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## **CENTROPE Regional Development Report**

### **Stock Taking Report on Technology Policy, Research, Development and Innovation in CENTROPE**

Zoltan Csismadia (Coord.),  
Gabiella Barath, Nora Baranyai (WHRI),  
Karol Frank, Tomas Jeck (EU SAV), Peter Huber (WIFO),  
Ludek Kouba, Petr Rozmahel (MUAFF)

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#### **Abstract**

This report analyses the institutional setting of the innovation systems in CENTROPE. It finds a large heterogeneity in terms of institutions, which tends to impede on possibilities in cross-border co-operation. In particular national innovation systems differ with respect to centralisation of technology policy, as well as with respect to strategies developed and objectives followed. In addition lacking continuity of policies and institutions in some countries represent a further problem impeding on cross-border co-operation in this field.

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# Stock Taking Report on Technology Policy, Research, Development and Innovation in CENTROPE

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## 1. Introduction

Regional competitiveness increasingly depends on the efficiency of businesses of a region and the regional milieu determined by local externalities. While efficiency often has a strong connection to the innovativeness of the enterprises and their research and development activities, the innovative milieu is shaped by policy interventions at local and regional level, which target science and technological background, clusterisation processes and networks and other areas of knowledge transfer (although it is of course also affected by national policy).

This stock taking report on technology policy, R&D and innovation together with the parallel focus report on technology policy, R&D and innovation monitors and takes stock of the current R&D policy within CENTROPE, and thus provides a short overview over the main actors and activities in the field of R&D policy on the territory of the CENTROPE which is indicative of the competitive position of the CENTROPE partner regions. In contrast to the focus report on technology policy, R&D and innovation which concentrates on quantitative information the stock taking reports focus is on institutional features and therefore analyzes, the role of policy, both from a strategic and implementation point of view.

The primary focus of the country chapters collected in this study therefore is on the soft factors and processes of innovation, R&D and policy interventions, which are not in traditional statistics and come from project partners. Each partner contributed to the synthesis report with a case study, in which they shortly summarize the regional innovation system of the covered regions. So these case studies for the Austrian, Czech, Slovak, and Hungarian regions contain the institutional background of the regional innovation system, the most important strategic priorities and measures, the cluster and network policies, the results of former interventions and of course the role of international cooperation, especially cross-border cooperation within CENTROPE.

**Table 1.1: The outline of case studies – dimensions and the aspects of comparison**

Dimension	Main aspects of investigation/comparison
<b>General information on national and regional innovation system</b>	This section introduces the main characteristics of general information on regional innovation system: <ol style="list-style-type: none"> <li>1. Regularity</li> <li>2. Institutional background</li> <li>3. Financial background</li> </ol>
<b>Innovation strategies</b>	This section gives a picture on national and regional innovation strategy through: <ol style="list-style-type: none"> <li>1. Overall innovation strategies, written documents</li> <li>2. Validity of the existing strategies</li> <li>3. Definite objectives</li> <li>4. Expected quantitative indicators</li> <li>5. Correlation between regional and national innovation strategy</li> </ol>
<b>Innovation policy and decision-making processes</b>	This section gives an overview about regional innovation policy and decision-making processes, particularly the dependencies and the independencies from the national level's decisions, policies and finance.
<b>Cluster strategy</b>	This section presents a picture on the national and regional cluster policy in the following fields: <ol style="list-style-type: none"> <li>1. Overall cluster strategy, written documents</li> <li>2. Validity of the existing strategies</li> <li>3. Definite strategic objectives</li> <li>4. Expected quantitative indicators</li> <li>5. Fitting of the cluster and the innovation strategies</li> </ol>
<b>Best practices</b>	This section introduces the most important best practices concerning: <ol style="list-style-type: none"> <li>1. The results of former innovative interventions</li> <li>2. The former and existing inter- and intraregional cooperation</li> <li>3. Role of international cooperation, especially cross border cooperation within CENTROPE.</li> </ol>

Source: Own Research.

These expert contributions from project partners therefore augment and complement the statistical data analysis conducted in the thematic focus report on technology policy, R&D and innovation of the CENTROPE regional development report project. They therefore provide the necessary information to compare the CENTROPE-regions' regional innovation systems, institutional similarities and differences, the strategic issues and priorities of regional innovation policies, the used tools, instruments and measures forming the innovation policy, the R&D capacities (e.g. knowledge and R&D competencies of

universities) or the financial background. They will thus answer to the question how research is conducted in the CENTROPE and provide a policy from both a strategic and implementation view.

In contrast to the parallel study entitled “Thematic focus report on technology policy, R&D and innovation”, which analysis the CENTROPE and its sub-regions as a single region territory, this stock taking report is therefore structured around country studies. The reason for this is that one of the Central results of both this study as well as the parallel thematic focus report on technology policy, R&D and innovation, was that national innovation systems in CENTROPE vary greatly among the countries of CENTROPE. While this also applies to R&D capacities and R&D policy results, this even more true of the institutional backbones of the national innovation systems, which also deeply influence the regional innovation systems in the region.

The next for chapters of this report therefore present the individual country studies on Austria, the Czech Republic, Slovakia and Hungary, while the last chapter presents a short synthesis of the differences and communalities of the innovation system in the different parts of the CENTROPE.

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## 2. National and Regional Innovation System in the Austrian CENTROPE

*Author: Peter Huber*

### 2.1. Introduction

By the available information the Austrian innovation system is an above average performer among the EU 27 countries in terms of most indicators of innovative activity. In particular according to the Innovation Union Scoreboard<sup>1</sup> 2010 (IUS – see: INNOMETRICS 2011), Austria performs below the EU 27 average only in terms of the population with completed tertiary education, non-EU doctorate students, venture capital, as well as with respect to three out of five indicators on economic effects of innovation (knowledge intensive services exports, sales of new to market and new to firm innovations, license and patent revenues from abroad) among the indicators considered in this scoreboard (table 2.1). All of these areas of below average performance reflect well known and often criticized problematic areas of the performance of the Austrian innovation system.<sup>2</sup> In aggregate, however, Austria ranks 7th among the 27 European Union countries considered in this scoreboard, and is considered to be the only “innovation follower” among the CENTROPE countries by the IUS 2010 report.<sup>3</sup>

At the same time, in terms of growth performance in 2011, Austria has performed below the EU-average for a somewhat larger number of indicators used by the IUS. This applies to the growth of all indicators on human resources, on financial support and innovation outputs as well as 2 out of 3 indicators on the excellence of the research system and on linkages and entrepreneurship. Only the indicators on firm investments, intellectual assets and economic effects showed above average growth performance. The public debate on

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<sup>1</sup> This is a system of indicators developed from the European Innovation Scoreboard (EIS), which was originally developed as an instrument of the European Commission under the Lisbon Strategy to provide a comparative assessment of the innovation performance of EU Member States.

<sup>2</sup> See for instance Aiginger, Falk and Reinstaller (2009) for a summary of the results of an extensive evaluation of the Austrian innovation system.

<sup>3</sup> The other CENTROPE countries rank among the group of so called moderate inventors with the Czech Republic ranked 17<sup>th</sup>, Hungary 21<sup>st</sup> and Slovakia 23<sup>rd</sup> among the EU 27.

R&D policy in the last years in Austria has, however, almost exclusively focused on the development of the share of R&D expenditure in GDP.

**Table 2.1: Current and Growth performance of the Austrian Innovation System according to the IUS 2010**

Enablers	Current performance		Growth performance	
	EU 27 average	Austria	EU 27 average	Austria
<b>- Human Resources</b>				
--New doctorate graduates	1.4	2.0	0.0	-2.4
--Population with completed tertiary education	32.3	23.5	3.6	3.5
--Youth with upper secondary education	78.6	86.0	0.4	0.0
<b>-Open, excellent and attractive research system</b>				
--International scientific co-publications	266	936	6.7	9.0
--Scientific publications among top 19% most cited	0.11	0.12	2.6	2.4
--Non-EU doctorate students	19.45	8.5	1.5	0.8
<b>-Finance and support</b>				
--Public R&D Expenditure	0.75	0.81	3.2	2.3
--Venture capital	0.11	0.03	-2.5	-14.0
<b>Firm activities</b>				
<b>-Firm investments</b>				
--Business R&D expenditure	1.25	1.94	2.1	3.2
--Non-R&D innovation expenditure	0.71	0.47	-9.0	0.0
<b>-Linkages and Entrepreneurship</b>				
--SMEs innovating in-house	30.3	34.37	-2.3	-5.1
--Innovative SMEs collaborating with others	11.2	14.71	2.6	-5.0
--Public-private co-publications	36.2	56.3	2.2	7.7
<b>-Intellectual Assets</b>				
--PCT patent applications	4.0	5.05	0.4	3.5
--PCT patent applications in societal challenges	0.64	0.71	2.6	7.6
--Community Trademarks	5.4	9.56	10.2	15.1
--Community Designs	4.7	9.19	1.2	10.7
<b>Outputs</b>				
<b>-Innovators</b>				
--SMEs introducing product or process innovation	34.2	39.55	-2.3	-5.4
--SMEs introducing marketing/organizational innovations	39.1	42.78	-2.9	-5.3
<b>-Economic Effects</b>				
--Employment in knowledge intensive activities	13.0	14.04	0.4	0.7
--Medium and high tech product exports	47.4	52.3	-0.3	-0.3
--Knowledge intensive services exports	49.4	30.9	1.5	2.5
--Sales of new market and new to firm Innovations	13.2	11.24	-0.4	1.5
--License and patent revenues from abroad	0.2	0.19	0.2	10.6

Source: Innometrics 2010.

With respect to this indicator the last decade has seen substantial improvement. In particular the share of R&D expenditure in GDP which was notoriously low in the 1980's

and 1990's is estimated at having amounted to 2.76% of total GDP in 2009 (i.e. 5<sup>th</sup> highest in the EU 27-countries) and the aim of Austrian technology policy is to obtain a R&D share "comparable to that of leading research nations", which is operationalised as 3.76% of GDP.

## 2.2. Laws and Regulations

From a legal point of view the field of research and development as well as innovation policy in Austria is a classical field of shared competencies between the national and provincial level of government in Austria: While university education as well as research by the Austrian constitution is a competence of the national government, the constitution for historic reasons makes no reference to either innovation and or research and development and a number of policy fields relevant to innovation and technology policy are either shared competencies of both federal provinces and the national state while others are in the competence of federal provinces only.<sup>4</sup>

These constitutional aspects aside, however, probably the two most important federal laws which have a direct relevance to the Austrian innovation system are the "Forschungs- und Technologieförderungsgesetz" (FTFG BGBl I 52/2009) – law on research and technology support – and the "Forschungsförderungsgesellschaft Errichtungsgesetz" (FFG-G BGBl I 52/2009) – law on establishment of the Austrian research promotion agency. These laws regulate the competencies and activities of the most important federal financing institutions of research and development in Austria (the Austrian science fund in the law on research and technology support and the Austrian research promotion agency in the law on establishment of the Austrian research promotion agency). In addition the law on research and technology support also provides the legal basis for the activities of the Austrian council for research and technological development. Finally, the Austria Wirtschaftsservice-Gesetz (AWSG BGBl I 137/208) regulates the operation of the fourth important non-ministerial public sector actor in the Austrian innovation system at the national level, the Austrian business agency.

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<sup>4</sup> Since the Austrian constitution foresees that competencies not explicitly given to the national level are regional affairs, in Austria, in general, federal provinces have substantial leeway in defining their competencies.

According to the law on research and technology support the Austrian science fund is responsible for supporting basic research (which is according to the law: “the creation of knowledge and deepening of scientific experience that is not profit oriented”) and is commissioned by the ministry to administer programs to support such knowledge creation according to a framework contract. This regulates the basic conditions under which support is granted. The council for research and technology by contrast is established as a purely advisory body, that advises the government and may also formulate own recommendation but has no own legal powers.

By contrast the law on establishment of the Austrian research promotion agency states that the agency is entitled to undertake any measures to support research, technology, development and innovation to the benefit of Austria. To this end the agency develops suggestions of support programs that have to be approved by the minister of transport innovation and technology and the ministry of the economy, family and youth (which in turn have to achieve agreement with the minister of science and research in issues relating to the European framework program). Finally, the Austria Wirtschaftsservice-Gesetz entitles the Austrian business agency to administer enterprise based economic support among which support and counselling of enterprises on innovation is explicitly mentioned.

## **2.3. Innovation Policy making Governance Structure**

### **2.3.1. Central Government ministerial level**

Given the many shared competencies in the field of R&D and innovation policy the history of Austrian technology policy is characterized by a strong fragmentation of competencies and many attempts to overcome this much criticized fragmentation by increased coordination and creation of new institutions.<sup>5</sup> None the less despite the most recent reforms in 2004 (at least partially) unclear competencies remain to be a characteristic feature of the Austrian innovation system. Since innovation and technology policy is almost by definition an area of politics cutting across different fields of competence at least three ministries currently are important players in the formulation of this policy: These are:

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<sup>5</sup> See Pichler, Stampfer and Hofer (2007) for a recent post war history of Austrian innovation and technology policy.

- First the ministry of the economy, family and youth (BMWFJ) which has important competencies in the fields of financing and subsidies to applied research, innovation transfer (i.e. fosters the cooperation between companies and universities and non-university research institutions) and international co-ordination of research and development policy. It is also a co-proprietor of the Austrian research promotion agency (FFG) owns a 50% stake of AWS (Austria Wirtschaftsservice) and is responsible for the Christian Doppler Research Association, (a research institution supporting application-oriented fundamental research).
- Second the ministry of transport innovation and technology (BMVIT) which is responsible for research and innovation support as well as environmental, mobility and information technologies. It also holds a 50% stake of the Austrian research promotion agency (FFG), as well as 50% of Austria Wirtschaftsservice (AWS), and is responsible for the Austrian institute of technology (the former Austrian Research Centre).
- Third the ministry of science and research (BWF) which is mainly responsible for basic research in Austria as well as the Austrian university system. This Ministry is also the owner of the Austrian science fund (FWF), – the most important instrument for supporting basic research in Austria, – finances a large number of non-university research institutions and administers a substantial amount of the research budget of the Austrian government.

In addition to these three ministries there is also a substantial involvement of many other ministries in science and technology policy in Austria. For instance the ministry of agriculture supports a number of programs with respect to the development of environmental and food technologies, the ministry for education, arts and culture is responsible for educational matters other than the universities, while the ministry of finance has an important role, since it governs the financial resources for policy.<sup>6</sup>

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<sup>6</sup> In addition in the national budget for 2009 another 9 ministries (other than the three main actors) contribute to federal expenditure on research. For most of the ministries other than those already mentioned these budgets, however, often amount to less than € 100.000.



### **2.3.2. Non-ministerial public sector actors**

In recent years, however, the previously existing autonomy of the ministries was increasingly curtailed by the Austrian council for research and technological development, and a fundamental reform of the institutional set-up of the financing institutions in 2004 led to the ministries increasingly outsourcing program execution to specialized agencies such as the Austrian science fund (FWF; owned by the BMWF), the Austrian research promotion agency (FFG; jointly steered by the BMWFJ and the BMVIT) as well as the Austrian business agency (Austria Wirtschaftsservice, AWS, also jointly steered by the BMWFJ and the BMVIT) which implement the science, technology and innovation programs on behalf of the ministries (see also section on laws and regulations).

The main objective of the Austrian science fund is the support of basic academic research and guaranteeing high quality standards of basic research. The Austrian research promotion agency provides direct funding for innovative industrial projects. On behalf of the corresponding ministries the FFG delivers further programs that promote industry-science collaborations on excellence level and many others. Austria Wirtschaftsservice, (AWS) by contrast offers a broad range of company-specific investment promotion programs and services.

Furthermore, in an effort to create a body with the power to design long-term strategies for Austrian innovation policy, the Austrian council for research and technological development was established in 2000. Unlike the research councils in other countries, this is an advisory board for the government and the individual ministries. It has no formal decision-making powers and its recommendations are not binding for the government. None the less this institution takes an active role in Austrian technology policy and has also been mentioned as an important future advisory agency for the government in the recent Austrian R&D and innovation strategy (see below).

