

## Romanian-Bulgarian Services Centre for Microsystems and Nanotechnology – a Cross Border Cooperation Programme Project

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**Abstract:** *The paper considers the project “Romanian-Bulgarian Services Centre for Microsystems and Nanotechnology” (RO-BG MicroNanoTech) within the frame of the Romania-Bulgaria Cross-Border Cooperation Programme 2007-2013. The project is aimed to achieve cross-border networking for joint development of a Romanian-Bulgarian Services Centre for Microsystems and Nanotechnology. In the paper an overview of the main objectives, partnership, target groups, project outcomes and results of the project is done. Some conclusions and plans for the future of the project are presented.*

**Key words:** *Romania-Bulgaria Cross Border Cooperation Programme, Microsystems, Nanotechnology, Services Centre.*

### INTRODUCTION

Research, education and innovation are three central and strongly interdependent drivers of the knowledge-based society [1]. Together they are referred to as the “knowledge triangle”. Knowledge-intensive business services (KIBS) represent one of the fastest growing areas of the European economy. These services play an increasingly important role in the performance of client sectors and are often considered to be one of the hallmarks of the knowledge-based economy [2]. The KIBS sector’s growth rate is so much faster than that of other sectors that it cannot solely be attributed to the growth of those sectors which are users of KIBS. When considering the growth of KIBS, the increasing demand for certain forms of knowledge has to be taken into account. A major driver of KIBS growth is revealed by the rapid increase in technology-related business services, of which the most prominent examples are computer and information technology services. More services have emerged to help clients deal with different technologies and technological problems. Some of these are active around specific bodies of technological knowledge – mechanical engineering, biotechnology, nanotechnology etc.

R&D services as a subgroup of KIBS are considered to be increasingly crucial for the technological competitiveness of mature as well as high-tech industries [3]. R&D services are provided by firms and other organisations, which are able to transform heterogeneous knowledge stocks into high-value-added problem-solving activities. Employment in high-tech and medium-tech industries and knowledge-intensive services is an indicator of innovation process implementation [4]. Bulgaria followed the European trends in employment in high-tech manufacturing sectors until 2007, which consisted of initial reduction of workforce in these sectors until 2004 and a subsequent gradual increase; however the country is still in a catching-up position compared to the EU average. Actions should be taken to initiate and promote the process of modernisation of research entities and to enhance their potential. The availability of continuous training opportunities is of great significance, including distance learning in higher education, improvement of scientific employees' qualification and skills and implementation of joint programmes for scientific training and internships between the academic and business communities. The implementation of the objectives of National Research Development Strategy 2020 will enable the creation of sustainable relationships between education, science and business as a basis for the development of the knowledge economy.

European Framework Programmes for research, technological development and demonstration activities are the most efficient instrument for building the European Research Area. The Competitiveness and Innovation Programme supports three main areas – innovation and competitiveness, energy efficiency and information and communication technologies. Through this programme the European Commission supports the development and operation of national networks of businesses that are

interconnected on a European scale. This is a public service in the area of innovation, technology transfer and support for small and medium enterprises (SMEs).

The Romania-Bulgaria Cross Border Cooperation Programme is an Operational Programme, financed by the European Commission, applied in Romania and Bulgaria for the period 2007-2013 [5]. Overall strategic goal of the Programme is to bring together the people, communities and economies of the Romania-Bulgaria border area to participate in the joint development of a cooperative area, using its human, natural and environmental resources and advantages.

The project "Romanian-Bulgarian Services Centre for Microsystems and Nanotechnology" (RO-BG MicroNanoTech) is in the frame of the Priority axis 3 of the Programme – „Economic and Social Development“, whose objective is to enhance the economic development of the eligible areas through business infrastructure support, training of the human factor, and cooperation between communities and institutions. The key area of intervention is „Support for cross-border business cooperation and promotion of a regional image and identity“ and the Indicative Operation – „Promotion of co-operation between universities, research institutes and businesses in the field of R&D and innovation“. The project [5] is financed through the European Regional Development Fund. The Consortium comprises 5 partners – 3 Romanian and 2 Bulgarian institutions. The lead partner is the National Institute for Research and Development for Microtechnology – IMT, Bucharest, Romania.

#### **RO-BG MICRONANOTECH PROJECT'S MAIN GOALS AND OBJECTIVES [6]**

The aim of the project RO-BG MicroNanoTech is fostering the cross-border cooperation through the development and implementation of a regional cross-border Services Centre for Microsystems and Nanotechnology. The project is aimed to promote High Tech technologies in the less developed regions of the two countries: the South of Romania and the North of Bulgaria. Since the share of employment in knowledge-intensive services is much lower in Romania and Bulgaria compared to the EU average and services firms are still poorly integrating these services, the RO-BG MicroNanoTech project aims to create a critical mass and gather many different actors able to provide a friendly framework for access of SMEs from this geographical area to the applications of the microsystem industry. The Services Centre will help in stimulating, encouraging and facilitating Romanian/Bulgarian cross-border industrial development, implementation and access to the world class micro/nano technology achievements in: MEMS/NEMS (simulation and manufacturing), CNT based nano-devices, biosensors, bionano materials and engineering, drug-delivery systems, nano-filters, mixing and protein separating structures; bio-MEMS,  $\mu$ -TAS and integrated lab-on-a-chips, reaction chambers and detection points on a substrate, orthodontics, micro-robotics, spintronics. The centre will act as a source of reliable and accessible information and an instrument for the dissemination and exchange of MicroNanoTech knowledge.

