Jan HRUŠÁK*

THE USE OF STRUCTURAL FUNDS FOR ENHANCING SCIENTIFIC CAPACITIES – THE CZECH CASE

Short overview of the implementation of the National Strategy Reference Frame (NSRF) and of the operational programs (OP) in Czech Republic will be presented. In the running financial and programming period (2007-2013) 26 operational programs are used to cover three main cohesion policy driven objectives. The *Regional Competitiveness and Employment Objective* (total of 0.42 billion €) covers only the Capital City of Prague with two operational programs OP Prague – Competitiveness and OP Prague – Adaptability, both strongly supporting RTDI activities. The *Convergence Objective* (25.89 billion €) is focused on the support of the economic and social development of the less developed regions and in the Czech Republic, it covers all cohesion regions except for the Capital City of Prague. It encompasses 7 regional operational programs (NUTS II) with the total assigned amount of EUR 4.66 billion € and 8 thematic operational programs with the total assigned amount of EUR 21.23 billion €. Relevant for the RTDI domain are mainly the OP Research and Development for Innovation, the OP Enterprises and Innovation, and the OP Education for competiveness.

The *OP Research and Development for Innovations* is in terms of finances the fourth largest Czech operational program (2,07 billion €). It is focused on reinforcement of the research, development and pro-innovation potential of the Czech Republic, in particular through universities, research institutions and their cooperation with the private sector. It supports equipping of the research workplaces with modern technologies, development of new research workplaces and increasing the capacity of tertiary education.

The *OP Enterprise and Innovation* (3,04 billion €) is focused on support for development of the entrepreneurial environment and support for implementation of research and development results into entrepreneurial practice. It allows an im-

* Dr. Jan Hrušák, J. Heyrovský institute of physical chemistry vvi., Academy of Sciences of the Czech Republic

provement of quality of infrastructure and services for business activities and establishment of cooperation between enterprises and the scientific-research institutions.

The *OP Education for Competitiveness* is financed in particular from the Convergence objective but in the case of projects creating lifelong learning framework, it is financed also from the finances of the Regional Competitiveness and Employment objective and in this case, the eligible territory is hence also the Capital City of Prague. The total amount of 1.83 billion € is reserved from the EU funds for it. In addition, the program financing is to be increased by another EUR 0.32 billion from the Czech public sources.

The *European Territorial Cooperation Objective* pursues support for cross-border, interregional and transnational cooperation of regions and complements the regional dimension of the whole strategy.

Thus, 22,4 % of the total amount of the structural funds is used in Czech Republic within the RTDI sector (including ICT). Examples of RTD projects up to huge pan-European installations will be given.

EU funds represent the main instrument for the realization of the European policy of economic and social cohesion[1]. In addition to the agricultural policy, European cohesion policy is one of the most important European agendas and the European Union spends more than a third of its common budget on it.

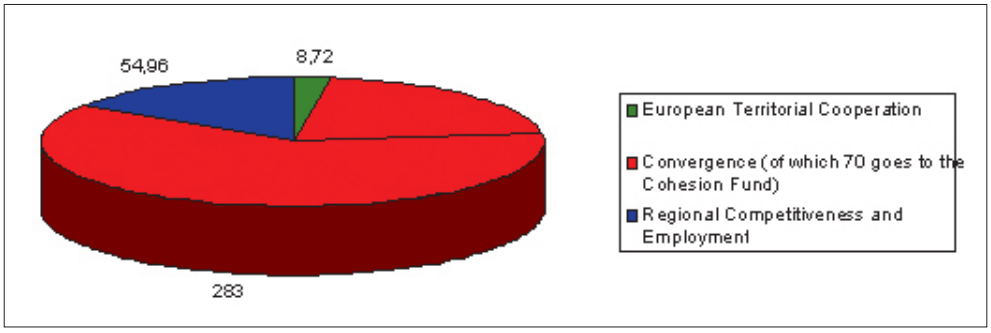

Fig. 1. Cohesion Policy for 2007–2013, Total: around 347 billion euros (current prices)

Through the EU funds, finances intended for mitigation of economic and social differences between Member States and their regions are distributed. The following main funds are available:

– European Regional Development Fund (ERDF) 213 000 M€
– European Social Fund (ESF)
– Cohesion Fund (CF) (15 MS / transport, environment)
– Solidarity Fund

[1] *Strategic Guidelines for Cohesion defined in cooperation with the MS (*REGULATION (EC) No 1080/2006*)*

– EGTC – European grouping of territorial cooperation
– IPA – Instrument for pre-accession assistance
– Jaspers- Jeremie- Jessica

The use of the funds is driven mainly by the two following objectives:

– *Convergence* In regions covered by the Convergence objective (75% EU 27 – GDP), ERDF focuses its intervention on modernizing and diversifying economic structures as well as safeguarding or creating sustainable jobs.