### **2.3.3. Regional and local actors**

In addition to these national actors the federal provinces of Austria, whose role in the field of technology policy had been traditionally limited to that of promoting foreign direct investments up to the early 1990s, due to a number of factors (such as the shift in EU regional policy towards supporting the Lisbon agenda, increased co-financing of national programs by federal provinces and a generally more strategic and consistent policy for-

mulation in regional policy along cluster and similar concepts) have obtained increasing competencies in the field of technology policy in the last two decades.

In particular all federal provinces in Austria co-finance a number of national programs (e.g. competence centres, Aplus FHplus), have industrial policy concepts that are often centered on regional technological strengths or on cluster policies and have also developed institutions and financial instruments to subsidize research and technology. Finally, a further increase in competence has also occurred due to the introduction of special practically oriented tertiary educational institutions (Fachhochschulen – or universities of applied sciences) which are financed and controlled by the provinces and have sometimes obtained research and development competencies in recent years and must be considered an important element of the current innovation system in Austria.

Thus for instance the city of Vienna has a number of institutions and funding instruments responsible for its research policy. Aside from financial instruments, by which the city provides financial support to the universities and non-university research institutes located in the capital city, probably the two most important of these are the Vienna business agency, (which owns the ZIT GmbH, which in turn is the technology agency of the city and supports enterprise level applied research and innovation in Vienna, and also administers many other urban enterprise support schemes,) and the WWTF (Vienna science, research and technology fund) which subsidizes both academic research institutions as well as individual researchers on thematic research projects.

Similarly, the province of Lower Austria aside from providing financial support for research and development through its regional development agency eco-plus has developed a comprehensive system of technology parks and so called technopoles<sup>7</sup> (which are locations where research and higher education institutions are located) and has increasingly invested in attracting high level research institutions (as for instance the Austrian institute of technology (AIT) or the Institute of science and technology Austria (IST Austria)) to Lower Austria, by taking an active role in co-financing the establishment of these institutions, that are otherwise controlled by the national government.

In Burgenland the regional development agency (Wirtschaftsservice Burgenland AG-WIBAG) is responsible for enterprise support and administrating regional development

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<sup>7</sup> These are located in Wr. Neustadt, Tulln Krems and Wieselburg.

initiatives on behalf of the provincial government as well as the regional technology parks<sup>8</sup>. In terms of innovation policy this agency has an important role in providing risk finance and its daughter company the Technologieoffensive Burgenland GmbH (TOB) is a central actor for research development and innovation policy on a provincial level and is also responsible for knowledge transfer programs (e.g. between the polytechnics – Fachhochschulen – and the European centre for renewable energies in Güssing).

Finally, below the provincial level a number of regional development agencies, which exist in all provinces and are usually organized on NUTS 3-level may also be considered players in the regional innovation system. In their majority these are institutions that provide important inputs for local development and also provide important networking services.<sup>9</sup>

#### 2.3.4. Multi-level governance links

Clearly given the fragmented, multi-level nature of governance structures for research and technology policy in Austria there is a need for both horizontal and vertical co-ordination among actors. Such institutions in the form of inter-ministerial work groups and the general co-ordination competence of the federal chancellery are well established on the national level in Austria. Despite substantial overlap in the competencies of different actors at the federal level this co-ordination between national ministries and their associated funds can therefore rely on well established formal institutions.

The formal co-ordination mechanisms of technology policy between individual provinces, by contrast - despite the overlap in themes, instruments and technologies stressed – are much less well established and are mostly sporadic (i.e. related to individual project and topics) and rest on informal contacts.<sup>10</sup> Here, however, the actors of CENTROPE may be

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<sup>8</sup> These are located in Neusiedl am See, Eisenstadt, Neutal, Pinkafeld, Güssing und Jennersdorf.

<sup>9</sup> These institutions are often referred to as regional managements (Regionalmanagement) or regional development associations (Regionalentwicklungsverband) and depending on location often have rather different competencies and tasks. Due the large number of institutions and their (relative to the national or provincial level) limited resources as well as the space limitations of this report we do not describe their activities in detail here.

<sup>10</sup> Informal co-ordination, however, is relatively easy in Austria given the small size of the country and the limited number of actors in the R&D and innovation policy arena.

considered to be somewhat of a forerunner since the provinces of Burgenland, Lower Austria and Vienna are currently co-operating in marketing their joint location as the “Vienna Region”. While this initiative clearly stops short of full policy co-ordination among the provinces considered, it does provide an information platform for both internal and external actors on the relevant activities of each of the provinces involved. Furthermore, as a concrete result this initiative also has led to increased co-operation of the clusters in these regions.

Similar observations apply to the co-ordination between regional and federal actors in technology policy. Here too formal co-ordination mechanisms are much less well established than on the national level. In 2007, however, the Austrian council for research and technological development has created a semi-annual platform called “Plattform FTI Österreich” composed of 13 members including representatives of the provinces to receive and exchange information. In addition the BMWF has initiated regular information meetings with provincial actors on research policy. Once more these initiatives are, however, primarily information and discussion fora and do not attempt to integrate policies fully.<sup>11</sup>

## 2.4. Financial background

In general Austria has a subsidy system for innovation that is rather generous in comparison to other countries. It consists of a large number of measures and programs that address a wide range of market failures actors and technology fields using both direct and indirect intervention instruments. Nonetheless, the quality and availability of relevant data on the financial aspects of this support is rather poor both on the national and even more so on a regional level, both for innovation output indicators as well as for data on direct and indirect public support to innovation.

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<sup>11</sup> In addition to this also co-ordination needs arise with the EU level. We, however, do not deal with these for reasons of brevity of this report and since these closely follow the general mechanisms existing in the EU. Gerhardter et al (2009), however, provide an excellent summary of existing mechanisms and problems of co-ordination on this level of governance.

### 2.4.1. Total R&D expenditure

**Table 2.2: Estimates of total R&D expenditure in Austria**

	Total native R&D expenditure (in Mio. EUR)	Of this financed by:					Total native R&D expenditure in % GDP
		national <sup>1)</sup>	provincial <sup>2)</sup>	Enterprise-sector <sup>3)</sup>	foreigners <sup>4)</sup>	Others <sup>5)</sup>	
1981	896.14	362.40	47.86	450.20	22.17	13.51	1.10
1985	1,248.68	518.16	71.20	613.35	30.90	15.07	1.21
1989	1,669.07	617.84	89.38	885.35	53.87	22.63	1.32
1993	2,303.31	957.12	129.67	1,128.40	59.69	28.42	1.45
1994	2,550.73	1,075.14	158.69	1,179.42	106.52	30.96	1.53
1995	2,701.68	1,092.28	153.89	1,233.50	190.10	31.91	1.55
1996	2,885.55	1,066.46	159.06	1,290.76	337.00	32.27	1.60
1997	3,123.21	1,077.59	167.35	1,352.59	478.21	47.47	1.70
1998	3,399.83	1,097.51	142.41	1,418.43	684.63	56.86	1.78
1999	3,761.80	1,200.82	206.23	1,545.25	738.91	70.59	1.90
2000	4,028.67	1,225.42	248.50	1,684.42	800.10	70.23	1.94
2001	4,393.09	1,350.70	280.14	1,834.87	863.30	64.08	2.07
2002	4,684.31	1,362.37	171.26	2,090.62	1,001.97	58.09	2.14
2003	5,041.98	1,394.86	291.62	2,274.95	1,009.26	71.29	2.26
2004	5,249.55	1,462.02	207.88	2,475.55	1,016.61	87.49	2.26
2005	6,029.81	1,764.86	330.17	2,750.95	1,087.51	96.32	2.48
2006	6,318.59	1,772.06	219.98	3,057.00	1,163.35	106.20	2.46
2007	6,867.82	1,916.96	263.18	3,344.40	1,230.24	113.04	2.52
2008	7,548.06	2,356.78	354.35	3,480.57	1,240.53	115.83	2.67
2009	7,657.67	2,475.55	382.82	3,442.06	1,240.95	116.29	2.79
2010	7,890.68	2,596.71	389.51	3,491.93	1,293.56	118.97	2.78
2011	8,286.30	2,730.28	393.76	3,697.61	1,342.59	122.06	2.79

Source: STATISTIK AUSTRIA. – <sup>1)</sup> Based on data from the federal budget (see Statistik Austria for details) <sup>2)</sup> 1981, 1985, 1989, 1993, 1998, 2002, 2004, 2006 und 2007: based on questionnaire. 1994-1997, 1999-2001, 2003, 2005 und 2008-2011: based on estimates made by provincial governments. <sup>3)</sup> 1994-1997, 1999-2001, 2003, 2005 und 2008-2011: estimated by Statistik Austria. <sup>4)</sup> 1994-1997, 1999-2001, 2003, 2005 und 2008-2011: estimated by Statistik Austria. <sup>5)</sup> Communities (excluding Vienna), social partners, social security system and other public sector as well as non-profit sector 1994-1997, 1999-2001, 2003, 2005 und 2008-2011: estimated by Statistik Austria.

The most recent estimates of R&D expenditure provided by the statistical office in Austria (see table 2.2) which are based on data from the national budget, estimates of the individual provinces on their R&D expenditure and a four yearly questionnaire of R&D statis-

tics, however, indicate that total R&D expenditure in Austria amounted to a total of € 8,3 billion in 2011 of which almost a third 33% was financed by the national government and a further 4.8% came from the individual provinces, while the enterprise sector accounted for 44.6% of total expenditure and about another 16.2% of the financing of R&D came from abroad.

Furthermore these data also suggest that the share of national government spending in total R&D expenditure after having declined from the mid 1990's (from around 40% in 1995) to the mid 2000's (to 28 % in 2007) has started to increase again in the last years. The share of provincial governments in R&D expenditure by contrast – despite some sporadic oscillations – has declined slightly since the early 1990's when it was at around 5.5%. The reason for this long run decline, however, is the rapidly increasing importance of foreign sources of finance for Austrian R&D expenditure, which sharply increased after Austria's accession to the European Union in 1995 and has been on the rise ever since then.<sup>12</sup>

#### **2.4.2. Data on federal budget expenditures and expenditures of federal agencies**

Furthermore, also the annual Austrian research and technology report (BMWf et al., 2011) provides some budget data on the federal budget and on the expenditure of the major federal financing institutions of research and development in Austria.<sup>13</sup> According to this report the Austrian ministries spent € 89 Mio in addition to the large global subsidies to the major financing institutions (FWF, FFG, the Ludwig Boltzmann Gesellschaft, the academy of sciences and the Austrian institute for technology) in 2009. Furthermore, the present value of the subsidies of the FFG amounted to approximately € 428.7 million of which € 236.5 million were provided to enterprises and € 116.2 to research institutions in 2010. In

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<sup>12</sup> In part this increase is also due to the increasing participation of Austrian research institutions in European framework program projects, the majority of this increase, however, comes from foreign owned enterprises investing in R&D in Austria.

<sup>13</sup> Note that these data are incomparable to data on R&D expenditures in table 2.2 and have number of drawbacks that limit their interpretation (see BMWf et al, 2011 for a more detailed discussion).

addition the FWF promoted scientific research with funds amounting to € 172 million in 2010 (see BMWF et al., 2001).<sup>14</sup>

Data for the AWS are not reported in the annual research and development report. However according to its own “achievement report” (AWS, 2011) the technology programs of the AWS provided funds amounting to EUR 49 million in 2010 (last available year), and a further EUR 451 million for programs promoting firm growth (including special programs but excluding the infrastructure program).

Despite substantial comparability and statistical problems this data thus also suggests that over recent years, the strong increase in the country’s R&D quota in recent years has been accompanied, and partly enabled, by a significant expansion of public support measures. In 2004, the value of the subsidies granted by the FFG amounted to € 127 million, which is approximately 30% of today’s funding and the AWS and FWF show similar increases over time.

### 2.4.3. Costs of tax credits

Furthermore, there are fiscal incentives for R&D expenditure that consist of two types of tax allowances (one R&D expenses according to the *Frascati manual* of the OECD, and another one for economically useful inventions), as well as a tax credit. According to INNO-Policy Trendchart (2009) the system of fiscal incentives for R&D could be considered quite generous compared to other EU 27 or OECD countries. However, the reform of the corporate tax system and the decrease of the corporate tax rate in Austria in 2005 reduced the attractiveness of fiscal incentives, and therefore made it comparable to the level of the EU 15 (Aiginger et al., 2009). Also, the current legal arrangements and the lack of transparency in the fiscal innovation system have been criticized (OECD, 2007).

A recent study by Falk (2010) estimated costs of the tax credit to rise from € 416 million for the years 2009 to € 566 million in 2013, while estimates by the ministry of finance suggest that costs in 2009 amounted to € 400 million and that these costs may rise to € 590 million by 2013. In addition both direct and indirect R&D subsidies amounted to 0.42% of the GDP in 2008 according to INNO-Policy Trendchart (2009).

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<sup>14</sup> The major part of these subsidies € 83 million was spent on subsidies for individual projects. International programs and SFB-programs accounted for another € 15 million each.

## 2.5. Innovation Strategies

### 2.5.1. National Innovation Strategies

One of the most striking and also most intensively criticized specifics of the Austrian innovation system in recent years was the almost complete lack content driven strategic vision for innovation policy on a national level. As for instance pointed out by the (INNO-Policy TrendChart, 2009) the Austrian National Reform Program (NRPs) did not define specific goals with respect to innovation policy and left the overall rationale of the policy mix unclear despite defining specific targeted programs.<sup>15</sup> In spring 2010 the federal government, however, published its strategy entitled “The path to Innovation Leadership” (Bundeskanzleramt, 2011). Based on a multi-year process of discussion and analysis this strategy, based on the overall satisfactory performance and rapid development of the Austrian innovation system and in the face of the new short-and long term challenges, defines two central goals for technology policy in Austria:

1. To further develop science, technology and innovation in Austria so as to make Austria one of the most innovative countries in the EU by 2020 and to in this way strengthen the competitiveness of the economy as well as the welfare of society.
2. To develop and increase the potentials of science, research, technology and innovation to face the economic and social challenges to society.

According to this vision by 2020 Austria will belong to the group of the most innovative countries of the EU and will be one of its innovation leaders. It will then be a top location for research, technology and innovation, providing best working conditions to top scientists attracting research institution and innovative enterprises from all over the world.

Although it is too early to judge the concrete practical consequences of this strategy it defines five closely linked areas in which – based on the specific trends, structures and challenges in Austria – individual measures should contribute to achieving these strategic goals.

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<sup>15</sup> Other analysts have resorted to more candid formulations: Gerhardter et al (2009) refer to Austria as a “project administration champion” and Tichy (2008) characterizes the situation as “decentralized governance without concept”.



- In the field of education the government aims to improve both the access as well as the permeability of the education system by a broad reform of the education system on all levels (from early childhood to lifelong learning), to improve the use of human capital of the foreign born population in Austria through improved integration policy, increase mobility of students and graduates and to increase the internationalization of Austrian innovation and research system. In addition improved framework conditions and a reduction of gender inequalities at universities should help to guarantee an ample supply of excellent young academics.
- In the field of basic research, which is defined as a central area of government responsibility, the strategy foresees a strengthening of the individual elements of basic research in Austria by improving the infrastructural conditions, reforming university financing, increasing financing of competitive projects based on excellence, further developing the system of results based financing for research and the launching of an Austrian excellence initiative, which should produce up to 10 excellence clusters by 2020. In addition knowledge transfer between enterprises and universities should be strengthened and the attempts of the non-university research institutions in attaining international reputation should be supported.
- In the field of innovation and enterprise research the strategy aims at increasing the share of enterprises conducting research and development by 10% to 2013 and by 25% until 2020. The instruments to achieve these objectives are amongst others increased direct subsidies, improved access to risk capital, support for innovative newly founded enterprises and improved co-operation between research institutions and enterprises. In addition an active competition policy should also contribute to increasing the innovativeness of enterprises.
- In the field of governance of the innovation system the government foresees an increased necessity for co-ordination with other policy fields (such as education and competition policy) as well as for guaranteeing openness and mobility. In addition the strategy aims at increasing the efficiency of the division of competencies in innovation policy and establishing mechanisms of defining areas of excellence, increasing the transparency of the public support system as well as establishing a more intense dialogue between science and economic actors. As concrete measures the strategy therefore foresees the creation of a high level “task force research, technology and innovation” to co-ordinate and accompany the strategy implementation, a more

strongly results based system of financing, and working towards a better integration of Austrian research and innovation policy actors into international actor networks.