The main tasks are:

- Joint development of R&D facilities for microsystems in the cross-border RO-BG area.
- Building the portfolio of services to be offered by the Service Centre in designing, manufacturing, testing and using of microsystems
- Elaborating Joint Programme of Activities for the co-operation between universities and research institutes.
- Stimulating the joint participation of the research entities and SMEs from cross-border RO-BG area to national and international research projects on microsystems with the aim to develop the service portfolio of the Service Centre.
- Increasing the visibility of the activities on microsystems in the cross-border RO-BG area by disseminating information about services and R&D results of

the Service Centre.

- Creating a mechanism for rapid transfer of know-how and experience to SMEs by information exchange and training by-research.

The target group is represented by SMEs, entrepreneurs, either individuals or via SMEs, local associations from the area of interest - micro and nanotechnology. All institutions finally focus on developing the 'knowledge triangle' research-education-innovation in this region, in order to encourage a breakthrough in High-Tech technology in the cross border area, with beneficial economic and social effects for both academia and business in both Romania and Bulgaria. These institutions can be generalised as follows:

- SMEs from the RO-BG cross-border area that are active in microsystem industry - those involved in designing / manufacturing / testing microsystems and those that are using microsystems and nanotechnologies in various applications;
- Research groups from institutes and universities located in RO-BG crossborder area and focused on research activities about microsystems;
- Teaching groups from the RO-BG cross-border area that are delivering training courses on microsystems.

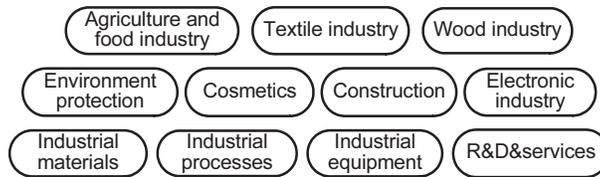
The existing attempts in RO-BG cross-border area to develop training courses in microsystems and nanotechnologies will be gathered and then disseminated to all, in order to be offered to people from research and industry. Also, the 'missing links' in teaching on microsystems and nanotechnologies will be identified, becoming subjects for courses to be developed by the teaching groups. The project will identify the possible students and will stimulate the elaboration of such new courses. The necessity to develop 1(2)-year sandwich Master degree engineering programs in MicroNano manufacturing in the Romanian and Bulgarian Universities will be investigated.

RO-BG MicroNanoTech has established and maintained the following resources:

- administration of a multilingual website [www.ro-bgmicronanotech.eu](http://www.ro-bgmicronanotech.eu);
- two databases;
- organisation of professional and public events;
- providing information and networking possibilities.

### **SURVEY ON SMES ACTIVE IN THE FIELD OF MICRONANOTECH**

A survey among the companies in the cross-border area was carried out in order to identify the ones involved in producing microsystems and those using microsystems and nanotechnologies in various applications. The main domains of interest can be summarised as follows (Fig.1): agriculture and food industry (multifunctional biologic active products, obtained by MNT, security of food, production of food and winery); textile industry (protection equipment, fire and water proof textiles, clothing, lingerie and underwear, carpets); cosmetics (perfumes); construction (usage of nanoparticles in materials for construction); wood industry (furniture, usage of remainders of wooden mass, biochemical solutions in wood maintenance); environment protection (quality of drinking water, treatment of waste water, identifying pollutants in the environment); industrial materials (industrial and motor oils and greases); industrial processes (thermo diffusion galvanizing of steel parts - "nano-based Zn powder", vacuum deposition on plastic materials - hydrogen combustion cells by deposition of Pt coatings, diamond like coatings, process automation); industrial equipment (non-standard equipment for chemical industry); electronic industry (sensor, robotics, wireless communications, security systems, measurement and control systems). Two data bases are in the process of set up. They can be used to search for expertise in the micro-nanotech sectors in the RO-BG cross-border area. The companies are indexed by name, domain and key words.



**Fig.1 - Main domains of interest**

## CONCLUSIONS AND FUTURE WORK

As a result of the work on the project RO-BG MicroNanoTech, based on the cooperation of universities, research institutes and SMEs in the RO-BG cross-border area will be created and developed with two offices and two InfoPoint centres. A Joint Programme of Activities for the co-operation between universities, research institutes and SMEs in the MicroNanoTech field will be elaborated. Databases on human and material resources and results obtained in microsystems in RO-BG cross-border area will be created. The development of MicroNanoTech field in RO-BG cross-border area will be promoted. Master degree engineering programs in MicroNano manufacturing will be developed.

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## ЛИТЕРАТУРА

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