategic Plan for years 2005 – 2010 and in its 2009 update as one of the MU's priorities. The focus is being placed on courses deepening educational background of professionals, as well as on establishing and strengthening long-term partnerships with enterprises whose employees will be being educated by MU.

E) Masaryk University is a long-time member of two major international university networks, the **Utrecht Network** and the **Compostela Group of Universities**. Though each has a somewhat different focus, both are concerned with deepening international cooperation, their activities covering such areas as exchanges of academics and students, training programmes for administrative staff, the promotion of summer schools and other similar events, the organization of international conferences and the publication of scholarly work.

www.muni.cz/international_cooperation/university_networks

www.linkedin.com/companies/south-moravian-center-for-international-mobility

Masaryk University is the founding member of **South Moravian Innovation Center** and the **South Moravian Center for International Mobility**, two leading agencies for technology transfer and mobility in research. The Masaryk University acts actively in the preparation and implementation of the Regional Innovation Strategy III in the South Moravian Region and is the coordinator or partner in several such projects.

5.9

A) Norwegian University of Science and Technology (NTNU) - www.ntnu.no

B) Vision of the NTNU is to be internationally recognized as an outstanding university by 2020. It was planned that NTNU's programmes of study and continuing and further education to be relevant for society and there is a demand for all graduates in working life. NTNU is promoting interdisciplinary measures and merge theory with practice. NTNU have an international focus and is a leader in technological and natural science education.

www.sintef.no

C) SINTEF was originally established in 1950 by the Norwegian Institute of Technology (NTH) as the Institute's own instrument for carrying out commissioned research. Today, the former NTH has been incorporated into the Norwegian University of Science and Technology (NTNU) in Trondheim. NTNU's general profile is based on technology and natural science, and the University has the main responsibility for technological education and research in Norway. The University also offers a wide range of courses in the arts and aesthetics, social science, medicine, and business management and administration. NTNU and SINTEF realise that it will be appropriate to define national strategies and alliances in certain areas.

www.ntnu.no/research/gemini-centres

The Gemini Centres form a model for strategic cooperation in which scientific groups with parallel interests coordinate their scientific efforts and jointly operate their resources. SINTEF and NTNU - The Norwegian University of Science and Technology - have established a wide range of Gemini Centres. The objective of the Gemini Centres is to develop large scientific groups of higher quality than either of the partners could manage to build up on its own.

SINTEF also cooperates with NTNU and other partners in other areas and via other centres:

www.cesos.ntnu.no

Centre for Ships and Ocean Structures is one of NTNU's three Centres of Excellence. SINTEF is a partner in this centre.

www.cma.uio.no

Centre of Mathematics for Applicatics is one of the University of Oslo's centres of excellence. SINTEF is an active partner in this centre.

The Gas Technology Center was established in 2003, and unifies the combined efforts of The Norwegian University of Science and Technology (NTNU) and SINTEF. The Gas Center seeks to exploit the synergism of multidisciplinary research into the natural gas value chain. The center is the largest natural gas research- and educational center in Norway.

www.ntnu.no/gass

The Centre for Renewable Energy (SFFE) unifies the competence of NTNU, SINTEF and IFE within the field of renewable energy, as well as initializing new and relevant research tasks. Research fields include small scale hydropower, wind-, solar-, wave-, and bio energy as well as social dimensions of energy use.

www.ntnu.no/energy/cre

D) NTNU in cooperation with SINTEF organization is national leaders in contributing to research-based **spin-off companies** and revitalization of the public and private sectors. NTNU's students are encouraged to apply their knowledge to innovative commercial activities.

www.ntnu.no/wiki/display/tto/Spin-off+companies

Exchange students who come to NTNU from abroad typically attend the university for short periods of between 3-12 months and return to their home university at the end of the exchange period. NTNU students are highly sought after by industries both in Norway and abroad. NTNU's **Entrepreneurship Center** arranges internships or summer work for students in startup companies in the Silicon Valley or Boston, or in Singapore. All NTNU master's students participate in an interdisciplinary team project called Interdisciplinary Teamwork where they are called on to come up with creative solutions to challenging problems from companies.

www.nec.ntnu.no/prosjekt/e-projects.htm

The International Association for the Exchange of Students for Technical Experience (IAESTE) helps Norwegian students work overseas and welcomes overseas students to Norway.

www.iaeste.no/web/index.php?section=1

The Gløshaugen Innovation Center is NTNU, SINTEF and SIVA's joint initiative to create an exciting environment and atmosphere for entrepreneurship, commercialization and networking, with close ties to the academic and scientific world. The Innovation Center has as its goal to be the driving force in commercializing business ideas from the NTNU and SINTEF. It is primarily a service for students, faculty, employees or others with ties to NTNU or SINTEF who want to set up businesses using R&D-based ideas with commercial potential. The Center is member of **Gate2Growth** an Initiative supported by the European Commission - DG Enterprise - Innovation/SMEs programme.

www.ntnu.no/ig

www.gate2growth.com

NTNU School of Entrepreneurship (NSE) offers highly motivated students a two-year master study in commercialization of technology. Students with at least three years of technological education are welcome as applicants. NTNU School of Entrepreneurship is devoted to educate future entrepreneurs. They are now recruiting class of 2011. The purpose of NSE is to educate future entrepreneurs by stimulating students to pursue new technological business opportunities.

www.iot.ntnu.no/nse/default2.asp

E) NTNU has nearly 300 different cooperative or exchange agreements with institutions in 58 countries, from Albania to

Zimbabwe. The university also participates in numerous student exchange and placement programmes, such as the Erasmus programme and the Leonardo da Vinci programme. Others are operated in conjunction with other Nordic countries (**NORDPLUS**).

NTNU cooperates with the University of Oslo and a number of other educational institutions, in offering Gründerskolen (Entrepreneurship Concept School), in which students from NTNU travel to the Silicon Valley, Boston, or Singapore and remain from June through August. Students are placed with startup companies, where they work during the day - while attending an evening course in entrepreneurship and work on a business plan.

5.10

A) University of Ljubljana - www.uni-lj.si

B) University of Ljubljana (UL) has procedural rules and policies concerning cooperation with business entities and enterprises in place. University supports all forms of university-enterprise cooperation. Apart from transfer of knowledge through education of students (and their employment in businesses) and publication of papers, the University shares its' knowledge through: sponsored research agreements, contractual consulting, licensing, and spin-off companies.

www.uni-lj.si/en/about_university_of_ljubljana/ul_strategy.aspx

University of Ljubljana's seven strategic objectives desired to achieve higher quality, cohesion and time reduction between creating, obtaining, transferring and applying knowledge are:

1. Increasing the scope and quality of research and development work;
2. Introducing study programmes in line with the Bologna process principles;
3. Strengthening and enhancing international cooperation;
4. Increasing the flow of knowledge into practice;
5. Establishing a comprehensive system of quality monitoring and assurance;
6. Development of supplementary activities;
7. Strengthening mutual cooperation among autonomous members.

All the strategic decision-making is reached through the University Of Ljubljana Board Of Directors and the Senate.

C) University of Ljubljana aims to increase the applicable value of its' knowledge and the constant flow of knowledge between Univesity of Ljubljana faculties and other organisations in the economic and public sectors. Structures at UL that support the student body-enterprise cooperation are:

The Economic Board is an advisory body of the University of Ljubljana's Rector and consists of 14 members – well established people of local business community, most of them performing high powered managerial jobs. The Economic Board advises on issues regarding the future development of student curricula, provides an insight into the future needs of the job market and provides counselling on fund raising strategies.

The University of Ljubljana Career Centre (KC UL) is an internal organisational unit. Its basic task is to conduct career counselling and assistance to students enrolling and choosing study programs at the University of Ljubljana. KC UL has strong connections with the local business and provides market oriented services for employers, such as job announcements and selecting appropriate candidates. KC UL is oriented towards training students for a breakthrough entry into the labour market and towards establishing relations with commercial and other organisations that are potential employers. A system of student tutors, career counselling, training, Life-long learning and the international exchange of students and higher education teachers is being established in a parallel process, providing assistance in implementing, enlarging and enhancing the Bologna process principles.

UL International Office is intergrated in the international academic, scientific and research realm, both as an institution and mostly through its teachers, researchers and students cooperation and exchange programmes. The University of Ljubljana has an exchange programme for students and teachers with 750 European universities within the ERASMUS programme. It cooperates with 25 higher educational institutions in the Southern and Eastern European region and with over 100 universities through other bilateral agreements.

D) In accordance with its strategy the UL especially supports the development of interdisciplinary postgraduate and doctoral study programmes whilst underlining the **transfer of knowledge** into practice. Professional training is becoming a vital part of UL study programmes. The aim of practical training is to integrate the knowledge obtained at the university into practice and to provide authentic practical situations where students can test their theoretical knowledge. At each University of Ljubljana's faculty there are **technology centres (parks)** and **institutes of applied research** to provide support for enterprises.

University Technology Transfer Office (TTO) was established in 2007 and is formed as an internal organizational unit with a specific aim to put into place an internal invention disclosure procedure, invention assessment and patent protection and to market the publicly financed knowledge, generated at the University of Ljubljana. The University of Ljubljana TTO also participated in two international projects in the field of managing intellectual property. The project „*Promoting Business Potentials through Spin-Off's in Slovenia*“ took place from April 2008 to March 09 between our Flemish partners Innotek vzw and Katholieke Hogeschool Kempen, the University of Ljubljana Incubator and the University of Ljubljana. The second

<http://www.lui.si/eng/>

www.lui.si/projekti/delavnice_za_izdelavo_poslovnega_nacrta/

www.lui.si/projects/workshop_how_to_write_a_business_plan/

<http://www.iri.uni-lj.si>

international project is „*A pilot project on the transfer of technology from university to industry*“ and is held as a collaboration between The European Patent Office, the Slovenian Intellectual Property Office and the University of Ljubljana.

The Ljubljana University Incubator (LUI) strives to create the best possible business conditions for students in order to help them realise their prospective business ideas. While introducing the academic world to the economy, the incubator and its educational programmes grew into an important crossroads, indicating new research paths for researchers. Through its activities, the LUI follows the goals of the University of Ljubljana, which consist in stimulating other forms of knowledge transfer such as, for example, the setting up of new detached spin-offs or other corporate bodies, the establishing of which is based on implementation and use of university rights regarding intellectual property.

LUI also organizes a series of workshops on „How to start a business“ which admit a limited number of participants in order to give a platform with highly relevant information pertaining to setting up a business. **“Turn Your Idea into a Success Story”** is a series of workshops hosting various experts in entrepreneurship who help young people develop their ideas and write business plans.

The Institute for Innovation and Development at the University of Ljubljana (IRI UL) was established by the UL and ten technologically advanced and successful Slovenian companies. The institute had already set up and implemented projects in 2008, which are aimed at securing an adequate environment for facilitating interdisciplinary projects and the acquisition of relevant competences.