- Finally, in terms of the government support system for innovation the strategy aims at adapting this system towards the new priority of becoming an innovation leader by explicitly taking into account the particular requirements of basic research, guaranteeing effective and efficient use of funds, and focusing resources on a few broadly defined research topics<sup>16</sup> as well as further simplifying and harmonizing the subsidy system. In addition the government aims at a one third state and two thirds private division of R&D expenditure by 2020 (currently the public sector share is slightly above this – see above).

### 2.5.2. Regional Innovation Strategies

Aside from this new strategy on the national level a number of regional innovation strategies for individual provinces of the Austrian CENTROPE exist.<sup>17</sup> These predate the recent national strategy and thus also often do not fully reflect the recent Austrian strategy. It is, however, expected in a number of cases that regional governments will adapt and/or redesign their regional innovation strategies in the near future.

For instance the Viennese innovation strategy (Stadt Wien, 2007) which was designed in 2007 aims at increasing the R&D share of GDP in Vienna to 4%, attaining 22,000 employees in the R&D sector, reaching a share of 20% tertiary educated population as well as increasing the number of enterprises engaging in R&D in Vienna to 800 and the

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<sup>16</sup> These topics, however, remain undefined in the document.

<sup>17</sup> Aside from this all Austrian provinces have regional development strategies and also various planning documents for regional policy which make references to aspects of innovation and technology policy. In some cases (if regional innovation strategies predate regional development plans) these documents often refer to regional innovation strategies or (if regional development plans predate regional innovation strategies) innovation strategies refer to regional development plans. Furthermore in many cases also strategic documents such as development plans, which make reference to R&D as well as separate innovation strategies exist at a more local (NUTS 3 or below) level. Given the limited resources of these territorial administrative levels (relative to both the federal and provincial level) in Austria, these concepts often focus more strongly on institutional aspects on a local level and increasing or improving co-operation of actors. Again due to the large number of such documents and the space limitations of this report we do not describe their activities in detail here.

number of Viennese SMEs participating in framework program project to 200 by the year 2015. The strategy focuses on four central strategic areas of action. The first of these is concerned with the development of human resources and focuses mainly improving the situation and quality of doctoral as well as post doctoral students and studies and increasing female participation in research and development. The second area is concerned with R&D support and suggests focusing research and development policy on a smaller set of visible and relevant topics<sup>18</sup> as well as improving the transparency of the existing support system, the third area is concerned with communicating R&D policy by foreseeing increased efforts at organizing a dialogue of research with other regional actors and the fourth area aims at a better integration of innovation policy in other policy fields in particular with regional development and SME policy.

Similarly the Lower Austrian regional development strategy (drafted in 2004) defines the following development strategies in the area of innovation and technology policy (Land Niederösterreich, 2004): Increasing innovation and technology orientation of the economy by increased co-operation with other policy areas and co-operation with business and education actors, developing the regional innovation system by co-operation among technology actors and creating a creative milieu, supporting SMEs, further developing regional competence, technology and innovation centres, improving conditions for attracting technology oriented firms through developing advanced business services, improving telecommunication and telematic services and increasing co-operation of regional actors with other European regions of excellence. The more recent technology strategy (which received the European prize for innovative regions and was drafted in 2007 – Viehböck, 2007) builds on this strategy and states the vision that Lower Austria should become a leading technology region in the future. In addition to a number of measures aiming at creation of enterprise friendly framework conditions, increasing the number of newly founded high-tech enterprises, intensifying technology transfer, concentration of R&D

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<sup>18</sup> In this respect the strategy mentions the life sciences, information and communication technology, automotive and creative industries as well as physics, mathematics and social and cultural sciences as well as humanities as particular strongholds of the Viennese economy around which such a specialization can be developed.

investments to areas of potential success<sup>19</sup> and securing qualified human resources, this concept also states that the Lower Austrian strategies should take account of those of neighbouring provinces. This technology strategy is thus one of the few concepts to take explicit account of issues of co-ordination between provinces.

Finally, for the Burgenland the Austrian national reform program foresees that increasing the innovative capacity in the region will be a central instrument to improve the competitiveness of the region and the placement of the Burgenland as an important player in the cross-border CENTROPE region. To achieve this reform program foresees increased investment in human capital and enterprise services and increase cross-border co-operation in the field of innovation (see: ÖROK, 2006).

## 2.6. Cluster Strategies

### 2.6.1. The scope and aims of cluster strategies

Regional governments in Austria in the last two decades have also been particularly active in the field of cluster policy. Each federal province has a set of clusters which serve as a focus field for industrial as well as innovation and research initiatives. Interestingly, however, in Austria clusters have rarely been seen as an instrument of technology policy on a national level but rather as a regional development policy instrument (see Clement et al., 2009). Thus for instance the Austrian technology report 2010 devotes half a page to the Austrian cluster initiatives and the Austrian governments innovation strategy does not mention the concept at all and also a general strategy towards using clusters as innovation policy instruments is missing on a national level.

On regional level, however, the cluster concept is used both in the Viennese strategy, where in particular the life science and automotive clusters are seen as important focal points of technology policy, as well as in the Lower Austrian strategy, where clusters are defined as part of the regional Innovation strategy designed in 2007 and where in addition clearly defined criteria (at least 100 enterprises, relevant research institutions in the region

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<sup>19</sup> In this respect this strategy is based on an extensive SWOT analysis of individual subfields in the areas of information and communication technologies (ICT), environment and energy, new materials and production processes, Life Sciences and enabling technologies for ICT.

and willingness to co-operate among enterprises) exist for the creation of new clusters (see Clement et al., 2009).

Although clusters in general have been considered to be rather successful in Austria and have certainly increased dramatically in number since the beginning of the first cluster initiatives in the early 1990s, they have also been criticized on a number of occasions. For instance Fritz et al. (2007) point out that overemphasizing cluster policies could also potentially increase the risk of structural decline in regions, due to such policies encouraging over-specialization. Clement et al. (2009), by contrast, argue that the sheer number of clusters often leads to one and the same enterprise belonging to different clusters at the same time and that the lacking co-ordination of cluster initiatives among provinces leads to a situation of too many clusters focusing on too small territories as well as too many fields, and that at least from a point of view of regional marketing the parallelism of many very similar cluster initiatives of individual regions may lead to confusion on the side of potential foreign investors in Austria.<sup>20</sup>

### 2.6.2. Active clusters in the Austrian CENTROPE

At least with respect to the first of these criticisms the Austrian CENTROPE-regions (composed of the provinces of Burgenland, Lower Austria and Vienna) or the Vienna region is somewhat of a special case, since recently a number of clusters previously defined for individual provinces have combined (or increased their co-operation) to extend their territorial scope over the whole region. In particular this applies to:

- the life science cluster of the Vienna region (LISAVR), which claims responsibility for a total of over 170 companies active in the fields of biotechnology including medical biotechnology, and immunology.
- The automotive cluster Vienna region (ACVR) – which functions as a communication platform between businesses, research and educational facilities as well as funding

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<sup>20</sup> Indeed the number of clusters in the Austrian CENTROPE is so large that here we can only list the names and main purposes of (hopefully) all the clusters active on the territory of the Austrian CENTROPE. However Clement et al., 2009 as well as Clement and Welbich-Masek (2007) provide an extensive research on this topic including a list of all clusters active in Austria, a more detailed description of their activities as well as historical overviews and appraisals of cluster policy in Austria.

and political institutions in order to strengthen international competitiveness and market position and is engaged in network, interconnecting the automotive industry suppliers in the Vienna region using different technologies, promoting innovation, combining competences and reinforcing the transfer of knowledge.

The further clusters in the region, however, remain to be focused on the provincial level and include:

- The food cluster Lower Austria, – which forms a network for lower Austrian agricultural and food processing enterprises.
- The green building cluster Lower Austria – which is centred on the construction and construction materials industry in Lower Austria.
- The plastics-cluster of Lower Austria, – which in co-operation with the Upper Austrian plastics cluster aims to support companies in the plastic sector.
- The logistics cluster of Lower Austria – which sees its activities in the promotion of logistics competences of native companies, bundling of transports, reduction in the empty runs, and more efficient transport planning.
- The mechatronics cluster in Lower Austria – which was only founded last year and combines metals, mechanical engineering and mechatronics.
- Well-being cluster Lower Austria – which networks among enterprises in health tourism as well as their suppliers.
- The IT-cluster of Vienna – which aside from companies also includes research and educational institutions in information technologies.
- The mobility cluster in Vienna – which is supporting the automotive industry in Vienna.
- The ICT Cluster Burgenland – which is the information and communications technology-cluster for Burgenland.
- Plastics-Cluster Burgenland – which inter alia focuses on aiding companies of this sector in Burgenland in their internationalization.

Furthermore, the city of Vienna has also supported a number of further networking activities most notably in the field of creative industries that, while not having fully developed into a cluster are sometimes mentioned as cluster initiatives in the literature (see e.g.

Clement et al, 2009) and also focuses its innovation policy on certain fields of competence (defined as information and communication technology, physics, mathematics and social and cultural sciences as well as humanities) that are not organized as clusters. In addition currently plans are under discussion for creating a further environmental technology cluster in Vienna.

In addition also a number of Austrian wide networks and clusters or associations with similar aims as clusters are located and/or operate in the CENTROPE Region, These include:

- The Austrian Traffic Telematics Cluster (ATTC) – located in Vienna and founded in the year 2003 on the initiative of the ASFINAG. It combines 26 Austrian enterprises in the field of traffic telematics.
- Rail Technology Cluster Austria (RTCA) – located in Vienna which has operators industrial enterprises planners researchers as well as financing agencies and the BMVIT as its partners.
- Austrian Water – located in Burgenland. This is a confederation of enterprises working in the water sector.
- Austrian Aeronautics industries group – located in Vienna which founded as a non-profit association in 1999 to represent the common interests of the Austrian companies and organizations with business or research activities in the aeronautics supply industry as well as in aircraft maintenance and services.
- Austrian Automotive Association – located in Vienna which encompasses three automotive networks in Austria, the Chamber of Commerce and the Federation of the Austrian Industry.
- Network Metal – located in Upper Austria, which focuses on the interests of metal working enterprises in Austria.

## 2.7. Conclusions

In sum therefore one can conclude that the Austrian innovation system, despite showing a number of often criticized and well understood weaknesses, such as the strong fragmentation of competencies, weak co-ordination of individual actors as well as a general lack of binding strategies and – with respect to the regional level – often excessive focus on indi-

vidual provinces, has been rather successful in terms of quantitative indicators on innovation outcomes and (in particular) inputs. The conditions for this success seem to have been the rather attractive system of financing R&D.

Furthermore, focusing on more regional aspects, the Austrian CENTROPE or the Vienna Region may also be considered to be a rather interesting case study of the evolution of regional innovation policy systems, since there are visible signs that actors in this region are increasingly recognizing their strong interdependence and are attempting to create more integrative approaches to innovation policy. This said it is, however, also fair to state that these initiatives are often still in their infancy and it is still too early to say whether these initiatives could become the nucleus of a more strongly integrated innovation system for the CENTROPE or at least its Austrian parts.



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### 3. National and Regional Innovation System in the Czech CENTROPE<sup>21</sup>

*Authors: Luděk Kouba, Petr Rozmaheľ<sup>22</sup>*

#### 3.1. Introduction

Considering the economic structure and development of the South Moravian Region, the area of higher education, science, research, development and innovation has a very significant role. Brno, the capital of the region, is the second most important university centre in the Czech Republic with in total twelve universities and private colleges and almost 90,000 university students. Four leading universities dealing with R&D activities are located in Brno – Masaryk University, Brno University of Technology, Mendel University in Brno, University of Veterinary and Pharmaceutical Science Brno – and also other prestigious R&D centres and institutes. In 2010, Brno’s universities and research institutions achieved financial support of 17 billion Czech crowns (around 708 million euro) for building and developing their research infrastructure.

The South Moravian Region is considered to be the region with the most intensive, elaborated and coordinated research, development and innovation support in the Czech Republic. Already in 2002, the region prepared its first Regional Innovation Strategy. Today, the third revision of this document is valid. Within the context of the Regional Innovation Strategies, three crucial institutions were established – the Regional Development Agency of South Moravia, the South Moravian Innovation Centre and the South Moravian Centre for International Mobility. These institutions have participated in building an environment for R&D as well as encouraging R&D and innovation. The results of these regional innovation policies are among others a number of large projects (such as CEITEC, Central European Institute of Technology – 5.2 billion CZK, or 217 million EUR, ICRC, International Clinical Research Centre – 4.4 billion CZK or 183 million EUR) of supraregional importance that are supported from EU-funds.

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<sup>22</sup> Research assistance: Nikola Najman.

The decisive factor for success in the area of R&D and innovation in South Moravia were the long-term and broad based support of R&D and innovation policy in the South Moravian Region. The area of R&D and innovation has been a political priority for a whole decade without reference to the election results. Moreover, there has been an extraordinary amount of cooperation among the South Moravian Region, the Statutory City of Brno, universities and other R&D centres in South Moravia to realize extensive research projects and to profit from synergetic effects. In consequence, the long-term perspective, stable political support and broad cooperation among all relevant institutions have been crucial determinants of South Moravia's strong position in the area of R&D and innovation in the context of the Czech Republic.

## 3.2. General information on national and regional innovation system

### 3.2.1. Regularity

Since the innovation process is closely linked to research and development, the laws and regulations dealing with innovation issues are also clearly linked to R&D laws and regulations.

The **Act No. 130/2002** on the Support of Research and Development from Public Funds became the basic legal document determining the national R&D system in the Czech Republic (since 1 July 2002). The act is divided into 5 parts and 45 paragraphs. The crucial part one "Support of research and development from public funds" (the other four parts have a supplementary character) contains 41 paragraphs that are grouped into 11 titles. The act defines basic terms within the R&D area (basic research, applied research etc.), states subjects, methods and conditions of support and defines ownership of tangible assets procured for research and development and the rights to the results and their utilisation. The act also defines conditions concerning public tender in research and development and evaluation of research objectives (In order to evaluate proposals or the results of research objectives the grantor shall be obliged to appoint an evaluation commission or commissions) and it also states the main R&D authorities (Ministry, Research and Development Council, Grant Agency of the Czech Republic) in the Czech Republic.

Act No. 130/2002 was amended to the Act No. 211/2009 on the support of research, experimental development and innovation (since 1 January 2010). This act explicitly

emphasizes the importance of innovations which is reflected also in the above mentioned 11 titles, e.g. V. Public tenders in research, development and innovation. Regarding other content changes, in the paragraph 35, the Research and Development Council, an expert and advisory body to the government in the field of research and development, was reorganized and renamed the Council for Research, Development and Innovation. Moreover, paragraph 36a on the Technological Agency of the Czech Republic, was newly added into this act. On the contrary, other parts of the original act were repealed, e.g. paragraphs 27 to 29 describing the evaluation of research objectives.

In order to implement the above mentioned acts, the government promulgated the government regulation No. 397/2009 on an information system for research, experimental development and innovation (in total 10 pages). The regulation develops the concerned acts, specifically paragraph 32, focusing on the information system in the R&D and innovation field.

In the Czech legislation, there are also norms that are partially related to the R&D and innovation. E.g. Act. No. 341/2005 on public research institutions, Act. No. 342/2005 on amendment to some acts in connection with adoption of the act on public research institutions etc..