– *Regional Competitiveness and Employment* For the Regional Competitiveness and Employment objective, the priorities are based on innovation and knowledge-based economy, environment and risk prevention, access to transport and telecommunications services of general economic interest.

Though, between 2007 and 2013, EU Cohesion Policy instruments will provide some €86.4 billion (almost 25% of the total) to R&D and innovation, this is mainly bound to the Regional Competitiveness and Employment objective. Here the relation to research and development is straight. The priorities are based on three sections:

– innovation and knowledge-based economy: strengthening regional capacities for research and technological development, fostering innovation and entrepreneurship and strengthening financial engineering notably for companies involved in knowledge-based economy;

– environment and risk prevention: cleaning up polluted areas, boosting energy efficiency, promoting clean public transport within towns and drawing up plans to prevent and limit natural and technological risks;

– access to transport and telecommunications services of general economic interest.

For the Convergence objective (as related to the less developed regions) it is not so easy to establish a relation to support of scientific excellence. However, this objective represents the biggest financial share of the SF and thus, we have developed arguments in order to provide evidence for the regional socioeconomic impact of large scientific installations and to convince the EC and the national authorities.

As far as research is concerned there is (so far) just poor matching between the ERDF and ESF. It was a real challenge and some effort was needed in order to workout mechanisms allowing support of newly build research infrastructures in terms of human resources.

The whole process started already as soon as in 2004 and most of the social and economic partners were involved. Though the idea of supporting R&D through structural funds seem nowadays, it was not as easy that time. We decided to take an integrated approach and create a OP dedicated entirely to R&D. The first hurdle to overcome is setting of the National strategies. These are formalized in the National development plan (NDP) and in the National strategy reference frame (NSRF). Both documents were prepared well in advance (started 2005) in collaboration with the EC.

Though, interventions targeting the R&D and innovation sector are integral parts of all the NSRF´s and also fair amounts of resources are allocated to these actions, there still exist large differences between the individual member states. While

the EU-15 is mainly subject of the Competitiveness objective and the spending on R&D and innovation priorities is more or less mandatory (*vide supra*), the EU-12 member states, facing severe structural problems and being mainly subject of the convergence objective, were in a much more difficult situation. Table below summarizes the funds, the number of regions (NUTS 2), the total number of operational programs (OP), and finally the share of the interventions going directly to R&D.

Table 1.

Country	EU contr. Mil €	NUTS 2	OP	% RTD
BG	6 627	6	6	11,7
CZ	26 302	8	25 (1)	18,3
ET	3 403	1	3	21,9
HU	22 890	7	20	16,3
LT	2 305	1	4	20,9
LV	496	1	5	17,9
PL	66 553	16	22	18,8
RO	17 976	8	11	12,0
SI	4 101	1	5	28,1
SK	11 360	4	15(2)	12,2
EU – 15	120 744	-	-	41,4
EU – 27	284 252	-	-	34,7

However, among all the EU-27 states only the Czech Republic[2] and Slovak republic are providing funds for R&D through multiregional specially designed OP.

THE CZECH CASE

In the running financial and programming period (2007-2013) inline with the NSRF the following priorities were addressed by 26 operational programs in the Czech Republic. The individual priority shares are:

– Transport 33.4%
– Environmental protection, risk prevention 19.0%
– *R&D&I 18.3%*
– Investment in social infrastructure 5.4%
– Energy 5.2%
– *Information society 4.1%*
– Urban and rural regeneration 3.8%
– Technical assistance 3.1%
– Tourism 3.1%
– Culture 2.3%
– Other objectives 2.3%

[2] http: //www.strukturalni-fondy.cz/Programy-2007-2013

Fig. 2

The Regional Competitiveness and Employment Objective (total of 0.42 billion €) covers only the Capital City of Prague with two operational programs

– OP Prague – Competitiveness,

– OP Prague – Adaptability,

both strongly supporting R&D&I activities. The Convergence Objective (25.89 billion €) is focused on the support of the economic and social development of the less developed regions and in the Czech Republic, it covers all cohesion regions except for the Capital City of Prague. It encompasses 7 regional operational programs (NUTS II) with the total assigned amount of EUR 4.66 billion € and 8 thematic operational programs with the total assigned amount of EUR 21.23 billion €. Relevant for the RTDI domain are mainly the