University of Ljubljana joins knowledge and technology together with Slovenian industry and SMEs in many multidisciplinary **Centres of Excellence**. In the old financial perspective of Structural Funds the UL was the holder of 2 out of the 10 Research Centres of Excellence (CO – Centri odličnosti) in Slovenia. The Faculty of Electrical Engineering is the holder of the Centre of Excellence for Information and Communication Technologies and the Medical Faculty is the holder of the Centre of Excellence for Biotechnology and Pharmacy. In the new Structural Funds financial perspective (2008-2013) University of Ljubljana cooperates in all 8 newly established **Networks of Excellence**, in two of them as coordinator: *Centre of Excellence for Space Sciences and Technologies and Centre of Excellence for Biosensors, Instrumentation and Process Control*.

E) European projects are also of significant importance for the development of the UL research activity and its increased interconnection with the economy, as well as for market orientation development and regional development. UL is very active in international and European research, education and development programs in many of them in partnership with companies and SMEs. It has cooperated and still cooperates in 117 FP6 projects, in 77 FP7 projects and in many other research, development and educational projects financed by European union.

Together with local authorities, Chamber of Commerce of Slovenia and business and SME associations University of Ljubljana cooperates in many projects financed by regional development programmes like ESPON; INTERREG Slovenia-Austria, Slovenia-Italy, Slovenia-Croatia and in Transnational Cooperation Programme which aims at strengthening **cross-border, transnational and interregional cooperation**. UL is also actively involved in development of regional strategies through the **Technological platforms**.

UL has a highly professional **Office for European projects** with reach experience in the projects financed by European Structural Funds (ERDF, ESF, EQUAL, INTERREG). This European office at UL will ensure that administrative and financial aspects will be performed in accordance with the regulations of EU cohesion politics.

A) University of Padova - www.unipd.it

5.11

B) The University in its statute clearly emphasizes the importance of cooperation with enterprises in the field of intellectual property and spin-offs companies, even if there isn't a strategic plan to implement the university-enterprise policy.

C) The Job Placement Office has the aim of guiding students and new graduates in their transition from the academic world to the professional world. Links have been established between the University and firms, private and public institutions and professional associations to create and promote internships as an opportunity to exchange information and experiences. Thanks to the collaboration of the faculties and various degree courses, the "Vetrina degli Stages", both a real office and virtual listing, was created to help students and new graduates look for internships and training opportunities.

www.unipd.it/en/business/stage.htm

The University policy in technology transfer is implemented by the **Technology Transfer Office (TTO)**, which is **the Industrial Liaison Office** of the University of Padua. Created in 2001, it aims at valorising the know-how developed by the University and at transferring the technology from University to industry. It deals with patents, spin-offs and contract research, and it manages a business plan competition and a business incubator.

www.unipd.it/en/tto/index.htm

The marketing unit is called **Public Relations Unit**; its objectives are to take care and coordinate internal and external communication; to accomplish the university marketing; to identify the communication tools between university and external bodies the university works with; to coordinate the advertising activities and manage their procedures; to take care of the university relationship with the communication warrantor.

www.unipd.it/en/academics/economics.htm

<http://www.nanofab.it/it/>

www.unipd.it/en/tto/spinoffs.htm

www.unipd.it/en/tto/startcube.htm

<http://www.galileopark.it/>

<http://www.venetoinnovazione.it/>

D) The Faculty of Economics offers a wide range of training in entrepreneurship-related subjects for undergraduate students. There is also a Master programme in Innovation and Project Management for graduate students organized by the Faculty of Engineering. There isn't any centre for professional training and education.

The University is founding partner of **NANOFAB**, a research centre focused on applied research in the field of nanotechnology. It has many labs in the Venice area with advanced scientific equipment and it performs research activities finalised at industrial exploitation, based on the needs of local businesses. Another example is the **TESI lab**, and its mission is devoted to studies in the field of micro manufacturing and it has strong links with local industrial associations and companies.

The University enhances the creation of spin-offs, because they are the main tools to transfer technology to the market, but the activities of the spin-off must be clearly separated from the institutional and commercial activities which researchers can perform within the University. The Technology Transfer Office offers management consulting services to researchers willing to start a spin-off company and helps them in writing the business plan and in contacting industrial and financial partners.

Start Cube, the **incubator of the University of Padua**, is a structure created to facilitate the birth of new enterprise. Start Cube offers its services to professors, researchers, PhDs and recent graduates who want to explore the chance of transforming their scientific idea into a real business, creating a university spin-off. The incubator supplies furnished spaces and supporting services to the wannabe entrepreneurs.

E) The University TTO frequently co-operates with **Parco Galileo**, a **scientific and technological park** promoted by the local Chamber of Commerce, and with **Veneto Innovazione**, the regional development agency.

The University was partner of the Veneto region team that participated in the European network **START** (Start-up know-how transfer network), in cooperation with Copenhagen, Edinburgh, Hamburg and Vienna region. The aim of the project, entirely financed with the European Commission contributes in the area of PAXIS project, was to analyze the various ways to create innovative start-ups in the five regions involved and fostering the exchange of best practices.

A) Aalborg University - <http://en.aau.dk/>

5.12

B) It is the vision that Aalborg University should be an open and attractive research and learning institution with an international orientation. This implies an environment where research and teaching are given equal weight and where students and researchers alike are able to satisfy their scientific curiosity and development as far as their will and talent will take them in close interaction with one another and the rest of society. Aalborg University is directed by a Board of Directors - composed of 11 members, of which six are external members.

With the **University Act** of June 2003, the overall mission of the Danish universities was given a new wording while at the same time there were changes in the formal framework for the universities' governance and management, programmes, and form of ownership. In addition to research, education, and communication, the University Act now includes exchange of knowledge and internationalization in the universities' mission statements. The lawmakers intended the new legal status of the universities to be accompanied by new and wider degrees of freedom.

Continuing Education at Aalborg University offers a wide array of studies, ranging from Master's programmes to single courses within different academic disciplines. Aalborg University offers an annual supplementary education programme – **Life-long Learning** – for their former students.

<http://www.plan.aau.dk/ud-dannelser/livslang+laering>

C) The Knowledge Exchange Office is a service facility at the University which functions as a contact centre for external parties who are interested in cooperating with the University. The cooperation can e.g. be in the form of collaboration between Aalborg University researchers and R&D employees in private corporations or public institutions; the co-financing of researchers, PhD fellows and laboratory facilities; student-business project cooperation; and traineeships. The Knowledge Exchange Office facilitates network relations between businesses, organizations etc. and relevant parties at the University, provides training in entrepreneurship and publishes newsletters. Aalborg University offers numerous opportunities for cooperation, which is as much directed at small and medium enterprises as for large.

<http://www.nc.aau.dk/English>

Aalborg University's **Careers Centre** is a free service, where one can acquire company and organisational information during studies at Aalborg University. **The Careers Centres** offers:

<http://careers.aau.dk/>

- Student Jobs/Graduate Jobs;
- External Job Databases;
- Free Mailing List;
- Internships in Denmark;
- Careers Fair;
- Alumni from Aalborg University;

http://internationaloffice.aau.dk/international/accommodation_office

<http://en.aau.dk/About+Aalborg+University/University+Structure/Administration>

www.kvalitetssikring.aau.dk/kvalitetssikring-uddannelser/learninglab-aau

www.biomedcom.dk/media/novisamlet.pdf

- Seminars, courses, etc. in English;
- Career Centre Staff.

The International Accommodation Office is a unit of the International Office at Aalborg University. The Accommodation Office assists administrative personnel at Aalborg University with finding accommodation for international students (incl. PhD students), teachers, lecturers and researchers who are going to study or work at Aalborg University for a period of time. The International Accommodation Office furthermore assists Aalborg University affiliated persons who are going abroad for a period and are interested in subletting their accommodation.

Aalborg University has a central **Information Office**, one for each faculty, and a press unit on SBI (Danish Building Research Institute). The Information Office has a number of extroverted functions. This includes office functions as the interface between the university and the press. Information Office is also behind several of Aalborg University's internal and external communication activities.

D) Aalborg University recognises the value of giving its students an opportunity to cooperate with the business community, industry, organisations and institutions as an integrated part of their studies. As a result, graduate students at Aalborg University have the opportunity to spend one semester as a trainee at a national or international company, organisation or institution. The University has a traineeship service, which e.g. includes databases that facilitate the contact between interested students enrolled at Aalborg University and businesses, organisations etc.

Learning Lab Aalborg University is a resource and development center for employees and students at Aalborg University. Learning Lab Aalborg University will contribute to elucidation, development and qualification of the pedagogical quality of teaching and help to foster a debate on university teaching and learning.

Aalborg University participates in a great number of private and public, local, national and international collaborations, networks, associations, partnerships etc. at different levels. Aalborg University offers an alternative to the traditional PhD programme - an Industrial PhD where one is employed at a company in which the research will have its origin, and the working hours are divided between the company and the university.

Type of support to enterprise foundation and development of entrepreneurship:

- **NOVI Management A/S** acts as management company for the innovation environment NOVI Innovation A/S and NOVI Science Park;
- **NOVI Science Park** accommodates more than 75 companies – mainly high-tech companies – in a dynamic environment where the companies benefit greatly from each other and from the competences that they each encompass. NOVI is connected to Aalborg University and it is one of Denmark's largest science parks;

- **NOVI Innovation** provides:

1. A fruitful and attractive environment for entrepreneurs, their ideas and projects;
2. Critical mass concerning competence;
3. Necessary capital development and scaling.

The science park is the daily workplace for 750 people and the home of NOVI Innovation A/S, which handles NOVI's function as an innovation environment under the Danish Ministry of Science, Technology and Development.

For a number of years, Aalborg University has supported initiatives at the University which promote entrepreneurship amongst the University's students. **The SEA office** (Supporting Entrepreneurship at Aalborg University) is the hub where functions related to entrepreneurship and innovation at and around Aalborg University are promoted and managed. Initiatives, which SEA takes part in:

- Kickstart - entrepreneurial training and events;
- International Danish Entrepreneur Academy, IDEA - entrepreneurship, innovation and creativity;
- First Step - meeting place for knowledge entrepreneurs in Northern Jutland;
- Venture Cup - Denmark's largest businessplan competition;
- Incubator - start up own business during studies or just after graduating;
- Counselling - for students and candidates who wishes to start up their own business;
- Events for entrepreneurs.

Aalborg University's Matchmakings purpose is to offer regional key persons within education and trade and industry cooperation between the university and trade and industry.

Aalborg University continuously works at expanding and improving its cooperation with other universities and international research institutions and already has a large network at different levels. The university is e.g. a member of **The European Consortium of Innovative Universities (ECIU)**.

E) Aalborg University Liaison Council is established with the purpose of conducting the contact to the surrounding community. The duties of the council are to exchange information and points of view between public and private parties and the University and to advice the University's management on issues concerning central university political affairs.

Aalborg University feels a special responsibility for the regions in which the university is located and moreover accepts a commitment to the development in Denmark as a whole, in which context, too, it is open to cooperation with other national and international institutions of tertiary education, including universities in the third world. Aalborg University participates in a number of different types of university network collaboration at various organisational levels.