### 3.2.2. Institutional background at the national level

There are many important subjects that are parts of the system of research, development and innovation (R&D) in the Czech Republic. They include the government and regional bodies, municipalities, business and professional associations, unions, agencies, foundations, research and development institutions, firms as well as the general public. Significant functions in the R&D are attributed to the following bodies listed below:

The **Ministry of Education, Youth and Sports** is the central administrative authority responsible for research and development in the Czech Republic. Among others, the ministry is responsible for the international cooperation of the Czech Republic in research and development, including negotiations with the EU and the individual EU member states has the authority over research and development including the use of the EU funds for research and development, provides conceptual support for the major R&D infrastructure as well as for specific university research and performs the administrative functions of the central administrative authority for research and development in accordance with the legal regulations.

**Table 3.1: System of Innovative Entrepreneurship – main partners**

Regional Bodies	Government	Parliament	Industrial Property Office
Chambers	Research and Development Council		R & D Institutes
Banks	Czech Science Foundation		Fellowships
Domestic Partners	Technology Agency of the CR		Foreign Partners

Source: <http://www.aipcr.cz/eng/systempodnik.asp>.

**Table 3.2: System of Innovative Entrepreneurship – chosen State administration central bodies**

Ministry of Education, Youth and Sports	Ministry of Labour and Social Affairs
Ministry of Industry and Trade	Ministry for Regional Development
Ministry of the Environment	

Source: <http://www.aipcr.cz/eng/systempodnik.asp>.

The support of R&D and in particular innovation-support are also in the competence of the **Ministry of Industry and Trade**. As the innovation process is costly for the enterprises, the Ministry focuses on supporting projects with high technical and utility value of products and services (product innovations), on increasing the efficiency of manufacturing and services generation processes (technological innovations), on material composition product upgrade (material innovation) as well as on introducing advanced management methods and introducing significant changes of organisational structure or strategic orientation changes of the enterprises (innovation in management and administration) and on other non-technical innovations. Among others, the ministry is an important co-author of national innovation strategies. Also the **CzechInvest**, the Investment and Business Development Agency founded by the Ministry of Industry and Trade in 1992, is an important strategic tool for government support of investment opportunities including R&D and innovation incentives.

The **Council for Research, Development and Innovation** is an expert and advisory Government body for the area of R&D and innovation. According to its statute (Annex to Government Resolution No. 82 of 19th January 2005), the council bodies are the chairperson of the council and the board of the council. The chairperson of the council should be a member of the government who is accountable to the government for the council activities. The area of R&D and innovation is a priority of Czech government which is reflected by the fact that the Czech prime minister has been the chairperson of the council since 1 September 2010. The council is responsible for:

- drawing up long-term fundamental trends and schemes for the development of research and development in the Czech Republic
- reporting, analysing analyses and assessing the research and development situation in the Czech Republic on an annual basis
- developing a mid-term draft forecast for research and development support including the budget
- conducting negotiations with the EU institutions and with EU member states
- acting as administrator and operator and approving the rules of operation of the Research and Development Information System
- issuing proposals for members of the board and the chairperson of the Technology Agency of the Czech Republic and the Grant Agency of the Czech Republic

The **Grant Agency of the Czech Republic** (also called the Czech Science Foundation) was established as an independent institution in 1993. Its main function is to provide, on the basis of public tender, financial support for basic research projects submitted by individuals or organizations. The main source of the funds available is the state budget, but contributions from other sources are also possible.

Unlike the Grant Agency of the Czech Republic, which supports basic research, the primary objective of the **Technology Agency of the Czech Republic** is to support applied research, experimental development and innovation in the Czech Republic. The Technology Agency of the Czech Republic was established by the Act No. 211/2009 (130/2002) in 2009 as a part of the R&D and innovation system reform (Programmes TACR).

**Table 3.3: Associations under the Act No. 83/90 Coll. and other partners**

Science and Technology Parks Association CR	The Czech Society for New Materials and Technologies
Council of Scientific Societies CR	Czech Institution of Civil and Structural Engineers
Faculty of Civil Engineering, CTU in Prague	Faculty of Mechanical Engineering CTU in Prague
Association of Research Organisations	Brno University of Technology
Czech University of Life Sciences Prague	Association of Mechanical Engineers, Czech Republic
Institute of Chemical Technology, Prague	Charles University in Prague
Czech Centre Institution of Engineering and Technology	University of West Bohemia in Pilsen
Czech Committee for Scientific Management	VŠB - Technical University of Ostrava
Czech Union of Inventors and Rationalizers	RRSCCE, Russian Federation
Czech Association of Development Agencies	Czech Society for Quality
Vereinigung Tschechischer Unternehmen in Deutschland (Germany)	Eastbridge (Germany)
Association for Irrigation and Landscape Water Management	Technical University of Liberec
Czech Technological Platform Engineering	Association for Consulting
National Cluster Association	Palacký University Olomouc
College of Information Management and Business Administration	Tomas Bata University in Zlín

Source: <http://www.aipcr.cz/eng/systempodnik.asp>.

The **Academy of Sciences of the Czech Republic** was established by Act No. 283/1992 as the Czech successor of the former Czechoslovak Academy of Sciences. It consists of 54 public research institutions. The academy employs about 7,000 employees more than a half of whom are researchers with university degrees. The main objective is to conduct basic research in the natural, technical and social sciences and the humanities. Scientists of the academy institutes also participate in education, particularly through doctoral study programmes for young researchers and by teaching at universities. The academy also fosters collaboration with applied research and industry. The state budget is the primary

source of finance. The academy also established its own grant agency (The Grant Agency of the Academy of Sciences of the CR) which financially supports research projects selected through a peer-review procedure involving reviewers from abroad.

The **Technology Centre of the Academy of Sciences of the CR** is a consortium of institutes of the Academy of Sciences and the Technology Management Ltd. The technology centre is the national information centre for European research. It deals with analytic and perspective studies in R&D and innovation and it is involved in transnational technology transfer.

The **Association of Innovative Entrepreneurship of the Czech Republic**, a non-government organization in the field of innovative entrepreneurship, was established in 1993. According to the memorandum of association, its main activity is: research and development in the field of innovative entrepreneurship that is research, development and innovation, technology transfer, new materials and technologies, science and technology parks, innovative firms, innovative processes, innovative infrastructure, innovative potential and conditions for functional innovative market by respecting regulations of the European Union frame (frame of partnership for state research, development and innovation grants) and other municipal ordinance and legal enactments. Further to this main activity, 12 other objectives were defined by the memorandum.

### 3.2.3. Institutional background at regional level

By its nature, the South Moravian Region and The Statutory City of Brno have an important impact on the R&D and innovation policy in the region. Both of them participate in the establishment of specialized institutions in this area.

The **Regional Development Agency of South Moravia** (RDA) which was established on 10th September 1997 as a body administering the Phare CBC programme for the Fund of Small Projects as part of cross-border cooperation in the South Moravia – Lower Austria region. The activities of this agency were subsequently extended to include assistance to foreign investors provided as a service for CzechInvest. Related to the accession of the Czech Republic to the European Union, the RDA also started to provide consulting services and preparation of projects for pre-accession and structural funds. The RDA is an association of legal entities (South Moravian Region, The Association of Southern Moravian Municipalities and the Regional Chamber of Commerce of South Moravia). Thus its primary activities consist of providing services requested by the members.

The Regional Development Agency works actively in the area of innovations. The RDA became involved in implementing the Regional Innovation Strategy of South Moravia as well as in developing cluster initiatives. Since April 1994, RDA South Moravia has also been a regional representative of the Association of Innovative Entrepreneurship of the Czech Republic which supports the preparation and implementation of the National Policy for Innovations in the regions.

The **South Moravian Innovation Centre** (JIC) was founded in 2003 as an interest association of legal entities (South Moravian Region, The Statutory City of Brno, Masaryk University, Brno University of Technology, Mendel University in Brno, University of Veterinary and Pharmaceutical Science Brno). The JIC fosters enterprise skills development and commercialisation of research in South Moravia and also brings together all higher education institutions in the region, in a partnership that aims to maximise the contribution of higher education to regional and national economies. The projects and results of the JIC (see the following chapters for a more detailed description).

The **South Moravian Centre for International Mobility** (JCMM) is a specialized non-profit organization which encourages talented students and researchers based in the South Moravian Region. The JCMM was founded on 15th December 2005 by the Council of the South Moravian region, Masaryk University Brno and Technical University Brno. Over time, Mendel University in Brno and University of Veterinary and Pharmaceutical Science Brno became members as well.

At the Masaryk University, the **Technology Transfer Office of Masaryk University** (TTO) was founded. This office also aims to publicise the research and development results of Masaryk University and to make these results available for commercial use.

#### 3.2.4. Financial background

Besides the Czech state budget, the EU structural funds are very important source for the R&D and innovation in the Czech Republic. The most relevant operational programmes are Research and Development for Innovations and Enterprise and Innovation.

Table 3.4 illustrates the government expenditures on research, development and innovation in 2010 and 2011 in the Czech Republic. Government spending is divided into individual chapters according to the particular ministry competence. In 2010 gross domestic expenditure on research and development (GERD) reached 1.61% of GDP. This



is lower than the EU average amounting to 1.8%. In highly innovative countries including Japan, Sweden, Finland, Switzerland or Korea the spending on R&D amounts to 3% of GDP. In 2009, South Moravia belonged to the three regions (with the Capital of Prague and Central Bohemia) with the highest spending on R&D in the Czech Republic. Comparing regional GDP in market prices and total spending on R&D, the share of R&D expenditure in South Moravia is 2.14% of GDP, which is clearly above the national average.

**Table 3.4: State Budget Expenditures on Research, Development and Innovation in 2010 and 2011 (in thousands of CZK)**

STATE BUDGET CHAPTER	STATE BUDGET 2010			STATE BUDGET 2011		
	Institutional expenditure	Targeted expenditure	Expenditure in total	Institutional expenditure	Targeted expenditure	Expenditure in total
Office of the Government	38 722	10 086	<b>48 808</b>	39 315	10 103	<b>49 418</b>
Czech Security Information Service	0	0	<b>0</b>	0	0	<b>0</b>
Ministry of Foreign Affairs	13 527	7 000	<b>20 527</b>	13 404	0	<b>13 404</b>
Ministry of Defence	91 407	357 114	<b>448 521</b>	98 387	268 357	<b>366 744</b>
National Security Authority	0	0	<b>0</b>	0	0	<b>0</b>
Ministry of Labour and Social Affairs	37 272	26 678	<b>63 950</b>	955	31 204	<b>32 159</b>
Ministry of Interior	39 044	329 753	<b>368 797</b>	60 763	420 485	<b>481 248</b>
Ministry of Environment	186 023	292 905	<b>478 928</b>	222 853	108 736	<b>331 589</b>
Ministry for Regional Development	0	28 559	<b>28 559</b>	0	23 458	<b>23 458</b>
Grant Agency of the Czech Republic	70 276	1 945 866	<b>2 016 142</b>	93 204	2 367 686	<b>2 460 890</b>
Ministry of Industry and Trade	509 600	3 312 368	<b>3 821 968</b>	581 973	3 266 133	<b>3 848 106</b>
<b>Ministry of Industry and Trade *)</b>	<b>2 842 400</b>		<b>6 664 368</b>			
Ministry of Transport	23 019	76 886	<b>99 905</b>	1 336	7 779	<b>9 115</b>
Ministry of Agriculture	425 664	416 774	<b>842 438</b>	408 078	404 055	<b>812 133</b>
Ministry of Education, Youth and Sport	7 209 895	3 727 663	<b>10 937 558</b>	6 919 034	3 527 962	<b>10 446 996</b>
<b>Ministry of Education, Youth and Sport *)</b>	<b>1 158 199</b>		<b>12 095 757</b>	<b>3 000 000</b>		<b>13 446 996</b>
Ministry of Culture	75 415	23 171	<b>98 586</b>	70 365	141 205	<b>211 570</b>
Ministry of Health	207 625	632 230	<b>839 855</b>	377 789	698 115	<b>1 075 904</b>
Ministry of Justice	0	5 781	<b>5 781</b>	0	6 873	<b>6 873</b>
Czech Office for Surveying, Mapping and Catastre	22 159	0	<b>22 159</b>	34 391	0	<b>34 391</b>
Czech Mining Authority	160	9 740	<b>9 900</b>	0	0	<b>0</b>
Academy of Sciences of the Czech Republic	4 567 365	583 055	<b>5 150 420</b>	4 462 707	401 592	<b>4 864 299</b>
<b>Academy of Sciences of the Czech Republic **)</b>	<b>7 526</b>		<b>5 157 946</b>	<b>1 478</b>		<b>4 865 777</b>
State Office for Nuclear Safety	17 684	19 595	<b>37 279</b>	0	0	<b>0</b>
Technology Agency of the Czech Republic	51 960	0	<b>51 960</b>	69 375	780 102	<b>849 477</b>
<b>Total ***)</b>	<b>13 586 817</b>	<b>11 805 224</b>	<b>25 392 041</b>	<b>13 453 929</b>	<b>12 463 845</b>	<b>25 917 774</b>
<b>Total ****)</b>	<b>4 008 125</b>		<b>29 400 166</b>	<b>3 001 478</b>		<b>28 919 252</b>

Source: <http://www.vyzkum.cz/FrontClanek.aspx?idsekce=592654> Note: \*) including advances of the EU programmes, \*\*) including advances of the EU programmes and advances of the EEP Norway programmes, \*\*\*) expenditures on the State Budget of the Czech Republic (Act No. 130/2002 Coll.), \*\*\*\*) including advances of the EU programmes and advances of the EEP Norway programmes.

The operational programme **Research and Development for Innovations** is focused on support of the R&D 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 research workplaces with modern technologies, development of new research workplaces and increasing the capacity of tertiary education. The European Commission approved the operational program on 1 October 2008. The amount of EUR

2,070.68 million has been reserved for this programme. The OP Research and Development for Innovations includes 5 priority axes:

- European Centres of Excellence. € 685.4 million from the EU funds are reserved for this priority axis (33.1% of the OP R&DI).
- Regional R&D Centres. For which € 685.4 million or 33.1% of the total budget have been reserved.
- Commercialization and popularization of R&D with funds of € 213 million or 10.3% of the total OP budget.
- Infrastructure for university teaching connected with research and direct effect on increase of human resources for research and development Activities to which € 414 million (20% of the operational programme budget) have been devoted.
- Technical assistance – which will receive € 72 million or 3.5% of the total budget.

The operational programme **Enterprise and Innovation** is focused on support for development of the entrepreneurial environment and support for implementation of R&D results into entrepreneurial practice. It encourages the establishment of new and the development of existing companies, their innovative potential and the use of the latest technologies and renewable sources of energy. It allows an improvement of quality of infrastructure and services for business activities and establishment of cooperation between enterprises and scientific-research institutions. The European Commission approved the operational program on 3 December 2007. The amount of € 3.04 billion has been reserved for this programme. In addition, the programme financing is to be increased by another € 0.54 billion from Czech public resources. The OP Enterprise and Innovation includes 7 priority axes; two of them explicitly dealing with innovation including more than a half of the whole amount within this OP. These areas are:

- Establishment of Firms. With € 15.7 million reserved from EU funds (0.4% of the OPEI).
- Development of Firms – Amounting to € 918.7 million or 25.7% of the total budget.
- Effective energy – € 418.2 million (11.7%).
- Innovation – € 922 million (25.8%).
- Environment for Enterprise and Innovation – € 1080.9 million (30.2%).
- Business Development Services – € 116.9 million (3.3%).

- Technical Assistance – € 105.4 million EUR (2.9%).

Within South Moravia, the budget of the South Moravian Innovation Centre which is the main actor of innovation policy in the region is around 60 million CZK (€ 2.5 million); the South Moravian Region subsidy amounts to 50% of the revenues.

### 3.3. Innovation strategy and policy at national level

The government of the Czech Republic passed **Resolution No. 172 of 17th February 2003**, on proposals to improve the entrepreneurial and investment environment, in which it tasked the Deputy Prime Minister for Research, Development and Human Resources with the co-ordination of preparations for the National Innovation Strategy of the Czech Republic. The main objective of this activity was to create conditions and lay the foundations for the formulation of the Czech Republic's innovation policy. On 24th March 2004, the government approved the **National Innovation Strategy of the Czech Republic**.