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OP RESEARCH AND DEVELOPMENT FOR INNOVATIONS

The Czech Republic sees the key to growth of its competitiveness in research and development, the innovation abilities of its enterprises, the increasing quality of its human resources and the use of Information and Communication Technologies (ICT). This is reflected in national policies and in support given to areas, which were identified by the Lisbon Strategy[3]. As a result, for the period 2007-13, one of the priorities of the Czech Republic is to strengthen the growth of the country's competitiveness and the orientation towards a knowledge economy. The Operational Program 'Research and Development for Innovations' should create around 2 500 new jobs in the Research and Development sector. Total expenditure on R&D as a share of Gross Domestic Product (GDP) should increase from 1.42 % to 2.4 %. The Summary Innovation Index (SII) is expected to increase from 0.26 to 0.36, while support should be provided to five centers of excellence. The OP is structured according to the following priorities:

– Priority 1: European Centers of Excellence [approximately 33.1% of total funding]

The main objective of this priority is to create a number of Centers of Excellence, which should be well equipped R&D centers with modern research infrastructures, able to contribute to the networking and closer integration between leading Czech R&D teams and the leading international research organizations and European research infrastructures. This effort will create internationally attractive partners in the Czech Convergence regions, research bodies with a clear research program and prominent profile.

– Priority 2: Regional R&D Centers [approximately 33.1% of total funding]

This priority will support the establishment and development of R&D workplaces with quality equipment focused on applied research and reinforcement of

[3] Conclusions du Conseil européen concernant l'examen de la stratégie de Lisbonne, Bruxelles, 22 et 23 mars 2005

co-operation with the application area (enterprises, hospitals, etc.) according to the needs of the region. The objective of regional R&D centers is to be a relevant research partner for collaboration with those application areas (enterprises, hospitals, etc.), including partnerships with innovative Small and Medium-sized Enterprises (SMEs) and other clusters. Through the advancement of knowledge, and the adaptation and transfer of technology and know-how, these centers will be able to contribute in an important way to the competitiveness of the economy in Czech regions.

– Priority 3: Commercialization and Popularization of R&D [approximately 10.3% of total funding]

This priority focuses on several horizontal, cross-cutting themes which are crucial for successful implementation of projects under the priority axes 1 and 2. It is open to other potential beneficiaries with a view to putting commercialization and popularizations of research on the agenda of as many Czech R&D institutions as possible.

– Priority 4: Infrastructure for University Education related to Research [approximately 20% of total funding]

The main objective of this priority is to support development of a quality infrastructure of universities, the aim being to increase the capacity of tertiary education and create conditions for improving the quality of education. This type of investment represents a prerequisite for the quantitative and qualitative increase in supply of human resources which is needed for research and innovation. These efforts complement the work supported by the European Social Fund (ESF) Operational Programme 'Education for Competitiveness' which aims at improving the quality and relevance of tertiary education and strengthening the role of universities.

– Priority 5: Technical Assistance [approximately 3.5% of total funding]

The objective of this priority axis is to support activities carried out by the Managing Authority to ensure efficient implementation of the Operational Programme: preparation, monitoring, administrative assistance, evaluations, audit and controls.

Breakdown of finances by priority axis

Table 2.

Priority Axis	EU Contribution	National Public Contribution	Total Public Contribution
European Centres of Excellence	685 395 373	120 952 125	806 347 498
Regional R&D Centres	685 395 373	120 952 125	806 347 498
Commercialisation and Popularisation of R&D	213 280 131	37 637 671	250 917 802
Infrastructure for University Education related to Research	414 136 177	73 082 855	487 219 032
Technical Assistance	72 473 830	12 789 500	85 263 330
Total	2 070 680 884	365 414 276	2 436 095 160

PROJECT EXAMPLES

Though the final decision on the projects within the OP is yet lacking, several projects crystallized and are close to final approval.