<http://467786.g.portal.aau.dk/EnglishBBN>

www.matchmaking.aau.dk/Om+AAU+Matchmaking

<http://eciu.web.ua.pt/>

<http://en.aau.dk/National+and+International+Cooperation/Businesses,+Organisations+and+Institutions/562040>

A) University of Bristol - <http://www.bristol.ac.uk>

B) The University of Bristol clearly defined the university procedures concerning cooperation with enterprises and incorporated it into a legal document under the title University and **Vision Strategy 2009-2016** and **Research and Enterprise Strategy 2009-2016**. University of Bristol Strategy reaffirms priorities for research and enterprise across the University, as detailed in the University Vision and Strategy 2009-16, and lays out the objectives for the next seven years. One of the key deliverables is for the **University Research Committee** to act as the Project Board for the implementation of the Strategy.

www.bristol.ac.uk/red/newco/incubation/sciencepark.html

<http://www.southwestrda.org.uk/>

<http://www.uwe.ac.uk/>

C) North Bristol will become home to a major new **Science Park** being developed by the South West Regional Development Agency (SWRDA) and its development partner supported by the Universities of Bristol, Bath and the West of England (UWE) and other strategic partners.

This substantial new development will enable high technology businesses in the South West to take the next step and successfully graduate from the current business incubation facilities in the region, such as those offered by the three Universities:

- *Step 1:* Pre-incubation for very early stage ventures;
- *Step 2:* Incubation for new small businesses;
- *Step 3:* Graduation space at the Science Park for smaller high technology businesses;
- *Step 4:* Mature space at the Science Park for more developed high technology businesses.

A spin out company may be appropriate if:

- Entry to the market by a new company is relatively easy with few significant barriers;
- The marketplace is fragmented with a lot of small companies;
- The technology has many applications;
- There is a portfolio of patents;
- Further investment is required in the technology and associated infrastructure in order to reach the market;
- There is a group of founders motivated to start a company;
- It is likely that investment funds can be raised for a company;
- There is a financial exit route for investors, including the University.

Members of staff require authorization from the University before setting up or becoming an officer (director or secretary) of a spin out company. The interests of the University, the individuals and the spin out company must all be considered, and legal issues addressed, including:

- The use of intellectual property owned by the University;
- The impact on existing and future duties of members of staff;
- The use of University resources, such as space and equipment.

www.bristol.ac.uk/red/newco/policy/

D) Enterprise Modules/Units: Innovation, Entrepreneurship and Enterprise. This unit addresses the learning outcomes related to innovation, entrepreneurship and enterprise. It focuses on entrepreneurial approaches in both small start-up companies as well as larger established organizations.

www.fen.bris.ac.uk/engmgmt/ugTeach/ugentre.html

Another source of help to develop the business idea and entrepreneurial activities is **Bristol University Business Angels** which was established with the help and financial support from RED. They offer a range of services from market research and business planning to funding, marketing and accounting. And their services are free!

www.buba.org.uk

The Student Development Unit at the University of Bristol Union provides training, advice and support to students involved in all sorts of activities including personal development courses run under the “Tooled Up” programme.

www.bristol.ac.uk/studentskills/content/tooled-up/

E) The University maintains close links with the South West Regional Development Agency, through which a number of programmes are funded, and company links are set up. It also has links with **Business West** and other in the region, through which we are in a good position to support businesses and enterprise throughout the region.

www.gwebusinesswest.co.uk/

The Bristol Enterprise Network is the University’s facility to assist knowledge transfer among the high-tech, high-growth business community. The network, which is free to join, brings together regional, national and international organisations from both the commercial and academic arenas. It provides easy and rapid access to the knowledge, expertise, experience and equipment that is available.

www.bristolenterprise.com

RED provides a professional service to support and promote research at the University, advising researchers on a range of European and overseas opportunities and providing guidance throughout the application process. As a result, Bristol is involved in numerous research consortia at the cutting edge of international research.

www.bristol.ac.uk/red/

A) University of Edinburgh - <http://www.ed.ac.uk>

5.14

B) University of Edinburgh has a clear policy, mission and vision in the field of university-enterprise cooperation. The University’s mission is to pursue excellence and it enjoys an international reputation for ground-breaking research in disciplines of interest to a wide range of industrial sectors. This research has had considerable impact on many areas of knowledge, and has led to the discovery of a number of important products and the foundation of many technology companies. **Strategic plan** is defined in 2008- 2012. period with the following strategic goal: *Excellence in commercialization and knowledge exchange.*

www.ettc.co.uk/

www.careers.ed.ac.uk/

www.scottishni.org/

www.international.ed.ac.uk/

[www.inf.ed.ac.uk/
alumni/workplacements.html](http://www.inf.ed.ac.uk/alumni/workplacements.html)

www.launch.ed.ac.uk/

[www.careers.ed.ac.uk/STU-
DENTS/Careers/B2.html](http://www.careers.ed.ac.uk/STU-DENTS/Careers/B2.html)

[www.ed.ac.uk/schools-departments/
communications-marketing](http://www.ed.ac.uk/schools-departments/communications-marketing)

www.transkills.ed.ac.uk/bet.cfm

www.epis.org.uk/

C) The Technology Transfer Centre offers services related to knowledge and know-how transfer. The company's principal activities are the provision of early-stage incubation support to high-growth start up and spin-out companies with ongoing research and development links to the University of Edinburgh, and the provision of lettable project office and laboratory to these companies during the early stages of their development. University of Edinburgh graduates are highly regarded by employers, and the **Careers Service** offers services to both current and former students, to assist them with finding employment. It also hosts a number of recruitment events, attracting major employers from across the UK. In addition, international students can join **Scottish Networks International**, giving them access to networking events with potential employers and the chance to compete for prestigious work placements.

The International Office is providing a wide range of services to help students, and companies. Colleagues across the University identified the need for the discussion of marketing issues leading to improvements in the University's approach and activities in this area. The Principal convened a group of relevant senior officers and the **Principal's Strategy Group** subsequently endorsed the view that a temporary **Marketing Strategy Group** be formed in order to give detailed consideration to this important area. Some of the important services:

- Placement service;
- Enterprise support service (for students);
- Personal & Careers Guidance;
- Communications and Marketing.

D) A new web address is being proposed <http://www.ed.ac.uk/entrepreneurship/> with the aim of coordinating entrepreneurship activity, events and initiatives across the university and wider community. The technology transfer office offers several trainings. Over the last three years, the University has received funding from the EPSRC to fund training and / or course development in the area of entrepreneurship. The amount of funding is based on numbers of EPSRC funded PhD students and research staff. The University already has a **programme of business and enterprise workshops**, as well as other activities in this area. Much of professional training and education is based in the **Department of Education and Society**, which includes the **Centre for Educational Sociology**, the **Centre for Educational Leadership** and the **Educational Assessment Unit**. There are important contributions from other departments including Educational Studies. The research contributes to the AERS Networks on Schools and Social Capital and School Management and Governance.

In January 2004, Edinburgh Research and Innovation set up the **Edinburgh Pre-Incubator Scheme (EPIS)** - a joint initiative between the University of Edinburgh, Scottish Enterprise Edinburgh and Lothian (SEEL) and the European Regional Development Fund (ERDF). EPIS is a unique initiative, the first in Scotland, which seeks to break down barriers between academia and commerce to encourage new entrepreneurs develop knowledge-led business ideas on the university campus.

B) There are clear procedures regarding the intellectual property management (technology transfer) and creation of spin-off companies, which are incorporated into Rules of Intellectual Property Management at the University of Maribor. Strategic plan is created to establish three pillars of innovation: Technology Transfer Office, University Business Incubator and Science Park, which will contribute to the greater involvement of the University in the economic environment. In the decision making structure representative of enterprises is named in board of University of Maribor. There are also representatives of enterprises in some other bodies on faculty levels.

C) **Technology Transfer Office** (in the form of non-profit limited company, owned by the University) gives a full support in assessing and commercializing the inventions, and later on monitoring the licenses and other agreements. It is also competent to lead the process of establishing spin-off companies and enter the company with the University's share. The TTO functions from 2006.

<http://www.tehnocenter.uni-mb.si/>

The University's business incubator, named **Venture Factory**, usually fosters the newly established spin-offs, offering them facilities and expertise in the field of entrepreneurship. The network of University's incubators reaches also Celje and Velenje. **The Styria Technology Park and Science Park** foster more mature companies. Currently there are no specific database placements/job offers accessible to enterprises and students. Some of the important links are:

<http://www.inkubatorcelje.si/>

<http://www.znanstvenipark.si/>

- **International office;**
- **Net spin-off Incubator of the University of Maribor;**
- **University career centre.**

<http://www.uni-mb.si/podrocje.aspx?id=0&langid=1033>

http://www.inkubatorcelje.si/ang/index_en.php?id=univerzitetni_ink

D) Some faculties from the University of Maribor have enterprise boards, which discuss competences, skills, curriculums, etc. in the processes of study programme's formation and evaluation. In the process of the accreditation a part of the study programme's proposal is also trade branch assembly's opinion, opinion of related sphere ministry or relevant employer association's opinion. TTO and Venture Factory carry out occasional trainings and lectures about entrepreneurship and intellectually property management. Young researchers, employed at the University, are even obliged to participate such training. Currently at the University level there are no centre for professional training and education, but there are some centres for professional training and education placed at the faculties.

E) Joint research projects can be realized through contract between University and companies; in the form of joint institutes; through various national and EU projects; through programmes such as Young researchers in economy. Styria Technology Park has been operating for several years, excepting companies, deriving from R&D results and other innovative ideas at the University. Science Park is currently being built, pursuing the same mission. Common

are also joint research institutes with private-public ownership. The University of Maribor is especially involved in EU regional development projects through cooperation with different partners within following networks: EUA, DRC, AARC, LEO-NET, ENAS, UNEECC.

*New WBC model of 6
university-enterprise cooperation*



6.1 Challenges and prospective views

Under the socialist system in former Yugoslavia (+ Albania – Slovenia = WBCs), almost all countries had a strong research capacities within large self-managed companies. Following the break-up of Yugoslavia and the collapse of the self-management system, many of these companies were broken up and their research teams were dispersed. Many researchers and engineers left established industries to set up new firms. From the other side, the new states succeeded, in some extent, in preserving science capacity in public universities and research institutes.

However, new age requires **new models of cooperation between universities and enterprises in Western Balkan region.**

The common objective of knowledge-based economic development efforts in the WBC should be focused towards the creation of an **“Innovating Region”**. The Western Balkan region as an “Innovating Region” should have the capability to move across technological paradigms and periodically renew itself through new technologies and firms generated from its academic base. The involvement of an entrepreneurial university in this concept is the key to the transition from regional development efforts based on existing industry to **knowledge-based regional development.**

Universities (higher education) and enterprises (industry) should be closely connected to and cooperate with each other for the common goal of pursuing social development. However, **cultural differences** are an important consideration of the development of university-enterprise collaborations. Universities and companies differ in the way that:

- Research is funded;
- The expected outcomes of research programs;
- The way that each manages the results of research.