The strategy is an introductory document in the area of innovation policy in the Czech Republic and its character is general and describing rather than specific. For the first time, the associated terms are defined, the innovation system in the EU is described and a basic analysis of the state in the Czech Republic is attached. In the second part, the strategic plans are developed in a rather general form.

The ideas that are outlined in the national innovation strategy were elaborated in the **National Innovation Policy of the Czech Republic for the period 2005-2010**. The vision of the policy contained four general purposes: First to establish a favourable legal and institutional framework, second to eliminate barriers to innovation activities, third to take active part in creation of new EU tools of the research, development and innovation support and to incorporate new EU legal regulations into the Czech legislation and fourth to promote selected activities of innovation processes by both direct and indirect tools in compliance with the EU legal regulations.

This vision started to be implemented through four strategic activities that included the strengthening of research and development as a source of innovation, establishing well-functioning public private partnerships, guaranteeing human resources for innovation and making the performance of the state administration in research, development and innovation more effective. Each objective had tasks defined necessary for its achievement, tools for executing the respective tasks and for each tool there were measures necessary for its

implementation, coordinators and managers, terms of implementation, indicators of implementation (success) and methods of evaluation were also defined. In consequence there were twenty six concrete measures defined within objective 1, six measures within objective 2, eight measures within objective 3 and eight measures within objective 4.

The **Innovation Strategy (Framework) for Industry and Enterprise for the period 2005-2008** was also linked to the national innovation strategy. It defined four innovation strategy priorities: 1. Infrastructure development for industrial research, development and innovation; 2. Funding, development and cooperation of innovation companies; 3. Human resources development; 4. Practical implementation of R&D results. Among others, this strategy dealt with specific tools that are sorted into two groups: direct tools (subsidies, preferential loans and guarantees for credits) and indirect tools (tax policy; venture funds and the protection of intellectual and industrial property rights).

On 8 June 2009, the government of the Czech Republic approved the **National policy of research, development and innovation of the CR for years 2009-2015** (NPRDI CR) that substitutes the former NPRDI CR for 2004-2008 and national policy of innovation for 2005-2010.

The NPRDI CR for years 2009-2015 (in total 37 pages) specifies nine main objectives:

1. implement strategic management at all levels
2. focus public support on sustainable development
3. enhance efficiency of the system of public support for R&D
4. use R&D results in innovation and improve the cooperation of public and private sector in R&D
5. improve the participation of the Czech Republic in international cooperation in R&D and innovation
6. ensure quality human resources for R&D and innovation
7. create an environment stimulating R&D and innovation
8. ensure links to other policies
9. thoroughly evaluate R&D and innovation system.

This policy also defines the following priorities of R&D and innovation in the Czech Republic for the period 2009-2011: biological and environmental aspects of sustainable development; molecular biology and biotechnology; energy resources; material research; competitive engineering; information society; safety and defence. In general, the national strategies and policies dealing with R&D and innovation support have direct impact on regional levels through the operational programmes (an important document, in this regard, is the National Development Plan) and regional project activities.

### 3.4. Innovation strategy and policy at regional level

The **Regional Innovation Strategy** that was elaborated by the Regional Development Agency of South Moravia for the period 2002-2004 was the first regional innovation strategy in the Czech Republic. Although it was not an official document, the strategy initiated the establishment of the South Moravian Innovation Centre (Jihomoravské Inovační Centrum – JIC), which is considered to be the most successful agency supporting innovative entrepreneurship in the Czech Republic. The second regional innovation strategy for the period 2005-2008 was already an official strategy of the South Moravian Region. Its main results were the founding of the South Moravian Centre for International Mobility and the Technology Transfer Office of Masaryk University.

In October 2008, the third regional innovation strategy was presented. For the first time, this version was put together in collaboration between the South Moravian Region and the Statutory City of Brno. Therefore the strategy corresponds with the Development Programme of South Moravia and the Strategy for the City of Brno. For the purpose of definition of objectives a vast enquiry that used data from 186 technological companies in six industrial sectors was conducted. The drafting of the document was coordinated by the Regional Development Agency of South Moravia, South Moravian Innovation Centre and South Moravian Centre for International Mobility. These institutions realize most of the proposed projects as well.

This version reflects economic development during the last years and strives to prepare the region on effective exploitation of the structural funds. The intention of the strategy is to transform the South Moravian Region into the most innovative region in the Czech Republic and to one of the 50 most innovative regions in Europe (currently South Moravia is ranked as No. 60 among 203 European regions that were evaluated). To achieve higher regional competitiveness, the strategy aims to foster co-operation among research

organisations and enterprises and to use the potential of large R&D projects in the region (International Clinical Research Centre - ICRC, Central European Institute of Technology - CEITEC). Besides a basic analysis of the South Moravian innovation performance, the strategic part of the document defines four priority axis (technology transfer, consulting for SMEs, human resources, internationalisation) and particular projects with focus on four key industries (engineering, electrical engineering, ICT, life-sciences).

The main indicator of innovation performance is expressed by an index – the so called Regional Innovation Scoreboard used for international comparisons (European Regional Innovation Scoreboard). For this strategy, the index is calculated by using the following indicators: participation in life-long learning (% population aged 25-64), employment in medium-high & high-tech-manufacturing (% of workforce), employment in knowledge-intensive services (% of workforce), human resources in science and technology (% population), public R&D expenditures (% GDP), private R&D expenditures (% GDP), number of patents applied for at the European Patent Office (EPO) per million population.

The Regional Innovation Strategy 3 is a key document which determines current character of innovation policies, projects and measures in South Moravia. The main actor of these policies is the South Moravian Innovation Centre (JIC) which is currently dealing with the following projects:

- Incubation Programme. The purpose is to provide or mediate complete support to start-up companies (finance, premises, consultancy, contacts, promotion, PR and technology transfer services). To be considered for incubation, a business plan must be based on innovation and there must be a potential for a positive return on investments.
- Innovation Park. It includes the buildings and area of the technology park as well as JIC services. Innovation Park JIC consists of two areas (INTECH, INBIT) with a total space of about 6 000 square metres.
- Technology Transfer. The aim is to cooperate with universities in creating an effective environment for technology transfer in the South Moravian Region and to offer top-quality support and services to companies (Business Development, Outsourcing Development) and science and research organisations (Commercialisation, Contract Research) in this region.

- Innovation Vouchers. These are lump-sum subsidies granted to companies (particularly small and medium enterprises) for the purposes of pilot projects of (long-term) cooperation with knowledge providers. On one hand, innovation vouchers improve competitiveness of enterprises and on the other hand, they contribute to commercialisation of research at scientific and technology institutions.
- 120 Seconds for Innovative Companies. This is a special networking event that helps to stimulate new co-operations among innovative companies (the participation is free of charge).
- Patent and license fund- which is the first fund of its kind in the Czech Republic that provides money to inventors for the protection of industrial property. The clients may be granted a loan of up to CZK 400,000 for a period of five years (moreover the client has a consultant from JIC).
- Innovation Academy. These are interactive seminars for owners and managers dealing with innovation strategies of companies, creation of effective innovative processes in companies, new markets, products and improvements of corporate process efficiency.
- Brokerage. Under this project international meetings that encourage mutual cooperation between academia and industry in research are held in the areas of development, technology applications and production.
- INOVACE.CZ. The purpose of this website is to establish one centralised online platform for people who are interested in innovations.
- Microsoft Innovation Centre. The joint project of the South Moravian Innovation Centre and Microsoft aims to improve the knowledge of new Microsoft information technologies among professionals and to create environment enabling cooperation and growth of companies in the region.
- Brno Research Navigator. It provides a list of selected R&D institutions and teams in the region. R&D profiles are divided in following science areas: life sciences; chemistry and non-metal materials; IT; electronics and instrumentation; physics, metal materials and machinery.

### 3.5. Cluster strategy and policy

The government acknowledged the **National Cluster Strategy 2005-2008** under Government Resolution No. 883 of 13 July 2005. The Strategy had the following objectives:

- To use clusters to interconnect the resources of the Ministry of Industry and Trade, the Ministry of Regional Development, the Ministry of Labour and Social Affairs and the regions of the Czech Republic in a targeted and coordinated manner that maximizes the impact of aid granted from public resources.
- To improve the effectiveness of communications with regions, tertiary education institutions and the private sector (particularly with the industrial sector as a whole) with a view to developing shared priorities.
- To ensure the identification and support of sectors and branches with the necessary growth potential (particularly to include the SMEs into the innovation processes) and to increase their competitiveness through cooperation and innovation, especially in regions which adopt decisions to promote innovative clusters.
- To help SME groups related to cost-sharing and overcoming traditional growth barriers, e.g. access to finance and information technologies, the performance of research and development, and the marketing of new products.
- To create a framework for the analysis, monitoring and evaluation of the performance of cluster initiatives, and their impact on the regional and national economy (including international comparisons).
- To prepare a national cluster study in the Czech Republic, the result of which should have been the identification of sectors with export potential in the regions. Based on the outcome of regional surveys, to draw up a general study of the industrial structure in the Czech Republic, contributing to the planning of programmes within the scope of structural funds for the next programming period.

Looking at the objectives and also examining other parts of this strategy, its emphasis on regional development is evident. Moreover, taking into account, that not a single regional cluster strategy has been created (unlike the situation concerning innovation strategies) there is still some room to develop in this policy area in the Czech Republic. As far as realization of the strategy is concerned, CzechInvest, the agency of the Ministry of Industry and Trade, was responsible for cluster policy implementation. At the regional level, there



are regional development agencies that should coordinate regional development policy with clusters founding. Nevertheless, cluster issues are only of marginal importance for both regional development agencies and CzechInvest. In consequence relative to innovation policies cluster policies are somewhat less developed in the Czech Republic. Moreover, a new version of the national cluster strategy was not elaborated, which also suggests a lower priority for these policies.

The strategy picked up the threads on other regional, industrial and innovation strategies and policies. The support of clusters was in accord with the national SME support programmes and with the Innovation Strategy framework for industry and enterprises for the period 2005 – 2008. There were also close links to national and regional innovation strategies at the level of joint objectives and mutual cooperation. And last but not least, the EU structural funds had a crucial role concerning both projecting and funding within the realization of the strategy.

**Table 3.5: Realization of the National Cluster Strategy – projected funding 2005-2008**

	2005	2006	2007	2008	2005-2008
<b>Funds in total (mil. CZK)</b>	36	120	120	140	416
<b>SF EU funds (mil. CZK)</b>	27	90	90	105	312
<b>State budget funds (mil. CZK)</b>	9	30	30	35	104

Source: National Cluster Strategy 2005-2008.

Currently, the conceptual foundations in the area of clusters support are prepared at the EU level and a new national cluster strategy is not intended. It is expected that the Ministry of Industry and Trade will act in accord with the EU cluster policy, first of all, as far as the evaluation of clusters projects according to stated methodology is concerned. Until 2013, cluster support is included in the operational programme Enterprises and innovation for 2007-2013. Its programme cooperation encourages the development of clusters focusing on R&D and innovation.

The **National Cluster Association** (NCA) puts together organizations and individuals with the purpose to coordinate the sustainable development of cluster initiatives and to develop cluster policy in the Czech Republic on the basis of concentration of knowledge, experience and expertise to strengthen the competitiveness of the Czech Republic. The association tries to create an active interface for international cooperation as well. Nowadays, the Association has 20 members; four of them are from the South Moravian Region (CEITEC Cluster-bioinformatics, CREA Hydro&Energy, ENERGOKLASTR,

NetSecurity Cluster). According to the database of NCA (2011), there are in total 41 cluster organizations and 3 cluster initiatives in the Czech Republic.

In South Moravia the South Moravian Innovation Centre coordinates clustering initiatives in the region. Clusters are considered as important tools stimulating regional development in South Moravia. Nowadays, there are 7 clusters in the region, besides four above mentioned these are: Water Treatment Alliance, Czech Furniture Cluster, Innovation in transport. The Water Treatment Alliance (WTA) associates firms dealing with water supply systems and wastewater treatment. They make common efforts to penetrate international markets and foster exporting abilities. The Czech Furniture Cluster is the joint furniture producers' activity supported significantly by the South Moravian Innovation Centre, Czech Furniture Producer Association, Mendel University in Brno and other bodies. Similarly to the WTA, the Czech Furniture cluster aims at penetrating international markets make joint efforts in research and development activities, support technology transfers and generally improve the quality of services provided by the Czech Furniture firms. The CEITEC Bioinformatics cluster associates firms and R&D institutions focusing on bioinformatics and other branches with high innovation potential. Contrary to the two clusters mentioned previously, the CEITEC Bioinformatics cluster is primarily focused on support of R&D and innovation activities. Thus, many universities, research institutions and innovative firms have been members of this association since it's establishing in 2009.

### **3.6. Best practises in the South Moravian region**

#### **3.6.1. Main results of Regional Innovation Strategy 1 and 2**

With respect to number of concerned projects, in this part, we will focus on successful examples and results of the R&D and innovation and cluster policies exclusively in the South Moravian region.

With regard to the results of previous versions of the Regional Innovation Strategy (1 and 2), one of the most important results were the incubators: INTECH (former called also Technological Incubator II) and the Biotechnological Incubator INBIT, which together contributed to the birth and development of about 40 innovative companies. These created around 300 highly-skilled jobs. Investments into the projects conducted within first two versions of the strategy reached 500 million CZK. Until now, the South Moravian Innovation Centre has helped with the establishment of about more than fifty companies

(Y Soft, Westcom, Strokom, Enantis, BioPeta and so on), of which 26 successfully completed the incubation programme.

The incubators are good examples of the cooperation among various kinds of subjects dealing in the R&D and innovation area. The **INTECH** building was completed in January 2008, as a part of the premises of Brno University of Technology participating in the professional selection process of future occupants of the incubator. The investor of the building is the South Moravian Region and it is operated by the South Moravian Innovation Centre.

Similarly, the Innovation Park **INBIT** which was opened in October 2008 is located on the new campus of Masaryk University. Therefore companies are able to use synergies with the top laboratories in the complex and for example co-operate with the Faculty Hospital Brno. Also the professional selection of companies in the Innovation Park INBIT is guaranteed by Masaryk University. The owner of the building is the South Moravian region, the operation is provided by the South Moravian Innovation Centre.

Within the realization of Regional Innovation Strategy 3, the project **INMEC** which is also called **CEITEC Science Park** will be built by June 2014 (park, incubator and technology transfer centre). INMEC focuses on companies dealing with nanotechnologies and micro technologies that are relevant for the key project CEITEC.

### 3.6.2. South Moravian successes within the OP Research and Development for Innovation

Nowadays, five research projects funded by the OP Research and Development for Innovation are developed in South Moravia: CEITEC, ICRC, AdmmireVet, Cetocoen and Recamo. In particular CEITEC and ICRC are of great significance not only to South Moravia but also on a national scale.

**CEITEC, Central European Institute of Technology**, is probably the most important contemporary research project in South Moravia included in the third regional innovation strategy. It aims to set up a Central European centre of scientific excellence in Brno by cooperating with education and research institutions (Masaryk University; Brno University of Technology; Mendel University in Brno; University of Veterinary and Pharmaceutical Sciences Brno; Institute of Physics of Materials, Academy of Sciences of the Czech Republic; the Veterinary Research Institute). CEITEC aids basic and applied research

based in the South Moravia region in reaching excellence. Its purpose is not only to connect regional R&D activities with the European Research community, but also to improve the conditions necessary for cooperation with the private sector. The core of the project includes seven research programmes (Advanced Nanotechnology and Microtechnology, Advanced Materials, Structural Biology, Genomics and Proteomics of Plant Systems, Molecular Medicine, Neuroscience and Molecular Veterinary Medicine). The project was proposed within OP Research and Development for Innovation and approved by the European Commission in June 2011. The Central European Institute of Technology will be constructed in Brno during the next three years. Its unique equipment should be used by 600 researchers and almost 1,200 students.

**ICRC, International Clinical Research Centre**, is the joint project of St. Anne's University Hospital in Brno and the American Mayo Clinic. Future joint research will focus particularly on cardiovascular and neurological studies. In 2006, the Czech government placed the project among the priority projects contributing to the development of the knowledge economy in the Czech Republic and promised both financial and non-financial support. The total contribution from the state budget is planned to amount to almost 2 billion CZK (around € 83 million). In June 2011, the European Commission decided about the grant at the amount of nearly 2.4 billion CZK (around € 100 million). The construction of the infrastructure was started in June 2010 and its first stage should be completed during 2012.