– *Extreme Light Infrastructure (ELI)*[4]

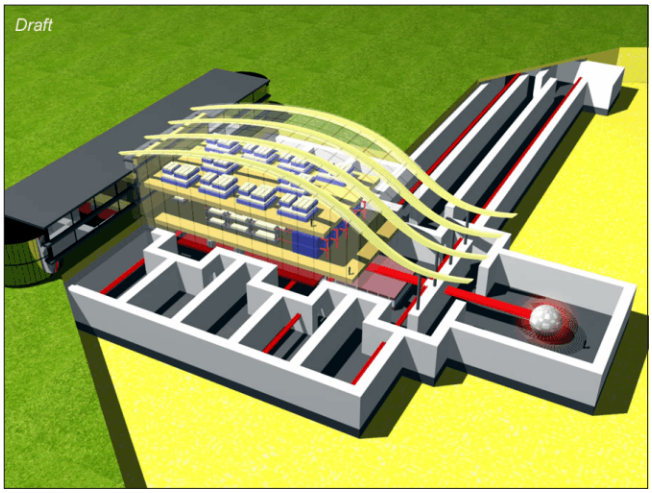

Fig. 3

ELI is a pan-European project from the ESFRI roadmap. It will be the only European and International Centre for high-level research on ultra-high intensity laser, laser-matter interaction and secondary sources with unparalleled possibilities. Its pulse peak power and briefness will go beyond the current state-of-the-art by several orders of magnitude. Because of its unique properties, this multidisciplinary facility will provide magnificent new opportunities to study the fundamental processes unfolded during light-matter interaction. The ELI project, a collaboration of 13 European countries (collocation in three MS – Prague CZ – Szeged HU – Magurele RO[5]), will comprise four pillars:

High Energy Beam Science devoted to the development and usage of dedicated beam lines with ultra short pulses of high energy radiation and particles reaching almost the speed of light.

Attosecond Laser Science designed to investigation of electron dynamics in atoms, molecules, plasmas and solids at attosecond scale (10^{-18} sec.).

Laser-based Nuclear Physics pillar of ELI will generate radiation and particle beams with much higher energies, brilliances suited to studies of nuclear and fundamental processes.

Ultra High Field Science that will explore relativistic laser-matter interaction in an energy range where totally new phenomena like radiation dominated interaction become dominant.

[4] http://www.eli-beams.eu/

[5] http://www.eli-np.ro/index.php

Financial allocations of 270 M€ requested is requested for the Czech part of the project. Further 50 M€ are foreseen for the development of laser technology in an other project under the OP PI.

– *Central European institute of Technology (CEITEC)*[6]

18 public and private institutions joined as partners to promote this project. CEITEC shall be a supra-regional centre of scientific excellence, in BMS and NMT that has the following goals:

Fig. 4

– To utilize plant systems as renewable sources of materials and biologically active compounds

– To understand the mechanisms of the genesis and spreading of important diseases, methods of their prevention, early diagnostics and therapy.

– To develop advanced materials and functional nanostructures for medicine, energy and information and communication technologies.

– To utilize information and communication technologies for biomedicine.

Financial allocations of 290 M€ requested is requested for the project.

– *Information technologies for Innovation (IT 4 T)*[7]

IT 4 represents a project that aims to build a European center of Excellence on High performance computing HPC. 12 public and private institutions joined as partners to promote this project. Vertical link to ESFRI roadmap HPC project PRACE exist. Financial allocations of 130 M€ requested is requested for the project.

The overall aim is to create a workplace focusing on 4 activities:

– *IT 4 People* (Information for People) – improving quality of life via new services based on modern ICT.

– *SC 4 Simulations* (Supercomputing for Simulations) – focusing on supercomputing and research (stress and deformation analysis of complex systems, shape optimization, fluid flow problems, materials design, biomechanical simulations, etc.).

[6] http://www.ceitec.eu/

[7] http://www.it4i.eu/en/index.php

Fig. 5

– *EC 4 Innovations* (Embedded Computing for Innovations) – focusing on the research and development of sophisticated embedded systems applied in mechatronics and innovative medicine.

– *Theory 4 IT* (Theory for Information Technology) – focusing on the development of new and non-traditional computing methods.

CONCLUSIONS

The process of support of R&D through structural funds in the programming period 2007-2013 was as not broadly accepted as it is today. However, through concerted effort of all the players involved resulted in an integrated approach. Several multiregional OPs for the support of Barcelona targets were build. Our case demonstrates that it is difficult but possible to use Structural funds for massive investments into research infrastructures. It is a process that requires coherent and sustainable strategies, long-time planning, political support and back-up. In order to secure a smooth implementation process it is essential that the adsorption capacity is properly evaluated, i. e. that all social economic partners and potential stakeholders are involved from early stages. Huge R&D project must be included into the programming from the beginning and rough consensus must be reached already at the preparatory phase of the OP. Time is a limiting factor for both the preparation of the OP´s as well as for the implementation.