University research is driven by individual curiosity and the desire to extend the boundaries of knowledge. The mission of most universities can be summarized as **teaching, research, and outreach.** In support of these elements of their missions, universities foster a culture which supports the sharing of information with colleagues and the publication of the research results in peer-reviewed journals. In contrast, companies use science to develop products that can be sold and generate a

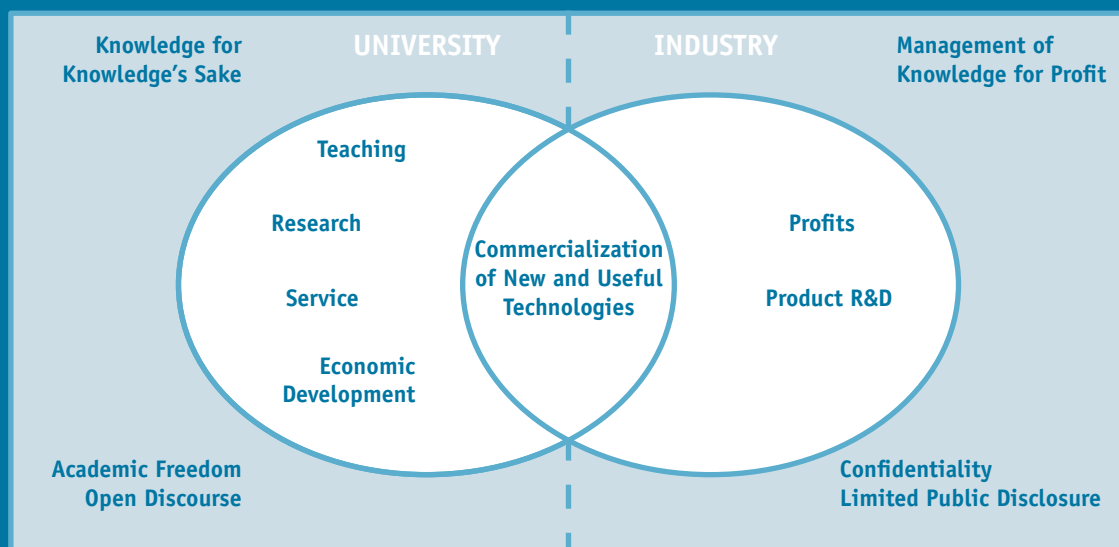


Figure 1. Bridging and linking different cultures of academic and industrial sectors

profit that provides a return to investors. In general, companies **manage science for profit** and often prefer to protect confidential information from early disclosure, as can be seen in Figure 1.

Competition in the market place requires short development times and proper management of intellectual property that restricts publication of research outcomes.

However, modern society based on knowledge, economy growth and better living conditions can not be achieved without close cooperation between universities and enterprises. Interactions between universities and enterprises are beneficial to both sides. Benefits to universities come from complementing their own academic research and from commercialization of research results. Benefits to companies come from increased access to new university research and discoveries.

6.2 Benefits for key actors in the knowledge triangle

It is widely acknowledged that the commercialization of scientific and technological knowledge produced in public funded research institutions, including universities and research centers, to the marketplace have a fundamental role to play in wealth creation, supports economic growth and technological innovation, and plays a significant role in new venture creation, growth of existing firms and new job creation.

All actors in **the knowledge triangle** (Figure 2) should have benefits from university-enterprise cooperation bearing in mind large number of people included in this triangle. Universities are repositories of knowledge about future technological, economic, and social trends due to numerous stakeholders (internal and external). **The major stakeholders** are academics, researchers, professionals, students, institutional leaders and managers, national governments, national agencies and advisory bodies, supranational

bodies (World Bank, OECD, etc.), and businesses and industry (including both multinational and small- and medium-sized enterprises – SMEs).

University-enterprise cooperation can take many forms from which key actors in the knowledge triangle should have **benefits**. In what follows some of them are described.

In the field of teaching and training, benefits of key actors can be through:

- Industry participation in academic planning and course design;
- In-kind support by industry (donation of equipment, student scholarships, teaching grants);
- Secondment of staff by industry to university as part-time professors, visiting professors, etc.;
- Industry provision of on-the-job training opportunities (summer jobs) and of part-time work opportunities;
- Delivery of specialized courses by universities (continuing education, executive development, specialized customized programs);
- Participation of university professors in industry-led professional development activities, faculty consulting in industry, participation on company Boards and other industry-driven committees.

In the field of research, industrial support to the university can be through the following activities:

- Research grants and research contracts;
- Donation of equipment;
- Access to industry research facilities.

The transfer of knowledge and technology from universities to enterprises occurs through a number of pathways, but the most prominent pathways are:

- The training of students (theses, class projects, practice);
- The publication of research results in the scientific or technical publications;
- Common participation in conferences and seminars.

Other methods that result in the transfer of knowledge are through:

KNOWLEDGE TRIANGLE needs universities, as source of knowledge, and providers of applied research

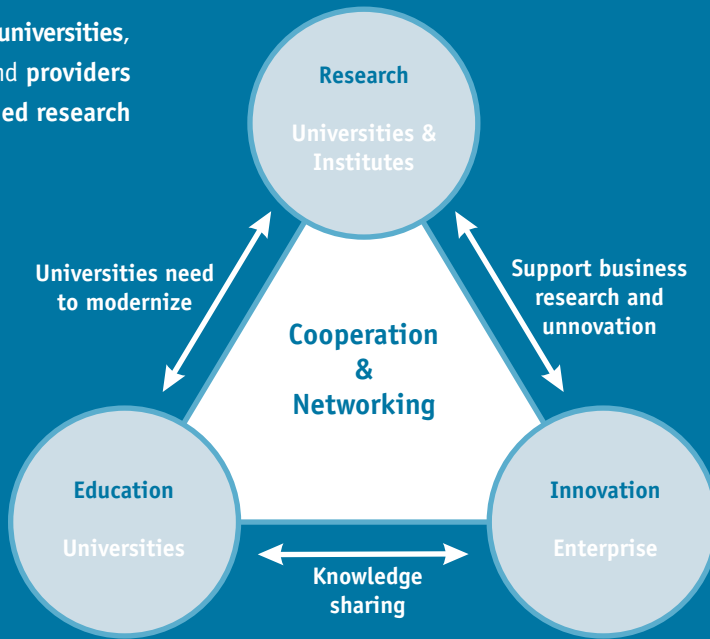


Figure 2. Knowledge triangle interactions

- Industrial consulting by university staff;
- Research in the university laboratory that is sponsored by a company;
- Consortia that bring together university scientists and industry scientists to conduct collaborative research;
- The licensing of inventions created at the university to companies for further development and commercialization;
- The creation of companies specifically for the development of a university created invention;
- The exchange of research materials between laboratories.

In addition to this, effective ways for technology transfer between two sectors are:

- Sale or license of patent;
- Joint venture for the commercialization of joint research;
- Creation of spin-off firms.

Technology transfer can help create closer ties to enterprises that might provide employment opportunities for students, additional sponsored research, and may even result in donations to the university.

6.3 WBC regional model of university-enterprise cooperation

Countries in transition, like almost all in the Western Balkan region, have to adapt their universities to the rapid changing of knowledge and technology in order to be in position to offer the education fully integrated with the needs of high technology industry and the wider economic and social environment. Bearing in mind all specificity of WBC region, including the fact the most countries were in one (Yugoslavia) and also the fact that new companies show their vitality and capability to be successful at the market, the **new WBC model of university-enterprise cooperation** should be combination of the following activities:

1. Establishment **Science and Technology parks** in regional university centers, which can be generator and place for new start-up or spin-off companies;
2. Organization of **WBC regional industrial clusters** depending on field of research and business;
3. Forming **University-enterprises consortia** for joint participation in FP7, EUREKA,

- TEMPUS and other EU funded projects;
4. Establishment of **regional Collaborative-training and/or Life-long learning centres**;
 5. Setting up of **Open Innovation Networks with SMEs**;
 6. **Practical placements** for students in industry;
 7. **Industrial fellowship programme** for graduates and/or employees from enterprises.

The suggested model is not the traditional linear model, based on the transfer of research results to industry through publication or mobility of graduates but rather so-called **"Assisted Linear Model"** comprising a variety of interlocking organizational mechanism such as research centers of excellence, technology transfer centers and incubators that move research with long-term commercial potential into use as well as cluster, centers for Life-long learning and joint consortia.

6.3.1 Establishment of Science and Technology Parks

We suggest that all bigger universities and administrative centers in WB countries should establish Science and Technology Parks (STPs), in close cooperation with municipalities, universities, regional or national authorities and industry representatives. Fully developed, these parks can incorporate some of the following units as illustrated in Figure 3:

- Technology transfer center;
- Incubation center;
- Centres of excellence;
- Collaborative – training center;
- Patent office or IPR support office;
- Start-up center; as well as
- Offices for start-ups, spin-offs and subsidiaries of large companies.

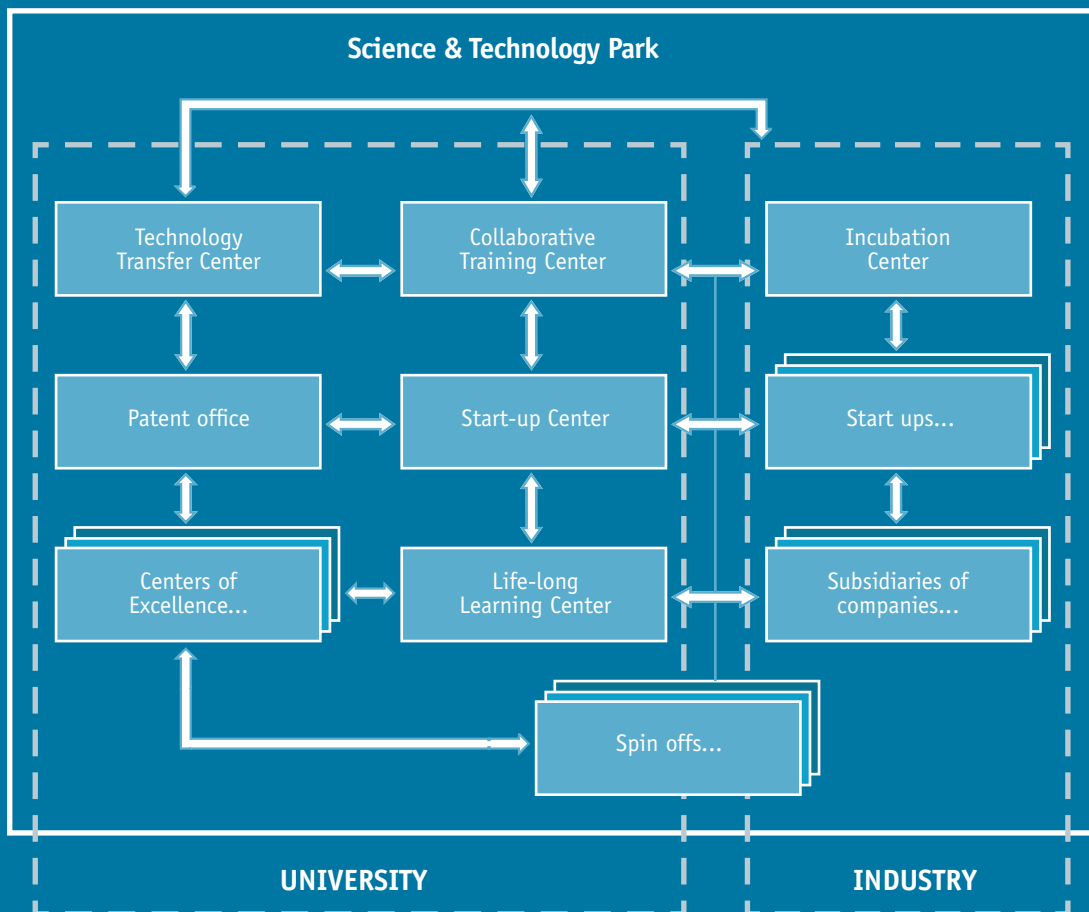


Figure 3. Proposed scheme of Science & Technology Park structure

In the future, other structures can be added, such as restaurants, a technical museum targeted at practical introduction of high school students into R&D, legal advisory, etc. The Science & Technology Park is a rather broad concept used to describe various attempts at stimulating development entrepreneurial, knowledge-based small and medium-sized enterprises (SMEs) within a country. Although there are several definitions of STPs, the fact is that they represent an agglomeration of SMEs, which have the following characteristics:

- They are linked to education and research institutions;
- They offer infrastructure and services for the activities of the hosted SMEs, primarily real estate and business space;
- They facilitate the process of technology transfer; and
- They are intended to stimulate the industrial development of the region where they are located.

The basic aims of the STPs will be to provide a favorable environments and infrastructure and to support the creation and growth of new enterprises which commercialize innovations from universities or research institutes.

The **activity** of STPs includes offering an entire set of services to tenant companies, in order to help them survive on the research and development market. The **motives** for founding STPs in WBCs are industrialization, regional development and the creation of synergy. The **goal** of these Parks is to stimulate economic growth in the region by:

- Creating an atmosphere suitable to the development of innovative activity;
- Support of entrepreneurship in the scientific-technological sphere;
- Forming of an infrastructure which stimulates the creation and development of small innovative companies;
- Technology transfer;
- Commercialization of the results of scientific and technological research;
- The employment of the best students who finish their courses of studies.

In WB region S&T Parks will be also used **to attract foreign investment** for creating jobs in the domain of high technology¹ and increasing the governmental budget. One of the important goals is also **to prevent brain-drain phenomena** which have been specific for WBCs in previous period.

These STPs should be funded partly by Ministries of Sciences and Technological Development (or equivalent) and partly through rents earned from their tenant companies. Private investors and venture capital funds can also invest resources in order to make a profit later on. Obtaining these resources for companies will be one of the most important functions of the park's management. Within the Parks should be developed and promoted the **entrepreneurial spirit** among science students and staff, and to encourage them to set up small high-technology companies. The STPs will provide tenants with **professional educational courses**, organize participation of tenant companies in international trade fairs and will provide consultations on development strategies, financing, participation in markets and placement of products.

6.3.1.1 Technology Transfer Center

Technology transfer is defined as a transfer of knowledge, scientific or technical know-how, technology, technology-based ideas or research results, developed within an academic institution, from academic institution to industry, where an academic institution may or may not have the property rights for commercialization of such scientific or technical know-how, technology or research results.

Politicians in European Union also recognized the importance of technology transfer from academia and establishment of spin-offs, therefore European Union funds projects such as **PROTON** (pan-European network of Technology Transfer Offices and companies affiliated to universities and other Public Research Organizations), **PRIME** (Policies for Research and Innovation in the Move towards

¹ There are some initiatives in the ICT area, such as the upcoming Technology Park at Indjija - located 30 km south of Novi Sad, Serbia

the European Research Area) and **INDICOM** (Direct indicators for commercialization of research and technology) that are examining issues concerning technology transfer from academia and establishment of academic spin-offs.

The role of the Technology Transfer Center (Figure 3) will be:

- To establish a database of universities research results;
- To serve close research-industry contacts;
- To manage interdisciplinary forums and networks;
- To deal with patents and intellectual property rights;
- To promote the commercialization of research results.

It proposes innovation projects and sends the proponents of a well rounded idea directly to incubation centers.

This Center will also be aimed at **attracting top-class experienced researchers** who left the countries from Western Balkan region and to contribute brain-gain phenomenon, which is one of the priority in FP7 REGPOT projects of European Union.

6.3.1.2 Incubation Center

The process of nurturing business start-up and growth has, for many years, been appropriately called **“incubation”**. The **purpose** of an incubation center is to provide all the resources that the entrepreneurs need to build successful businesses. A successful incubator must make major achievements in business start-up and growth, expansion of existing businesses and institutions, and the attraction of established firms and their various facilities from outside the country.

We suggest **establishment incubation centers or incubators** (depicted in Figure 3) and developing its services in the following major areas:

- Networking opportunities that will encourage entrepreneurs to interact with other companies inside and outside the incubator

for creating business opportunities for high technology companies from the region and from other partner universities;

- On-site staff and consultant management assistance in budgeting and cost control, personnel management, purchasing and marketing;
- Bringing technologies developed at WBC universities closer to commercialization;
- Knowledge in applications to regional, state and European development funds;
- Experience in obtaining financing for equipment and operations and linkages to seed and start-up venture funds for the incubated companies as well as from development funds.

The Incubator supports new start-up companies in the first phase of its existence. The support is offered under flexible conditions, and after about 3-5 years the newly created company is stimulated to leave the incubator since it is considered to be capable of independent existence. Most of the STPs have an incubator within themselves.

The university is a natural incubator, providing a support structure for teachers and students, to initiate new ventures of all kinds, intellectual, commercial and conjoint. The university is also a potential seedbed for new interdisciplinary scientific fields and new industrial sectors, each cross-fertilizing the other. Start-up companies often need periodic use of specialized equipment, which they cannot afford to purchase on their own. Incubators typically provide the most commonly used equipment and assist the tenants in gaining use of other equipment resident in research institutions and companies in the area. This **shared use of equipment** will give the incubator a strong position for the future success of its companies.

Furthermore, most entrepreneurs have little management training or experience in budgeting and cost control, personnel policies, recruiting and management, purchasing, and marketing. The incubator staff will have the primary function of providing **general management assistance** to the companies in the incubator. Effective incubators should run a series of large and small **seminars** where service providers in the region share common problems and solutions with the

tenant companies. One of the benefits incubator tenants value most highly is the opportunity to trade needs, experiences and ideas with other scientists and entrepreneurs within the incubator. The incubator will provide help to the tenants in accessing **networking** opportunities with others incubation centers in the WBC region and elsewhere.

An effective technology incubator programme, serves not only companies occupying space in the incubator building, but also other technology start-up companies in the area and, to a lesser extent, more mature technology companies as well. Broadening the number of tenants (beyond those in the building) is also very important, creating additional sources of income and possibly making the incubator company profitable and sustainable. The work in this area should be focused on supervising existing local companies to move parts of or all their business to the incubator. One of the aims of the incubation centers will be also to promote an **entrepreneurial culture**

through developing infrastructure for facilitating entrepreneurship and forming a pool of people possessing entrepreneurial mentality and skills as opposed to an “employee mentality” which has dominated the community in the WBC region.

Additionally, an important argument in favor of the incubator approach is that it is the place where students can do practical work, become participants in different projects, and learn through experience. We suggest forming the **school of entrepreneurship** as a part of the future Science and Technology parks. It is of high importance to improve the market economy and business thinking for young people and students especially in countries which have not had a tradition of entrepreneurship such as WBCs.

6.3.1.3 Academic spin-offs

Academic spin-offs are an important means of technology transfer from universities to enterprises and an important mechanism for

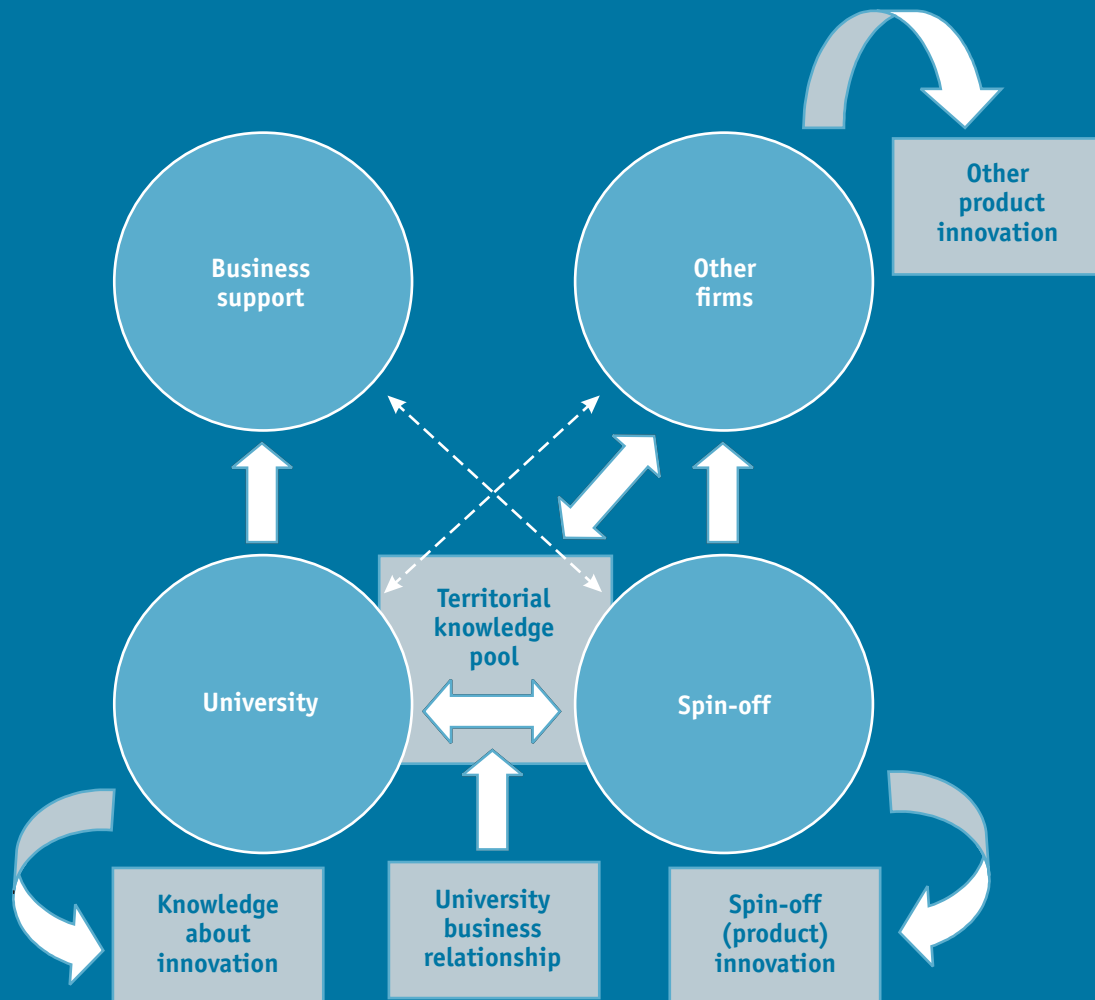


Figure 4. Heuristic model of how university-business interaction creates a more generalisable territorial advantage

economic activity. For example, spin-offs are the main mechanism for the rapid growth of technopolises like Silicon Valey, Route 128, Austin, Cambridge and others. The university spin-off is defined as a company that is founded

1. By a faculty member, staff member, or students who left the university to start a company or who started the company while still affiliated with the university; and/or
2. Around a technology or technology-based idea developed within the university.