**AdmireVet, Centre for Advanced Microbiology and Immunology in Veterinary Medicine**, is a project of the Veterinary Research Institute which was started already in December 2012. The whole budget of the project amounts to approximately 365 million CZK (€ 15.2 million); the EU contribution is 85%, the state budget contribution is 15%.

The core of the project **CETOCOEN** is building of the **Research Centre for Toxic Compounds in the Environment** (RECETOX) at the Faculty of Science, Masaryk University which was founded in March 2010. The total costs of the project should reach 685 million CZK (around € 28.5 million); the EU contribution is around 67%, the state budget contribution is nearly 12%.

**RECAMO, Regional Centre for Applied Molecular Oncology**, is proposed by the Masaryk Memorial Cancer Institute (MMCI), a long term full member of the Organization of European Cancer Institute (OEI). The purpose of RECAMO is to bring together research scientists and clinicians with a common aim - to translate the advances in our increasing

ability to study cancer into real advances in patient care. The project started in January 2011. The total budget is nearly 300 million CZK (€ 12.5 million); the EU contribution is 85%, the state budget contribution is 15%.

With regard to aspects of international cooperation within contemporary OP projects, the collaboration (which has had already seven years old tradition) is most obvious in the case of the ICRC-Mayo project. Moreover, this unique project is appreciated also in the U.S. because it is for the first time that a U.S. research institution has received a significant portion of a major EU medical research award. Besides the ICRC, a strong international aspect also arises in the RECAMO project. It will synergize European infrastructural entities with focused and targeted research activities concentrated under one roof of a European major cancer centre, MMCI, thus constituting a unique entity of coherent clinical and research activities. The idea of RECAMO is supported by top European institutions who expressed their wish to be actively engaged in the proposed infrastructure.

### 3.6.3. Cooperation within CENTROPE

Relative to these vast investments in R&D in Brno and South Moravia co-operation in CENTROPE is of a minor importance. Projects focusing on CENTROPE are mostly smaller R&D and innovation projects or cover parts within important OP projects. Two examples of such co-operations are:

- **CoReTech** (Cross-border Co-operation in Research and Technology Transfer Support Services) which falls under the program European Regional Cooperation Austria-Czech Republic supported by the European Fund for Regional Development was completed at the end of May 2010. The Technology Transfer Office of MU and the Research Support Office of the BOKU (Universität für Bodenkultur) in Vienna were the project partners. During the realization of the project, many seminars, workshops and strategic cross-border meetings were organized. The main outcome was a survey about tech transfer awareness of Mendel University staff and students and a SWOT analysis of the services of technology transfer, support of European projects at both partner universities, Brno University of Technology and South Moravian Innovation Centre. Total project costs were at the amount of € 364,897.
- **MonAirNet** aims to create a pilot monitoring network in the Austrian-Czech border region to assess the current POP-pollution (persistent organic pollutants). It is funded by means of the European Regional Development Fund (ERDF). It is a beneficiary of

the operational Programme Austria-Czech Republic 2007-2013 within the European Territorial Co-Operation. The project partners: are the Masaryk University of Brno and Umweltbundesamt.

Moreover the establishment of the CENTROPE region itself is a strong incentive to intensifying cooperation among others in the area of R&D and innovation because “Knowledge region” is one of four defined cooperation areas within CENTROPE. In particular centropet (former CENTRIS) is an international experts community for technology transfer and innovation support acting in the region aiming to stimulate cross-border technology transfer between enterprises and universities, which inter alia include the establishment of a voucher system for financing cross-border applied research as well as providing information for institutes, companies and intermediaries about the funding system for R&D collaborations.

Finally, the SMART FRAME is a R&D project geographically reaches beyond the CENTROPE-region's borders, however, it includes partners from three CENTROPE countries – Austria, Czech Republic and Hungary – plus Germany and Poland. The SMART FRAME focuses on SMEs operating in the high technology areas: materials, surfaces, sensors/actors and processes. The result of the project should be a long-term transnational network stimulating R&D projects as well as new jobs in high technology areas.

#### 3.6.4. Other selected examples of best practises

In addition also a number of more small scale initiatives are being developed in South Moravia. For instance in 2010, the report **Field research of public R&D teams in the South Moravian Region** was elaborated by the Berman Group (also a part of 'centropet'). The South Moravian Innovation Centre prepared the **List of the R&D organizations in the region**. The **SoMoPro** is a regional grant programme which aims to attract foreign researchers to work and undertake research training in research institutions in the South Moravian region for the period of 1 to 3 years. The **University Campus Brno-Bohunice** at Masaryk University of Brno is an important R&D area surpassing regional context. The Campus was built in the period 2006-2010 and total costs were more than 5 billion CZK (around € 208 million).

Finally the Kuřim Competence Centre which started to be realized in small town Kuřim is a good example of topical activity outside Brno. The centre will create a base for applied research in the area of engineering. The SynBIOsis (SynBIOsis – Maximizing Synergies

for Central European Biotech Infrastructure) project, by contrast, is a good example of international cooperation between the South Moravian Region and the Italian region Friuli Venezia Giulia. The main aim of this project is to put together two research-driven clusters in the area covering the intersection of biotechnology/life science and ICT (in particularly bioinformatics, nano bioscience, computational biology and biomedicine). The 3-year-project started in September 2009, earned a grant of 1 million EUR from the FP7-Regions of Knowledge priority project and involves in total seven partners in both countries. South Moravian partners are the Masaryk University, the association of companies CEITEC Cluster - bioinformatics, and the coordinator is the South Moravian Innovation Centre.

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## 4. Technology, Research, Development and Innovation in Slovak CENTROPE

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### 4.1. Introduction

The first efforts to establish a modern national innovation support in Slovakia have been launched rather late compared to other EU countries. The main motivation for drafting strategic documents focusing on R&D and innovation support was the accession process of Slovakia to the European Union and the obligation to implement the *acquis communautaire* as well as the cohesion policy regulations into national legislation. Moreover, the responsibilities for R&D and innovation support are divided among several government institutions and are subject of constant institutional changes. These in turn are highly correlated with domestic political cycles. Especially the various institutional forms (e.g. the council for knowledge-based society, the plenipotentiary for knowledge-based society) affiliated to the government office of Slovakia have been subject to repeated changes basically after each parliamentary election. Also the existing national and regional strategic documents are implemented only very slowly.

According to the Minerva 2.0 document, elaborated by the plenipotentiary for the knowledge-based society, the state of the knowledge economy in Slovakia remains rather miserable. Slovakia lags behind not only the most advanced OECD countries, but also behind Poland, Hungary and the Czech Republic in a number of areas of critical importance:

- Slovakia is the only Visegrad Four (V4) member with not a single university in any of the leading world university rankings.
- Slovakia has the lowest share of innovative firms in the economy of all V4 countries.
- In the ranking of top cited scientific articles Slovakia lags not only behind the V4, but also behind countries such as Brazil, Turkey or Mexico.
- Slovakia is far behind the leading performers in Europe and its long-term position is deteriorating despite the fact that Slovakia belongs to the group of five EU economies with the fastest growth.



Nevertheless, the implementation of Cohesion policy support in the present programming period is providing significant amount of financial sources for innovation activities and accelerating the process of national innovation system (NIS) development in Slovakia.

**Table 4.1: Selected Indicators of Research and Development, 2004-2009**

	2004	2005	2006	2007	2008	2009
<b>R&amp;D expenditure (% GDP)</b>	0.51	0.51	0.49	0.46	0.47	0.48
<b>of which (% GDP):</b>						
<b>Government sector</b>	0.16	0.15	0.16	0.16	0.15	0.16
<b>Business sector</b>	0.25	0.25	0.21	0.18	0.20	0.20
<b>Higher Education sector</b>	0.10	0.10	0.12	0.11	0.11	0.12
<b>R&amp;D expenditure resources (%)</b>						
<b>State and public resources</b>	0.571	0.570	0.556	0.539	0.523	0.506
<b>University resources</b>	0.003	0.003	0.003	0.002	0.003	0.006
<b>Business resources</b>	0.383	0.336	0.350	0.356	0.347	0.351
<b>Foreign resources</b>	0.043	0.06	0.091	0.102	0.123	0.128
<b>R&amp;D employees<sup>1</sup></b>	22,217	22,294	23,120	23,437	23,641	25,388
<b>annual change (%)</b>	6.2	0.3	3.7	1.4	0.9	7.4
<b>Patent applications<sup>2</sup></b>	215	155	193	240	167	176
<b>Number of patent applications<sup>2</sup> per 1000 of R&amp;D employees</b>	9.7	7.0	8.3	10.2	7.1	6.9
<b>Academic papers<sup>3</sup></b>	2,160	2,010	2,238	2,274	2,392	2,390
<b>Number of academic papers per 1000 R&amp;D employees</b>	97.22	90.16	96.80	97.03	101.18	94.14

Source: Slovstat (2011); IPO SR (2011); ISI Web of Knowledge<sup>SM</sup> (2011). <sup>1</sup> By 31. 12. <sup>2</sup> Domestic patent applications filed at the Industrial Property Office of the Slovak Republic. <sup>3</sup> Academic articles listed in Current Content Connect® (by 31. 03. 2011).

## 4.2. General information on national and regional innovation system

The still low level of innovation outputs in Slovakia is caused by:

- A low level of innovation inputs (finance, quality of human capital).
- A weak demand of the business sector due to the low-cost character of the economy and low wages which do not create a favourable environment for innovation.
- A weak performance of R&D organizations.

- A lack of political coordination as well as administrative burdens and administrative barriers.
- A low participation in international R&D networks.

The development of selected input (R&D expenditure and employees in R&D) and output (patents and academic papers) indicators of the innovation system in 2004-2009 is shown in table 4.1. The potential of innovation development is also weakened by a declining share of applied research and development since the start of the transition period. This trend was most pronounced outside the Bratislava region where basic research generated some 42.9% of total GERD in 1996, but 62.0% in 2008. This sharp decline of applied research and development in regions outside Bratislava was linked to:

- An overall decrease of share of GERD on GDP.
- Slovak research institutes focused on applied research facing strong competition from technology transfers from abroad (as a result of FDI inflows) and having difficulties to find customers for their products.
- Privatization of large Slovak enterprises by foreign investors since only few foreign investors decided to maintain research units in Slovak regions.

#### 4.2.1. Laws and regulations

The legal framework for R&D and innovation support is based on the following legal acts:

- *Act No 185/2009 on Incentives for Research and Development* – This offers incentives to entrepreneurs for research and development (which consists of providing subsidies from the state budget and income tax benefit), without prior invitation to tender as well as to increase staff capacity in research and development and increase the investments of the business sector into research and development. This support is focused on grants from the national budget supporting basic and applied research, experimental development, protection of industrial property and others
- *Act No 172/2005 on the Organisation of State Research and Development Support* – This regulates the terms for state support to research and development and the position and tasks of bodies with competence in the field of science and technology including the Slovak Research and Development Agency. It also develops a long-term plan of state science and technology policy and defines the national program for development of science and technology and information infrastructure for research and development.

- *Act No.133/2002 on the Slovak Academy of Sciences* – which provides the basic legal framework regulating the largest Slovak Scientific Network of Institutes.
- *Act No. 131/2002 on Higher Education* – stating the basic legal framework for Slovak higher education system.

#### **4.2.2. Institutional background – Main institutions (actors) of Slovak national innovation system**

##### ***Innovation policy making (Governmental level)***

*The Ministry of Education, Science, Research and Sports (MESRS)* is responsible for policy-making in the area of science and technology policies. The Ministry in collaboration with other relevant stakeholders of the innovation system (Ministry of Finance, Ministry of Economy and Construction, universities and Slovak Academy of Science, various associations) coordinates and prepares national science and technology policy.

The MESRS administrates the *Slovak Republic Government Board for Science and Technology* (a permanent advisory body of the Slovak government in the field of state science and technology policies). The *Agency of the MESRS for the Structural Funds of the European Union* was founded in 2007 as the managing authority for the Operational Programme Education and Operational Programme Research and Development.

*The Ministry of Economy and Construction* is responsible for innovation policy. In 2007, the Ministry elaborated the Innovation Strategy and other relevant innovation policy documents. In the same year, the Ministry established the Slovak Innovation and Energy Agency (SIEA). One of its tasks is preparation and coordination of innovation development and support in Slovakia. It administers selected innovation measures in the Operational Programme Competitiveness and Economic Growth.

The *Innovation Fund* is a body of the Ministry of the Economy and Construction. It is a non-investment fund supporting mainly industrial innovations.

The Plenipotentiary for Knowledge Economy at the Government of the Slovak Republic is responsible for the elaboration of new strategic documents such as MINERVA 2.0. The office of the Plenipotentiary replaced The Commission for the Knowledge-based Society (established in December 2006 in 2011).

### 4.2.3. Public sector actors

The MESRS supports research via state budget allocations and grants to a network of organisations and agencies important for development of science & technology (S&T) and higher education (The Slovak Academy of Sciences and higher education facilities). At the end of 2010, there have been 23 public and 10 private higher education institutions in Slovakia. The share of public expenditure on higher education reached 0.79% of GDP in 2009. In the academic year 2010/2011 a total of 103,000 students have been studying at 14 higher education facilities in the Slovak CENTROPE. A more detailed structure is shown in the table 4.2.

Two national funding agencies are operating in the area of science, R&D and innovation support:

- *The VEGA grant agency* is a funding and advisory body for the MERSS and the Slovak Academy of Sciences.
- *The Slovak Research and Development Agency (SRDA)* provides public and private research bodies with tendering and funding grants. The Agency has been established as a state non-profit organization with objective to financially support science, research and development (objectives: support basic research of superior quality; provide development and implementation of new forms of research support; support research and development from corresponding funds of the European Union; provide propagation of research and development results within the Slovak Republic; cooperate with the Ministry of Education of the Slovak Republic regarding preparation and implementation of state scientific, research and development policy).

The *Slovak Academy of Sciences* is the self-governing scientific institution of the Slovak Republic. The SAS successfully presents itself nationally and worldwide through the results in basic and applied research. It is represented by 69 institutes, of which 48 are budgetary and 21 are subsidised.

The *National Agency for Development of Small and Medium Enterprises* is a semi-public organization focused on development of SMEs. The founding members are representatives of the public and private sector. Its activities focus on management of venture capital support and the creation of incubators. Unfortunately, activities of this institution have had very little impact on innovation development. Due to its non-transparent managing of financial sources, the incumbent government has decided to cease its operation.

Table 4.1: Universities and students in the Slovak CENTROPE (academic year 2010/2011)

University	Number of students		Location	Subject
	Slovak	Foreigners		
<b>Comenius University in Bratislava</b>	24,292	1,684	Bratislava	science; social sciences; humanities
<b>University of Cyril and Method in Trnava</b>	5,910	40	Trnava	particularly social sciences and humanities
<b>Bratislava International School of Liberal Arts</b>	57	1	Bratislava	social sciences, humanities
<b>Pan-European University</b>	4,214	604	Bratislava	social sciences, humanities
<b>Slovak Medical University in Bratislava</b>	2,653	224	Bratislava	medicine; nursing
<b>St. Elizabeth University of Health &amp; Social Sciences</b>	11,745	2,007	Bratislava	medicine; nursing, social work
<b>Trnava University in Trnava</b>	7,414	75	Trnava	social sciences, humanities
<b>Slovak University of Technology in Bratislava</b>	17,697	445	Bratislava and Trnava	technology
<b>University in Sládkovičovo</b>	3,014	248	Sládkovičovo	economics and management; law
<b>University of Economics</b>	12,697	132	Bratislava	economics and management
<b>School of Economics and Management in Public Administration in Bratislava</b>	4,287	43	Bratislava	economics and management; law
<b>Police Academy in Bratislava</b>	1,478	20	Bratislava	
<b>Central European University in Skalica</b>	1,109	18	Skalica	economics and management; law
<b>Academy of Performing Arts</b>	977	105	Bratislava	arts
<b>Academy of Fine Arts and Design</b>	616	81	Bratislava	arts

Source: Ústav informácií a prognóz školstva (2011).

### *Regional and local actors in Slovak CENTROPE*

*The Business and Innovation Centre* – BIC Bratislava Ltd. was established in 1991. Its mission is business and innovation consulting, transnational technology transfer, financial consulting, regional development, support in the EU Framework Programmes for research, technology development and innovation (FP7 & CIP), project management and investment consulting.

*Network of Regional Development Agencies* located in Skalica, Galanta, Senica, Záhorie, Bratislava, Pezinok and Senec.

Some universities and the SAS have launched activities focused on transfer of scientific knowledge to the business sector. For example the SAS has established the Technological Institute of SAS, which is primarily focused on transfer of knowledge and cooperation between academia and the enterprise sector. The Slovak University of Technology has established the STU Scientific Ltd. (company for commercialisation of university research), University Know-how Centre and The University Incubator.

### *Financial background*

The financial support to the Slovak research and innovation system by public and business sectors decreased in the period 1989-2010. The major long-term trends in research funding in Slovakia are following:

- Low R&D spending.
- Unfavourable structure of R&D expenditure (2/3 government and 1/3 business).
- Increasing shares of basic research while thematic research lacks a strong focus and research themes are often too broadly formulated.
- The research system increasingly relies on European financial resources.
- Slovak research funding relies almost exclusively on grants. In 2009 tax stimuli were used for the first time although to a limited extent, only.
- Very low involvement of venture capital in innovation financing due to:
- Under-developed national capital market.
- Low awareness and demand for venture capital financing from the enterprise sector.

### **4.3. Innovation Strategies**

Although, the development of the National Innovation System (NIS) is seen as a major precondition for building a knowledge based economy, there is not a coherent NIS in Slovakia. Being aware of this negative development, the government elaborated a series of strategic documents in order to improve the innovation output of Slovak economy. These documents establish the framework for R&D and innovation support and outline the basic objectives, priorities, measures and tasks planned or being undertaken to overcome the above mentioned deficiencies.

Selected relevant strategic documents are:

- The Innovation Strategy for the Slovak Republic for years 2007-2013

- The National Reform Programme of the Slovak Republic for years 2008-2010
- The Innovation Policy of the Slovak Republic for 2008-2010
- The Innovation Policy of the Slovak Republic for 2011-2013
- The Long-term Objective of the State Science and Technology Policy up to 2015
- The 2008 Strategy implementing the 'Long-term Objective of the State S&T Policy up to 2015' in period 2008-2010
- Operational programme (OP) Competitiveness and Economic Growth, OP Research and Development, OP Bratislava region and OP Education
- Minerva 2.0 and the FENIX Strategy (most recent documents adopted by the government)

In general all these documents outline the objectives of the respective policies are complementary as well as linked to the objectives of the National Strategic Framework for 2007 – 2013. The Minerva 2.0 and FENIX Strategy are the most recent documents focused on specific aspects of knowledge based activities in the Slovak economy. However, due to the early parliamentary elections, the implementation of these strategies will depend on the continuity of the policy after the formation of new government in 2012. The experience from the past shows that strategies are changed or revised after the change of the government.

The Ministry of Economy and Construction has elaborated the Innovation Strategy for the Slovak Republic for years 2007-2013. The strategic objective of this strategy is defined as follows *“Innovation will become one of the main instrument for the development of knowledge based economy and provide high economic growth in Slovakia which will allow achieving economic level of the most developed economies of the EU.”*

The strategy formulates several priorities and subsequent measures that need to be implemented in order to overcome the unfavourable situation and negative development in the innovation environment in Slovakia. Some of the priorities and measures are interconnected with the National Strategic Reference Framework priorities and measures in the respective operational programmes.

The bulk of resources devoted to R&D and innovation support in Slovakia, however, relies on European Structural Funds. The Slovak CENTROPE-regions Bratislava region and Trnava region have different positions regarding the implementation of Cohesion policy support due to their economic performance.

#### 4.3.1. Regional dimension of Innovation Strategies

The regional and innovation development of the Bratislava region is focused on:

- Innovation development and competitiveness of the region.
- Knowledge-based economy and improvement of human capital.
- Building of institutional tools for innovation support.

The legal framework for RTDI activities in Bratislava region is based on following programming documents:

- Regional Innovation Strategy elaborated in 2004.
- Development Strategy of the Bratislava Region up to 2013.
- Programme of Economic and Social Development of Bratislava regions for 2007-2013.
- Single Programming Document NUTS II Bratislava, Objective 2 and Objective 3 for 2004-2006.
- Relevant operational programmes.
- Strategic and conceptual documents in the area of transport, education, culture and social services.

There are also strategies complementary and linked to the priorities outlined in the National Strategic Reference Framework as well as Programme of Economic and Social Development of the Bratislava region. However, the documents, especially the Regional Innovation Strategy, are outdated and need to be updated to reflect the recent changes in the economic development (the preparation of new Programme of Economic and Social Development are already in progress).

Activities supporting innovation in the Bratislava (and Trnava) region:

- Memorandum on Strategic Platform for Development of Innovative Region Build on Knowledge. The memorandum was signed by Bratislava and Trnava region, with the objective to improve the cooperation and set up priorities in areas related to innovation.
- CENTROPE –platform for coordination, integration and implementation of cross-border activities focused on economy, employment, innovation, R&D, infrastructure, transport, environment, culture, leisure time, sports and tourism.
- Building of Regional Innovation Centre up to 2015– in the form of voluntary groups of legal persons (enterprises) and projects financed by the ERDF and ESF.



The Bratislava region ranks among the fifteen most developed regions in the EU in terms of GDP per capita in PPS and therefore is eligible to receive support only under the Regional Competitiveness and Employment objective. However, the Bratislava region has negotiated an exemption from this rule in the area of Research, Technological Development and Innovation (RTDI) support. The support from Structural Funds in this area is limited to three of the eleven operational programmes in the present programming period.

The measures and activities supporting RTDI activities in the respective operational programmes are following:

The OP Bratislava region:

- Innovation and Technological Transfers.

Under this heading the OP foresees measures to: support the creation and implementation of innovation and technological transfer in SMEs, support the implementation of progressive technologies in SMEs, support projects focused on the implementation of innovative technologies in SMEs and to implement quality control systems and activities related to intellectual property rights.

- Informatisation of Society.

Here the electronisation of municipalities and development electronic services on local and regional level, the support for broadband infrastructure and the introduction and implementation of effective access and utilisation of ICT in SMEs are foreseen measures.

The OP Research and Development:

- Research Infrastructure in Bratislava region.

Which includes the building and modernisation of technical infrastructure for research and development in Bratislava region.

- Research and Development Support in Bratislava region.

Which encompasses the support of networks of excellence in research and development as the pillars of regional development and support to international cooperation in the Bratislava region and the transfer of knowledge and technology from research and development into practice in the Bratislava region.

#### OP Education:

- Transformation of traditional schools into more modern ones.  
Which foresees support for the reform and development of general and vocational education in primary and secondary schools, support for teacher training and continuing education of pedagogical staff as well as support and development of tools for the evaluation of upbringing & educational activities of schools and school facilities.

The regional and innovation development of the Trnava region is based on the Regional Innovation Strategy adopted in 2008 and Programme of Economic and Social Development of the Trnava region for 2009-2015 adopted in 2010. The regional innovation strategy analyses the innovation potential of the region, outlines following visions and priorities and concrete measures (see also table 4.3). The priorities here are:

- Priority 1: Knowledge-based economy development – includes the support of R&D in the region, support of R&D sector co-operation with industry/entrepreneurs, innovation infrastructure development, information society development support .
- Priority 2: Human resources development, development of educational processes at basic and grammar schools and at universities,- This aims at increasing the qualification, skills, expertise and mobility of the working force, develop life-long and e-learning as well as creativity and supporting and developing the technical infrastructure of educational institutions .
- Priority 3: Qualified jobs' creation - This is directed to the attraction of FDI with a higher added value together with also fostering domestic investments and aims at allocating financial sources for qualified jobs creation support in the process of new companies' establishment.

Due to its economic performance, which is below the 75 % of the EU 27 average, the Trnava region is eligible for Cohesion policy support under the Convergence objective. This provides the stakeholders in the region with full scale of existing operational programmes focused on R&D and innovation support (OP Competitiveness and Economic Growth, OP R&D, OP Education).

Besides operational programmes, the main instrument for inter-regional cooperation is the INTERREG IVC (Priority 1 – Innovation and Knowledge–Based Economy). The successful

implementation of this programme could improve the regional innovation capacity and inter-regional cooperation. It addresses the most pressing problems in the regions in the field of human resources, provides exchange of experience, examples of good practice and success-stories among relevant stakeholders, cooperation between R&D and business sector etc. In addition, the INTERACT II programme provides the necessary institutional background.

**Table 4.3: Measures and activities of the Trnava regional Innovation Strategy**

Measure	Sub Measure	Activity
<b>Innovation infrastructure development</b>	Non-material innovation infrastructure development	Regional innovation centre establishment and operation
		Consulting services in the area of innovation
		Establishment and development of technology centres
	Material innovation infrastructure development	Regional R&D centre
		Establishment and development of technology centres
		Regional R&D centre
<b>Establishment and development of automotive cluster and support of new clusters' creation in relevant technological areas in the TTSGR</b>		Preparation and cluster establishment (fulfilled)
		Operation and development of cluster
		Assurance of cluster sustainability
		Support of clusters' emergence in other relevant fields
<b>Support and creation of suitable conditions for R&amp;D activities initiation in the region</b>		Services for support of R&D activities in multinationals located in the region
		Participation in EU financed supporting projects and co-operation with existing and new initiatives in the region
<b>Development of human resources and innovation culture in the region</b>		Human resources development
		Innovation-related awareness raising activities in the region
		Follow-up and evaluation of the region's innovation performance

Source: Own Research.

#### 4.3.2. Correlation between regional and national innovation strategy

The link between national and regional policies is rather weak. The regional innovation strategies were elaborated before the present 2007-2013 programming period. The pro-

gress in implementation of regional strategies in the respective regions is rather low. Taking into account the priorities, measures and tasks included in the strategic documents, the contribution of the Cohesion Policy provides besides national resources the most significant share of funding for R&D and innovation activities in both CENTROPE-regions. The regional innovation strategies are out-dated and should be updated with respect to present programming period objectives and measures.

#### **4.4. Innovation policy and decision-making processes on the regional level**

##### **4.4.1. Innovation system in the Slovak CENTROPE**

The Bratislava Region traditionally has played a central role in the Slovak R&D and innovation systems. Basic research has gained on relative importance. Since 2000 the public sector became major provider of funding for research sector. This trend was most significant for the Bratislava city, where most higher education institutions (HEIs) and public research organizations are concentrated (Institutes of Slovak Academy of Sciences).

Bratislava city hosts the bulk of Slovak public research and development capacities. A total of eleven universities have seats in Bratislava region and one in Trnava Region (the best<sup>23</sup> Slovak universities – The Comenius University and the Slovak University of Technology are located in Bratislava). Similarly, most of the Institutes of the Slovak Academy of Sciences are located in the city of Bratislava.

The R&D capacities of the enterprise sector are highly concentrated in the Slovak CENTROPE-regions (42 percentage share of Slovak capacities). Therefore, the Slovak CENTROPE region may benefit from relatively high stock of human capital and rather developed innovation infrastructure (represented by public-funded institutions and business R&D organizations).

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<sup>23</sup> The Comenius University and the Slovak University of Technology scored 496<sup>th</sup> and 787<sup>th</sup> respectively out of 12000 World Universities in the Webometrics 2011 ranking.

[http://www.webometrics.info/rank\\_by\\_country.asp?country=sk](http://www.webometrics.info/rank_by_country.asp?country=sk)

The most important private R&D actors in the region are the following:

- Nuclear Power Plant Research Institute in Trnava.
- Welding Research Institute – Industrial Institute of the Slovak republic.
- Slovnaft VÚRUP, a. s., Bratislava (crude oil and hydrocarbon gases research).

**Table 4.4: R&D organizations in business sector in 2011**

	Number of organizations	Share on total in %
Bratislava	76	33
Trnava	21	9
Trenčín	32	14
Nitra	17	7
Žilina	28	12
Banská Bystrica	18	8
Prešov	19	8
Košický	21	9
Slovakia	232	100

Source: online database of R&D organizations ([www.vedatechnika.sk](http://www.vedatechnika.sk)).

#### 4.5. Cluster strategy

At present, there is no national cluster strategy in Slovakia. Nevertheless, several clusters have been established in the Slovak CENTROPE. The development of clusters in automotive and electronics industries has been the most important result of cooperation by public, non-governmental and private sectors on the regional level.

*The Autocluster – West Slovakia (AKS)* was founded by the city of Trnava and the Trnava Region. It currently associates 46 members (universities and research institutes, secondary educational institutions and manufacturers). It establishes basis for cooperation by supplier chains in automobile industry in Western Slovakia. The cluster supports the development of human resources, technology transfers and innovation processes. It cooperates with the Slovak Investment and Trade Development Agency, NADSME, Ministries of Economy and Education and the Association of the Automobile Industry of the Slovak Republic.

*The Electronics Cluster West Slovakia (EKS)* was founded by the cities of Trnava and Galanta and the Samsung Slovakia in 2008. The cluster promotes the development of the electronics industry in Western Slovakia. It is involved in a joint cross-border project with the region of Lower Austria – DUO\*\*STARS focusing on innovation, enterprise environment, education and electronic platforms for procurement of enterprise orders.

*The Energy Cluster CENTROPE* – is a voluntary organization of legal persons established in Trnava. It has been established at the end of 2010, as one of the outputs of the project The Intelligent Energy. The projects have been implemented in the framework of the Operational Cross-Border Cooperation Programme Slovakia – Austria 2007-2013 (financed in 85% from The European Regional Development Fund, 10% from national sources and 5% from own sources). The aim is to create concentrated cluster of independent, regionally interconnected companies and associated institutions with the potential to increase their competitiveness. It is participating in the CENTROPE Capacity – Intelligent Energy project.

*The Energy Cluster West Slovakia* provides consultancy services for the members of the cluster and the general public. It actively participates in preparation, realisation and implementation of the following projects between Trnava region and foreign partners:

- CE-C4: „Introduction of Regional Energy Concepts
- CE-C5: „Demonstration of Energy Efficiency and Utilization of Renewable Energy Sources through Public Buildings“
- NEMO: „New Efficient Mobility Opportunities“

*Tourism Cluster – West Slovakia* – founded in 2008 by five municipalities focused on the propagation of tourism in the Trnava region by participating in domestic and foreign exhibitions.

*Regional Innovation Centre Trnava* is being created with the support of OP Employment and Social Inclusion. The main activities of the project are following:

- Activities focused on education
- Activities of strategic nature
- Activities focused on human resources
- Supporting activities

The centre will be supporting small and medium enterprises from Slovakia by providing different types of high-quality services under favourable conditions.

#### 4.6. Best practices

*BioScience Slovakia* is an academic spin-off founded in 2004 with the aim to provide professional consultancy on commercialization of biotechnology research and innovation in Slovakia. Its main objective is the transfer of knowledge and technology in direct cooperation with academia. It is conducting biotechnological research and development in the field of diagnostics of infectious diseases targeting immunocompromised patients, including organ transplant recipients and patients on dialysis. In May 2011, the BioScience Slovakia started cooperation with the Institute of Virology of the Slovak Academy of Sciences (SAS) on the research project: “*The centre for innovative research of anticancer and antiviral strategies*”. The project is funded from the OP Research and Development. Since 2010, another project is currently carried out by these two institutes. In June 2010 in cooperation with the Institute of Virology of the Slovak Academy of Sciences (SAS) BioScience Slovakia initiated a research project “Industrial research in the clinical diagnosis of infectious pathogens” funded by EU structural funds.