To survive and prosper in an era of global competition, universities must become **entrepreneurial universities**. Entrepreneurial university means much more than the transfer of knowledge or the birthplace of high technology spin-offs. *Being an entrepreneurial university means being innovative with its programmes, research projects, institutional development, internationalization, and being able to generate income to supplement government funding.* The **regional benefit** need not be produced simply by interactions between the university and its spin-off companies. It is important to stress

that the regional knowledge pool remains an important part of the contribution that spin-offs bring, through the various elements of relationships between universities and their spin-offs. However, as it is shown in the model in Figure 4 there are other actors and other important relationships contributing to this positive relationship and to the regional impact in terms of creating territorial learning and knowledge assets.

Bearing in mind that WBC region has a pool of talented, motivated and well-educated young researchers, we suggest forming incubation centers within Science and Technology parks with the aim to encourage academics and students to establish spin-off companies to **commercialize the results of scientific inventions** made within the academic laboratories. Such companies are typically small high technology companies. The commercialization of scientific research through spin-offs is a direct means of transferring knowledge from higher education institutions to the SME sector. The close proximity to the Universities in WBCs, the possibilities of networking with both big and small companies in the local environment,

Case Study: DMS Group

The DMS Group, Novi Sad, located within the science-technology part of the University in Novi Sad, Serbia, is an advanced IT company of more than 300 developers (the average age of the group is 35) that has created the Distribution Management System (DMS) software product. DMS Software is organized modularly, the partner companies are able to selectively use only the parts (software) missing from their offer (e.g. selected DMS Functions, data base, graphic user interface, DMS server, etc). Apart from selling licenses for DMS Software, DMS Group has a large and experienced project team, which, on partner companies' requests, provides services in tender/proposal phase, as well as in installation, engineering, commissioning and training for system use.

After eight years of being partners, Telvent and DMS Group together founded a new joint venture under the name Telvent DMS. Telvent DMS LLC is a private IT Company for research, development and engineering in the field of the electrical power engineering management software. Its main product, the DMS Software, encompasses a variety of analytical functions for calculation and optimization in the electrical industry, and provides the tools necessary for efficient monitoring, managing, design and optimization of distribution systems. This package is a 21st-century software system for performing all technical tasks in distribution utilities in an efficient and optimal way that fulfills modern power industry development requirements across the world. This software tool enables utility personnel to: achieve high-quality knowledge about their electrical network, efficiently utilize, design and develop distribution facilities, reduce losses and operation costs, raise the profit (revenue) of the utility and improve the quality and quantity of supply of electrical energy to consumers.

Telvent and DMS Group have launched projects together in over 100 control centers worldwide including Tunisia (six control centers), Italy for the ENEL utility (29 control centers), Macedonia (28 control centers), Serbia (17 control centers), as well as in other countries such as Peru, Paraguay, Costa Rica, Panama, Venezuela, Argentina, Mexico, Indonesia.

DMS Group has taken second place at the Competition for the Best Technology Innovation, in Serbia, 2009.

and a growing network of resource providers which can help to stimulate company development will contribute to **wider attraction of WB region**.

As a good example it can be mentioned the Novi Sad Science Incubation Centre (NOSIC), Serbia established in 2003. There are now 44 registered enterprises in high-tech areas. Just for illustration we would like to name a few: *DMS Group, Energobull, Intens, HIO-FTN Group, 4 Expand, Levi 9, Novatronic, Novilog*, etc. All were established by university staff and researchers at the University of Novi Sad, Serbia. 28 companies are doing business with a significant profit and 576 persons are employed in these enterprises.

6.3.2 Organization of WBC Industrial Clusters

Regional clusters, the geographic concentration of economic activities in a specific field connected through different types of linkages, from knowledge spill-overs to the use of a common labour market, are increasingly viewed as an interesting model for universities-enterprises cooperation and understanding the economic strength or competitiveness of a region.

One of the most promising knowledge-transfer programmes in WBC can be model to develop **industrial (research-driven) clusters** involving both enterprises and universities and/or research institutes. Regional clusters will enable companies to reach higher levels of productivity and be more innovative. Apart from companies research and educational institutions and **regional development agencies** can increase their economic benefits. They can improve linkages and mobilize joint action to improve critical areas of the cluster-specific business environment in the region, and to increase international visibility of the regional cluster. The established clusters should be mutually linked and they need to have close relations with the **Chambers of Commerce** in WBC region.

One of the aims of clusters is to **promote knowledge transfer** among the members of the cluster. Knowledge and technology transfer takes place between members of the clusters

and includes skills and expertise transfer from universities and research institutes to enterprises. The knowledge should circulate also in the opposite direction – clusters will stimulate the **development of new courses** in the universities, for example courses on new IT technologies, virtual engineering applications, embedded systems, bioengineering, flexible and organic electronics, rapid prototyping, etc.

The members of the clusters will cooperate mainly in the field of joint promotion, joint R&D projects, participation in joint education events and in other forms of acquired knowledge. Cooperation in setting up the joint infrastructure of the cluster and in lobbying for common interests will be also important knowledge transfer activities.

Innovation regional policies should enhance linkages between the scientific community (universities and research organizations) and enterprises by improving the microeconomic capacity of the nations in WB region. The role of universities in the innovation process typically involve five areas: spin-out of research projects leading to the formation of new firms, licensing technology to established firms, university-enterprises collaboration programs (e.g. joint funding of research), publishing of research making it generally available, and through the continuous flow of graduated students and PhDs with new skills and knowledge. However, university linkages with established firms often lead to higher growth which points to the fact that establishing regional industry clusters are critical to the university-industry linkage in the innovation process.

The main reasons for entering in the clusters can be:

- The financial subsidy from the state;
- The commercial pressure for a higher degree of linkage and cooperation between sectors;
- Improved access to information resources and knowledge transfer through joint projects.

Key success factors include the creation of trust among the members, effective leadership of the cluster and the effective support of the top management.

Both value added and exports are expected to increase due to the positive effects on competitiveness of joint projects which will be undertaken within the clusters. The cluster sector is often described as the „engine“ of a regional economy.

Through the clusters model, governments in WBCs should provide co-financing of the costs incurred during the initial phase of their creation, for preparation of a joint development strategy and for the costs incurred during the first two years of their operations.

6.3.3 Joint participation in FP7 and EUREKA projects

The vast majority of programmes under the framework programmes of European Union support collaborative R&D between enterprises, universities, and other research institutes across Europe. Usually these projects must include partners from at least two EU member countries, what is a good opportunity for institutions from WBCs to cooperate and to learn from leading research organizations and companies in EU. Available evidence indicates that FP6 and FP7 projects have made an important contribution to the development of cooperation between universities and enterprises. Not only in money terms but importantly in terms of achieving this closer relationship between industry and academia sector.

Case study: *Embedded.rs cluster*

“Embedded.rs” industry cluster is envisaged to merge the embedded industry of Serbia. It was initiated by the private sector, as a logical response to market demands. Equally important participants are the country's biggest academic institutions and the most important research institutes in Serbia. The main goal of the initiative is to reinforce the strengths of the local embedded industry and its future perspectives. It is expected that the cluster will grow quickly in membership and will position itself as a valuable partner.

The cluster is supported by the Government of the Republic of Serbia, through the Ministry of Economy and has successfully implemented a number of projects in cooperation with local GTZ office and Serbian Export Promotion Agency SIEPA. Within the mentioned scope the cluster is working on solving mutual problems and creating better business environment by:

- Being the gateway to hardware and systems solutions that suit customers' needs;
- Insuring the reliability of members through continuous implementation of better business practices;
- Fostering contact networks to provide global solutions;
- Boosting the internationalization capacities of members in response to global demand;
- Promoting the profession and adapting the Serbian expertise in high technology.

Embedded.rs can offer a synergy between the members to provide more global hardware and system solutions to any third party, including the most complex and demanding hi-tech projects. The diversity of the cluster members, their experienced project managers and their interaction through embedded.rs hub permits such a commitment. The vision of the Cluster is to be the leading business association in the region with a worldwide recognition for the reliability and technical excellence of the members.

In this moment Embedded.rs members are:

- **Advanced Control Systems** - Manufacturer of sophisticated solutions for energy networks and automation;
- **Bitgear Wireless Design Services** - Electronics, FPGA and DSP R&D services provider;
- **Data Control** - Provider of software for embedded systems;
- **EUROICC** - Provider of solutions for industrial automation and R&D provider;
- **Hermes Softlab** - Provider of software for embedded systems;
- **Integra Solutions** - Electronics manufacturing services provider;
- **Mikroelektronika** - Producer of development kits and compilers for various microcontrollers architectures;
- **Novatronic** - Producer of LED displays and information display systems for various applications;
- **TES Electronic Solutions** - Provider of R&D services in area of analogue and mixed IC design;
- **School of Electrical Engineering** - Academic Institution, Belgrade;
- **Faculty of Technical Sciences** - Academic Institution, Novi Sad;
- **Institute “Mihajlo Pupin”** - Provider of full R&D services in areas of electronics and system design.

We would like to suggest that a very important model of the university-enterprise cooperation is **collaborative research, mobility and networking through FP7 REGPOT or INCO projects** which are especially devoted to WBC region or convergence regions.

The primary objectives of enterprises to collaborate with universities, within these projects, include **research synergies**, keeping up with major technological developments and **R&D cost sharing**. The increase in their knowledge base is the greatest reported benefit of firms from such collaboration. The fact that one of the main aims of EU policy for the Framework Programmes is to achieve a techno-economic convergence among its regions plays to the advantage of universities from such regions. The components of this dimension are improvement to the enterprises' technological and organizational capabilities, exploitation of complementary resources, new knowledge creation and/or acquisition, and acceleration of research. Enterprises may also benefit in terms of developing or improving new or existing processes or using sophisticated equipment at universities (or Centers of Excellence) purchased through above-mentioned FP7 projects.

Universities and enterprises from Western Balkan region should collaborate within specially designed program of European Union called EUREKA, helping make WB region economically strong and socially sound. **EUREKA** is the leading platform for R&D-performing entrepreneurs in Europe and beyond. EUREKA R&D is industry-led, applied, close-to-market — with tangible results and visible benefits. EUREKA now unites over 40 member countries. Together, they promote international, market-oriented research and innovation through introducing new products, processes and services to market. Results stemming from EUREKA projects are everywhere, such as: gsm mobile phone technology; navigation systems; smartcards to support mobile and electronic commerce; film special effects software for cinema; state-of-the-art medical devices and technologies to monitor and limit environmental pollution.

EUREKA Clusters are long-term, strategically significant public-private partnerships. Most

of Europe's leading companies participate in EUREKA Clusters, developing generic technologies of key importance to European competitiveness. EUREKA Umbrellas are thematic networks that focus on a particular technology or business sector. Their goal is to generate and support R&D projects in their specific field of operation.

EUREKA's Eurostars Programme is the first European funding and support programme to be specifically dedicated to research-performing SMEs. Eurostars stimulates them to lead international collaborative research and innovation projects. The Eurostars mission is to support R&D-performing entrepreneurs, by funding their research activities, enabling them to compete internationally and become leaders in their sector.

In the near future, very concrete steps should to be performed with the aim to build consortia (including academic and industry organizations from WBC) in order to prepare project proposals for EUREKA or Eurostars programme. This **TEMPUS** project can be very good basis to initiate preparing these proposals and building successful consortia.

6.3.4 Establishment of regional Collaborative-training and/or Life-long Learning centres

Establishment of **Collaborative Training Centres** (CTCs) at university level, as the university-enterprise links, can provide efficient and sustainable cooperation among the key actors of the knowledge triangle. Commercialization of R&D results, innovation and educational services are main activities of CTCs, developed on the basis of SWOT analysis and appropriate action plan, for at least three year. Market activities are important for visibility of CTCs, and should include analysis of potential users' attitudes, i.e. significant factors that influence the decision of enterprises and SMEs, unemployed graduates, to take part in CTC trainings and use its services. The important activities which can be undertaken to that purpose are:

- Identification of training and service needs (TSNA) in the target region of WBC;
- Estimation and categorisation of trainings

participants (young and unemployed people, women, and internally displaced people) and enterprises (type of enterprise, type of training/service, type of distribution...);

- Long-term planning of training and services distribution for various groups of users.

Final goal of **TSNA analysis** is to determine knowledge and skills gaps, weaknesses and new competence requirements in regional enterprises, especially SMEs, and labor market. The company managers and persons engaged in product and service development, are constantly facing the question: Which knowledge should be developed to enhance competitiveness and efficiency of the company, and which are the particular fields of activities that the company should concentrate on? The answer is that it is not wise to create an ultimate list of required knowledge, skills and services. On the contrary, it is necessary to develop a system which will continuously monitor the changing needs of the company, analyse the results and provide feedback to a flexible and promptly responding environment which includes educational, training and consulting institutions.

This tool is needed by both parties: the company managers and the training institutions providing education and new services.

Continuing education, the delivery of non-credit or professional development courses to the community and to local industry, is

an important element of the university's service to the community. Having in mind that universities in the WB region have no recent experience in organization of Life-long learning (LLL) courses, it is very important to discuss the concept of establishment of the future **Life-long Learning Centre** at WBC.

It is important to clear up that different types of vocational training will not replace academic programmes but will complement them by equipping graduates with the requisite employability and key skills. Universities should become aware that working in partnership with existing providers of training (i.e. in soft skills) would contribute to bridge the gap and move to commercial training for SMEs.

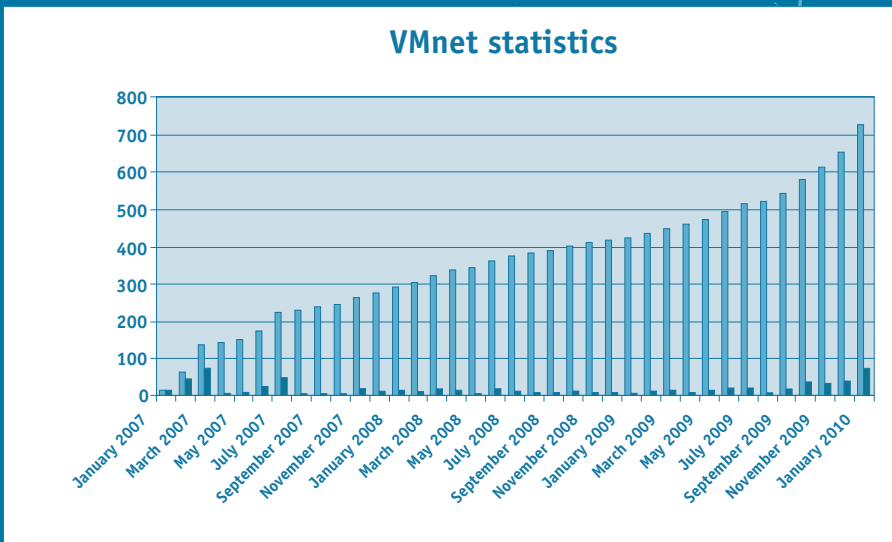
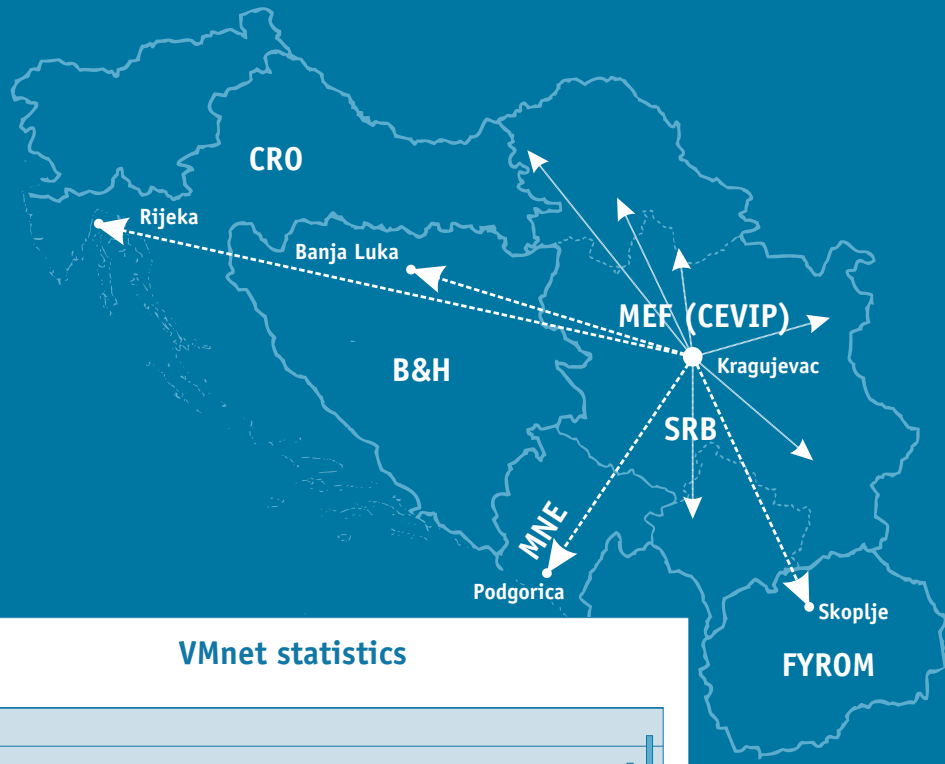
There will potentially be more work for Universities by providing short courses involving the underpinning knowledge required to complete a competence based on European Vocational Qualifications where there may be gaps in the individual's experience or qualifications. There is a lot of space for the Universities in WBC to organize different trainings such as training in communication skills, IT abilities, team working and collaboration, problem solving abilities and taking responsibility for employees own continued professional development.

The project WBC-VMnet has developed of an **overall regional T&SNA system**, with the objective to identify the following needs:

- Company needs for advanced trainings and R/D services in the field of product and process development, applying innovative VM technologies,
- The needs of the labour market, i.e. the unemployed who are registered at the national Employment Service (with the high school and university education) for specific trainings.

The regional TSNA system includes the following:

1. Analysis of the conditions in the companies (in particular sectors, which will be identified for each PC) through:
 - Analysis of the strategic goals of the company
 - Analysis of the organizational and innovative potentials
 - Assessment of their position at the domestic and international markets
 - Analysis of skills and knowledge of the employed in the project development sector
 - Analysis of posts occupied, i.e. the expected competencies of the employees occupying the position, for further development of recommendations by the experts in this field.
2. Research of the existing and required skills of the unemployed (university and high school degree), with the engagement of the National Employment Service, which will improve the balance between the offer and the requirements, and their successful employment.
 - Analysis of posts occupied, i.e. the expected competencies of the employees occupying the position, for further development of recommendations by the experts in this field.



In line with idea of network knowledge and transfer technologies, Centre for Virtual Manufacturing has established Virtual Manufacturing Network – VMnet as efficient industrial-science link, which has already more than 800 members (large companies, SMEs, R&D organizations, NGO, Agencies for SMEs, entrepreneurs, experts, managers, engineers, researchers, students etc.)

During the last year VMnet has increased number of members from other WBC (Bosnia and Herzegovina, Croatia, Montenegro and FYR Macedonia) within WBC-VMnet TEMPUS project realization.

Network gathers 13 experts from area of production technologies, materials, information technologies, software development, numerical FE/FV simulation of production processes, rapid prototyping, reverse engineering, design and marketing, who offer support for companies in their R&D activities to implement new technologies, thus improving their competitiveness on the global market. Apart from expertise offered within VMnet, by this network enterprises would get quality, timely and inexpensive development cycle and may optimize the existing products and processes, as precondition for increasing of competitiveness on increasingly requiring market.

Development and broadening of the network is helped by R&D organizations, SMEs, companies, Regional agencies for development of SMEs, Chambers of commerce, resource Ministries and all other institutions that find interest for joint actions. VMnet members are being updated and informed through e-mail about the latest news on important events, electronic brochures and magazines, useful links on manufacturers of equipment and software etc. In that way they have access to information on the latest achievements in the area of virtual technologies, in order for them to improve their knowledge and gain new skills, useful for doing business at their companies.

6.3.5 Setting up of Open Innovation Networks with SMEs

Since networks of knowledge and services in the area engineering technologies have been existing in the world for many years now, as well as networks of technology transfer, linking with those networks and active participation in exchange of experience can be set as a priority in fostering cooperation among universities and enterprises. Close cooperation between industry and university, and among different enterprises in the same supply chain, and even among competitors, has proved the best way to gain flexibility, get access to critical know-how and share research costs.

Learning from each other by networking is a well tested method in European countries for effective transfer of knowledge and technologies. Network based innovation programs are especially beneficial for small and medium sized enterprises. Improved level of services (R&D) for innovative enterprises, in line with their needs, can increase motivation of enterprise for cooperation with university and its research centres. On the other hand, better understanding of needs of SME and large enterprises by university centres which support innovations and research can give a quality and applicable R&D result, which will be easily commercialized. That way set off participation in financing and regular application of innovations in companies.

Involvement of university structures in development and managing of innovation networks in different fields with regional enterprises could be facilitator of mutual cooperation in future, as well as efficient tool for modernization of university towards society needs.

6.3.6 Practical placements for students in industry

A number of courses within curricula of engineering study incorporate practical placement of students. Practical placement takes place in a company selected by the student. Depending on the duration of the practical placement, the extent of the course is 3–9 ECTS credits. In the last ten years, in the period of transition to market economy

and privatization in the WBC region, there was an important decline in higher education - industry relations, thus students did not have quality organized practical placement in industry. On the other hand, faculties and university do not support institutionally implementation of this obligatory course.

The project WBC-VMnet envisages improving of existing practical placement realization at WBC engineering study, through well-defined and sustainable **Practical Placement Programme** (PPP) for students, providing them the opportunity to gain practical experience of industry in an area that relates to their academic studies, and to further develop their professional, technical and interpersonal skills. Students thus have the opportunity to make use of their knowledge in practice and to tune it to the actual needs of the industrial environment. According to this PPP programme students will work in the company for minimum 1 month (6 ECTS).

PPP programme should specify mutual obligations and claims, for the host company and for the student, incorporated in the contract. University (CTC, LLL, Career Development Centre or other similar units) should perform all administrative and management activities. All interested students fill up Application form, thus university can offer the interested companies with suitable students. The company can select the student according to the interview.

Benefits for enterprises and the companies will be in the input of fresh ideas and skills, developing links with universities and the opportunity to assess prospective employees. Students gain through obtaining a well rounded degree, having chance to apply their theoretical knowledge to real industry situations, and obtaining suitable experience recognized as part of the training requirement by the professional institutions.

6.3.7 Industrial fellowship programme (IFP) for graduates and/or employees from enterprises

Industrial Fellowship Programme (IFP) is intended to establish **sustainable partner-**

ships between universities, enterprises and graduates, leading to mutual benefits. Enterprise, SME or Company benefit from a highly qualified graduates (or employed engineers), as industrial fellows, who spend minimum 6 months to 2 years at University research and or excellence centres, for professional development, participating in specific research projects targeted to industry needs and company business. They work as part of enterprise, supported by a team of university experts – professors, teachers, researchers, who bring out technical expertise, research, and innovation to the enterprise or the company. Industrial fellows serve as **“gatekeeper”** for knowledge and technology transfer from university to their enterprises and provide excellent communication channels between them.

It is planned to develop IFP programme within WBC-VMnet TEMPUS project, during the second year of implementation, which will define:

- Procedures for administration and management of the programme;
- Conditions for qualifying of enterprise or the company;
- Funding rules;
- Requirements for graduates;
- Obligations of university research centre and mentor, who will be responsible for the career development of graduates;
- Related services for enterprise;
- Intellectual property rights (IPR);
- Quality monitoring rules etc.

IFP programme manual and promotional leaflets will be published and distributed to public at large.

6.3.8 Other cooperation modalities

Finally, it is very important to emphasize the role of students in further development of university-enterprises cooperation. As an illustration, the students of University of Novi Sad, Serbia established a consulting company **“CORE”** with the aim of providing services to SMEs, and the Rectorate has also used their services. Within the **“CORE”**, close contacts with the Techno

Park Sankt Augustin were developed, and an agreement between Timisoara incubators, the Szeged initiative and the University of Novi Sad Incubation Centre was reached to start a joint business idea competition.

Furthermore, we would like to suggest also that the Competition for the Best Technology Innovation (now organized jointly with the Serbian Ministry of Science and Technological Development, and the Chamber of Commerce of Serbia) would obtain regional importance covering all WB region. This Contest will have the following aims:

- To promote and foster entrepreneurial culture in High-Tech area, as well as to boost competitive potential of WBC region;
- To organize trainings for all participants in all aspects of business plan writing, as well as trainings in negotiation and presentation and communication skills.

The some categories can be: realized innovations, energy efficiency, innovative ideas, potentials and innovative municipalities. The special rewards can be given for the best student team and best female team. The Contest's Final should be presented at national and regional broadcast services.

6.3.9 Recommendations

From previously suggested and described mechanisms and possible structures of new WBC model of university- enterprise cooperation, we would like to summarize the following recommendations:

Recommendation 1

Governments of the WBCs should accelerate a transition of researchers from academic sphere to enterprises through a greater emphasis on the mobility aspects of the best young researchers.

Recommendation 2

Governments of the WBCs should also introduce tax incentives for projects which involve knowledge transfer from universities to enterprises in order to encourage innovation in SMEs.

Recommendation 3

Establishment of the Science and Technology Parks should be encouraged with activities to promote networking between their tenants.

Recommendation 4

Industrial clusters should be encouraged to move to internationalization so that they develop an outward exporting orientation and link up with international systems of innovation.

Recommendation 5

Universities should boost their incubation centers to provide more support to researchers to commercialize their application oriented research results through the creation of new spin-off enterprises.

Recommendation 6

Universities in WBC region should establish Technology Transfer Centers to handle property rights issues and the licensing of inventions and innovations created in university laboratories and to encourage patenting and licensing of technologies to enterprises.

Recommendation 7

Universities should focus on applied research activities. A record of collaboration with enterprises and participation in joint research projects should be included in academic staff promotion criteria.

6.4 Future steps

To improve **WBC's innovative capacity** in particular, more resources for science and R&D will not be enough. The focus needs to shift to:

- The microeconomic capacity of WB region;
- Quality and specialization of factor conditions;
- Sophistication of demand;

- Quality of enterprise strategies and entrepreneurship;
- Presence and depth of clusters.

These are the qualities of the business environment that enable the transformation of scientific knowledge into new products, services and competitive firms.

Universities in the WBCs should be important elements of their local systems of innovation:

- Driver of regional technology-based development and the source of a major proportion of local innovations and local companies;
- A good contributor to local knowledge and to the development of local technology clusters;
- A major source of knowledge in emerging and established clusters.

As an important future step need to be involvement of proposed WBC model of university-enterprise cooperation in corresponding **strategic documents** such as Regional Development Plans or Scientific and Technological development Strategies or university memoranda, etc. **Innovation policy** should be seen as the cumulative result of interaction among governments at various levels, businesspersons, academics, and social partners comprising membership from all of these spheres, especially at the regional level.

Furthermore, it is necessary to establish **new institutional arrangements of university-enterprise-government relations**. Next step will be generating a knowledge infrastructure in terms of overlapping institutional spheres with hybrid organizations emerging at the interfaces as can be seen in Figure 5.

In order to realize full capacities of knowledge triangle in the near future, WBCs should attain some form of model presented in Figure 5, known as a triple helix model. The common objective is to realize an **innovative environment** consisting of university spin-off firms, tri-lateral initiatives for knowledge-based economic development, and strategic alliances among firms (large and small, operating in different areas, and with different levels of technology), government laboratories, and academic research groups.

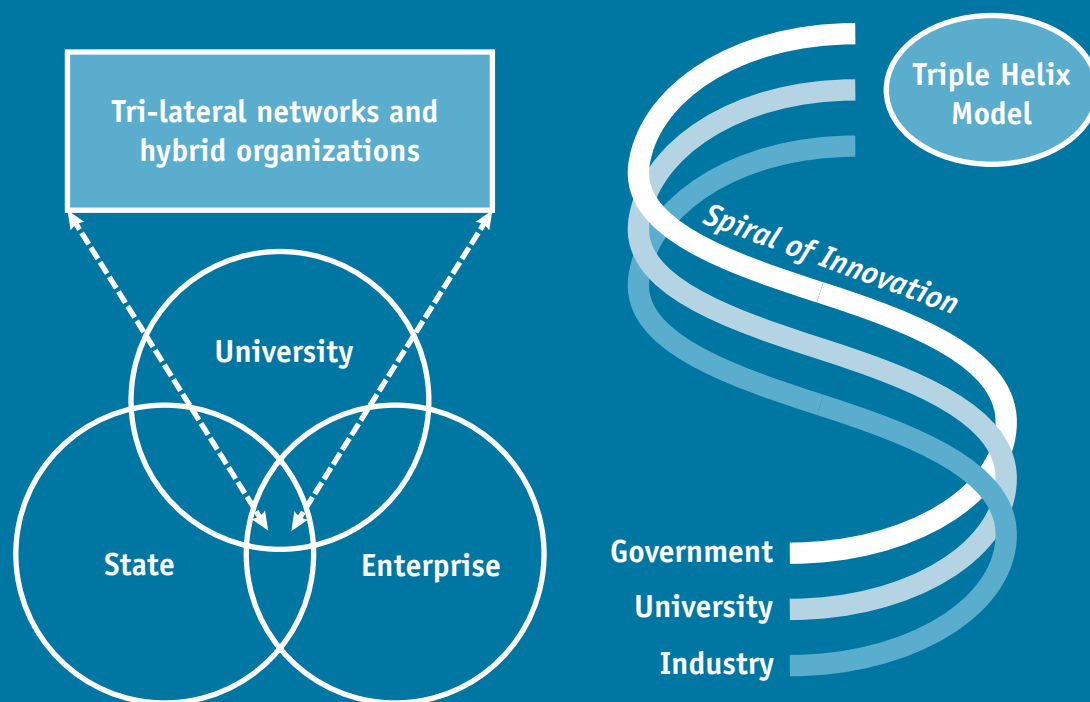


Figure 5. The Triple Helix model of University–Enterprise–Government relations [91]

The **triple helix** provides a flexible framework to guide efforts, from different starting points, to achieve the common goal of knowledge-based economic and social development. We suggest that all WBCs include the following elements in their **technology and innovation strategies**:

- A solid emphasis on government–university–enterprises collaboration;
- The importance given to programs, funding mechanisms and institutional initiatives designed to help small and medium enterprises (SMEs).

It is very important to achieve **partnership** between universities and research institutes with other players such as industry, Ministries (for sciences and technological development, for education, economy, infrastructure, etc.) international R&D institutions, scientific diaspora, society, etc. Partnership at WB regional level will lead to optimal usage of modern and capital equipment, fostering mobility and collaboration through joint research projects.

A significant step should be partnership of universities and enterprises with society through **science promotion** and closer collaboration with media as well as continuing

activities such as Science Festivals, Tesla Fest, popularization FP7 project calls and affirmation of scientists and innovators.

We suggest as a future step also **adopting a new legal framework**, for example, changes to the Law on research, Law on innovation, Law on Intellectual property, etc., and that these Laws would be regionally adjusted. These Laws (and/or some similar) can contain some of the following **measures** to support university–enterprises cooperation:

- Three years social contribution waived for MSc and PhD's employed by private sector;
- Tax break for money spent by SMEs and private companies on services of the scientific community;
- Creation of an early seed venture capital fund with the European Investment Fund of EIB with the aim of attracting public R&D and private players;
- Attraction of international high-tech companies and their R&D capacities in WB region.

Innovation policy need to be directed toward enhancing the interaction between human needs, research goals and resource providers; science,

technology and society; university, industry and government.

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Bearing in mind that all WBCs are in some kind of overall transition, innovation system and better cooperation among all actors in the knowledge triangle should become an endless transition.

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