*The Institute of Materials & Machine Mechanics of the SAS* is a research institution focused on the development of advanced nonferrous materials, technologies of their preparation and research in applied mechanics. Its unique contribution to innovation is research and development of aluminium foam. The institute has strong links to the business sector in the form of research, contractual research, spin-offs, sales of products, educations and joint patenting.

#### 4.7. Conclusions

During the last decades innovation policy has not been a central strategic priority of any government in Slovakia. This resulted in the delays in the creation of a coherent and functional innovation system on national and regional level. The Slovak national innovation system is weak, underdeveloped, underfinanced and little progress was made during the last two decades. The gradual process of NIS building has started only in the last eight years and is linked to the previous (2004-2006) and present 2007-2013 programming period.

The responsibilities for innovation policy are divided between several public sector institutions. The Ministry of Education, Science, Research and Sports, Ministry of Finance and Ministry of Economy and Construction are key stakeholders with budgetary and legislative powers. On a regional level the self-governing regions are responsible for the implementation of innovation policy.

With regard to the fact that domestic businesses do not have enough innovation potential, Slovakia is highly dependent on foreign investment. FDI's have been and will remain the main factor behind economic growth. The multinational enterprises in the manufacturing sector are still showing little interest to establish research centres in Slovakia or to re-allocate part of their own R&D capacity from abroad to Slovakia.

The regional innovation policy is based on outdated regional innovation strategies. Moreover, the strategies are not subject to any impact evaluation. Taking into account the priorities, measures and tasks included in the strategic documents, the contribution of the Cohesion Policy provides the most significant share of funding for R&D and innovation activities in both CENTROPE-regions.

The R&D capacities of the enterprise sector are highly concentrated in the Slovak CENTROPE-regions (42 percent of the Slovak capacities in this field are located in the Slovak CENTROPE). Therefore, the Slovak CENTROPE-region may benefit from a relatively high stock of human capital and rather developed innovation infrastructure (represented by public institutions and business R&D organizations).

The cluster strategy on a national level has not been elaborated, and cluster activities are carried out by relevant stakeholders mainly on the regional level (e.g. automotive cluster, energy cluster CENTROPE, electronics cluster).



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## 5. National and Regional Innovation System in the Hungarian CENTROPE

*Authors: Gabriella Baráth, Nóra Baranyai*

### 5.1. Laws and Regulations

The legislative background of the innovation system in Hungary is based on the acts created after the transition according to the requirements of the market economy and the European Union. The *Act CXXXIV/2004. on Research and Development and Technological Innovation* is a legal framework regulating the innovation system as a whole. The main objective of the act is to improve economic competitiveness and to contribute to sustainable development. The act comprehensively regulates the innovation activities, the institutional and financial background of the whole system as well as issues of intellectual property and spin-offs. The main goal of the *Act XC/2003. on Research and Technological Innovation Fund* is to ensure stable and calculable financial resources for the innovation system. The detached fund contains the so-called innovation affix – paid by medium and large enterprises – and state contributions. The amount of the state's budget is always equal to the sum of the innovation affix. The enterprises can reduce their debt obligations with their R&D costs. The innovation fund on the one hand encourages R&D and innovation activities of the enterprises, on the other hand it constitutes a stable and (partly) independent source for supporting innovation.

### 5.2. Institutional background

#### 5.2.1. Institutional background on the national level

The institutional background of the innovation system is characterized by constant reorganizations in Hungary. The last significant changes took place after the elections in 2010. In the former structure the national institutional system was headed by the government, which was responsible for establishing the innovation policy strategy, directing and coordinating the activities of the subordinate institutions (ministries as well as the directly subordinated bodies). In 2003 a supreme consultative body (Science and

Technology Policy Council<sup>24</sup>) and the decision-preparing and advisory board (Science and Technology Policy and Competitiveness Advisory Board) were established to help the government's work.

The ministries were also part of the innovation system, especially the Ministry of Education and Culture, the Ministry of Economy and Transport and the Prime Minister's Office, which had a significant role in supervising and governing certain areas of innovation policy. The tasks of the ministries were to direct the activities of the institutions under their control and to create, implement and monitor the innovation strategy in their respective policy field. The National Office for Research and Technology – NKTH, the Ministry of Economy and Transport had control over this institution – played an important role in innovation policy, because its president had command over the Innovation Fund as a transferred power and right of the Minister of Education. The Office is responsible for the implementation of the government's technology- and innovation policy, principally for financing different programmes. The merits of the implementation of the financial programmes were fulfilled by the KPI (Agency for Research Fund Management and Research Exploitation) between 2003 and 2008, then from January 2008 by the NKTH and the Hungarian Economic Development Centre (MAG Zrt.). Next to the NKTH a fifteen-member<sup>25</sup> Research and Technology Innovation Council was established dealing with strategic issues.

For the sake of regional innovation governance, regional innovation agencies were created by the NKTH. The agencies financed by the Office over three years are responsible for informing the enterprises, preparing them for innovation, creating a strategy for regional development and supplying the activities related to the part of the Innovation Fund allocated to the regions.

The Ministry of Economy and Transport also controlled the Hungarian Patent Office. This office's main task was to protect intellectual property rights, but since 2006 it – next to the authority – also has acquired duties connected directly to the innovation. The ITDH

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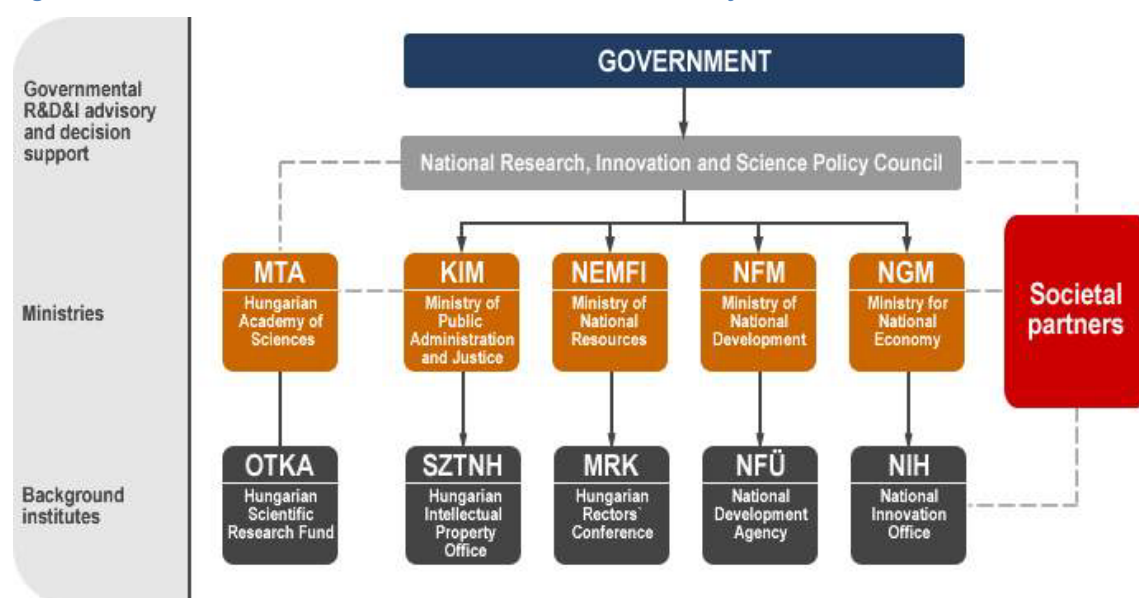
<sup>24</sup>These were headed by the Prime Minister. Vice-presidents were the Minister of Education, the Minister of Economy and the President of the HAS. The members of the Council were the ministers and the presidents of the governmental advisory boards.

<sup>25</sup> Seven members represented the government, while the other eight the economic and scientific sphere.

Hungarian Investment and Trade Development Agency was established in 1993 with the main task of building connections between Hungarian and foreign enterprises.

The last national institution is the Hungarian Development Agency directed by the head of the Prime Minister's Office, which was established in 2006 to complete the tasks arising from EU membership and source-allocation: planning, program development, call for proposals etc..

Figure 5.1: Government institutions of the R&D and Innovation system after 2010



Source: National Innovation Office, <http://www.nih.gov.hu/english/activity/national-innovation>

After the parliamentary elections in 2010 also structural and functional reforms in the institutional system of the innovation policy were implemented. According to the government's decision instead of the Science and Technology Policy Council and the Science and Technology Policy and Competitiveness Advisory Board a new council was established. The National Research, Innovation and Science Policy Council (15 members) has to comment on strategic issues relating to scientific research, R&D and innovation, the volume and the structure of finance. Besides the names of the certain governmental institutions (ministries, agencies) also their tasks have changed. The National Office for Research and Technology was renamed to National Innovation Office under the supervision of the Ministry for National Economy. The management of the Innovation Fund moved from the Office to the National Development Agency controlled by the Ministry of

National Development. The name of the Hungarian Patent Office changed into Hungarian Intellectual Property Office and it was subordinated to the Ministry of Public Administration and Justice. The Hungarian Rector's Conference now also plays a more important role in the innovation system than previously. The body's tasks are to reflect the ideas on education policy of the Ministry of National Resources in order to represent and protect the interests of universities and colleges. The president of the Hungarian Academy of Sciences has control over the financial resources provided for supporting scientific researches within the framework of Hungarian Scientific Research Fund (OTKA).

### **5.2.2. Institutional background on the regional level: the innovation system in West-Transdanubia**

The main actor of the West Transdanubian Region is the Pannon Novum West Transdanubian Regional Innovation Agency, which was established by the region's innovation organizations and institutions (West Transdanubian Regional Development Council, INNONET Centre of Innovation and Technology, Universitas-Győr Nonprofit Ltd, Zala County Foundation for Enterprise Promotion, Chamber of Commerce and Industry of County Vas and West Pannon Regional Development Plc.) with the financial support of the National Office for Research and Technology in 2005.

The main tasks of the agency are to prepare and implement the regional innovation strategy. The aim of this strategy is to harmonize the regional innovation processes, to encourage the spreading of knowledge, to provide and integrate innovation services and to establish and strengthen technological innovation networks.

The West Transdanubian Regional Innovation Council was established in 2005; the members of the Council represent different regional organizations. The Council's tasks are to facilitate the innovation processes, provide decision preparing materials for the Regional Development Council, control and coordinate the work of the Regional Innovation Agency.

Furthermore, also the network of higher education in West Transdanubia, namely Széchenyi István University, the West Hungarian University, the Georgikon Faculty of Agriculture of Pannon University, and other local/regional units of different universities and colleges seated outside the region (College of Finance and Accountancy, Faculty of Health Science at the University of Pécs, University of Óbuda) is an important element in the innovation system of the region as are the innovation and technological centres established in industrial parks, of which the INNONET Innovation and Technology Centre

has the largest importance. The centre provides a wide range of administrative, management, and training services at reduced rates for companies.

The two research institutes – the Sopron-based Geodetic and Geophysical Research Institute of HAS and the Centre for Regional Studies of the HAS West Hungarian Research Institute in Győr – are also elements of the regional innovation system as well as the different chambers in the counties of West Transdanubia.

### **5.2.3. Innovation policy and decision-making processes**

The regional innovation policy can be characterized as a highly centralized system with very limited regional autonomy in decision-making, dependence of regional innovation policy on the national frameworks, and no significant regional financial resources.

Despite several changes in regional innovation policies in the last years – such as the establishment of the regional innovation agencies – almost all the new measures have been launched by the central government, and only in very few cases have policies been designed jointly with the regional actors.

## **5.3. Innovation Strategy**

The Western Transdanubian Region's Regional Innovation Strategy (RIS) was completed in 2001<sup>26</sup>. The work on a revision of this strategy, a new RIS was started in October 2009, as a consequence the Regional Innovation Strategy Steering Committee was formed at this time<sup>27</sup>. It is expected that the new Regional Innovation Strategy (RIS Navigator) will be ready by the end of 2011. In this study we therefore build on the draft version of the ongoing RIS work.

The Western Transdanubian Regional Innovation Strategy (or RIS Navigator) takes into account the European Union, national and regional level strategies, rules and professional policy recommendations and the hierarchical relationship between them, which will

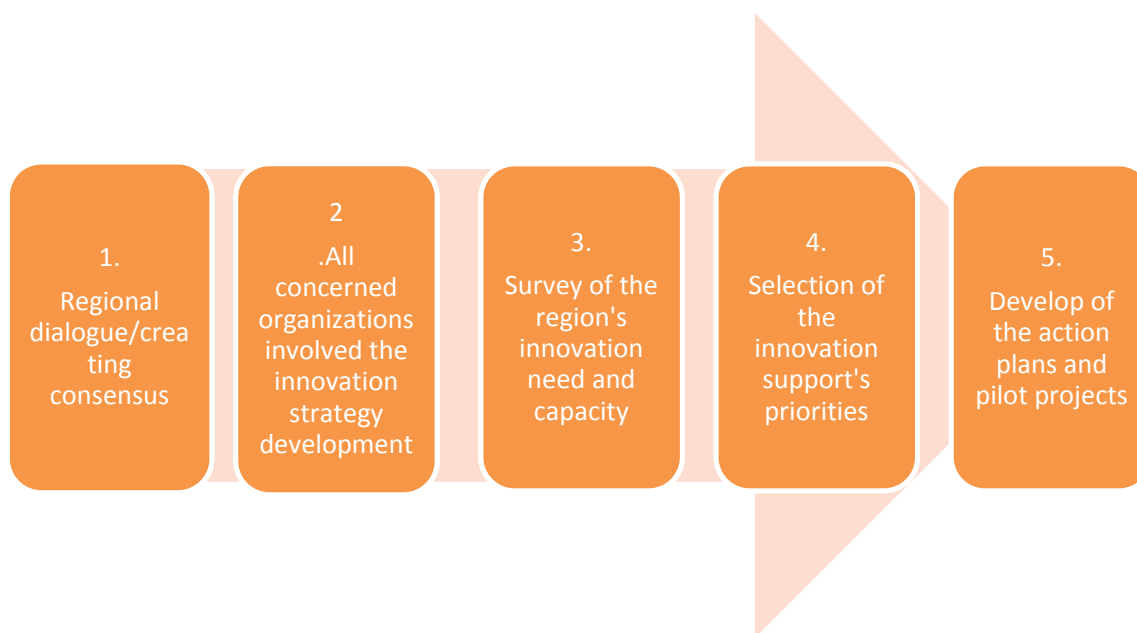
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<sup>26</sup> The Western Transdanubia Region's Innovation Strategy Program. Topic leader and editor: Tibor Dóry. Authors: Tibor Dóry, János Rechnitzer. Entrusting: Western Transdanubia Regional Development Council.

<sup>27</sup> The Regional Innovation Strategy Steering Committee was formed with 9 principals, with the following members: representatives of higher educational institutions, research organization and innovative firms.

influence the political, economic and innovation processes of the years between 2011 and 2015.

**Figure 5.2: Process of the Western Transdanubian RIS Navigator**



Source: Regional Innovation Strategy Navigator Working version, 2011, p. 9.

In general, the relevant government ideas related to innovation focus on the national level, and they do not include regional and county aspects. This is related to the ongoing revision of the territorial administration's units, and to the likely reduction of the importance of present regional level, as medium level.

During the preparation of RIS Navigator 2011-2015 the following development plans were taken into account:

- Europe Strategy 2020<sup>28</sup>
- The European Union's Strategy for the Danube region<sup>29</sup>
- Hungary's National Reform Program (April of 2011)<sup>30</sup>

<sup>28</sup> [http://ec.europa.eu/europe2020/index\\_hu.htm](http://ec.europa.eu/europe2020/index_hu.htm)

<sup>29</sup> [http://ec.europa.eu/regional\\_policy/cooperate/danube/index\\_en.cfm](http://ec.europa.eu/regional_policy/cooperate/danube/index_en.cfm)

- New Széchenyi Plan<sup>31</sup>
- Science-, Technology- and Innovation political strategy (2007-2013) and Action Plan<sup>32</sup>

The goals of these plans are the promotion of long term development and its maintenance in Hungary. The New Széchenyi Plan would like to increase the national innovation system's performance, above all by increasing the Hungarian enterprises' innovation ability and intensity of R&D as well as innovation, by increasing the number of innovative enterprises, and finally by encouraging the development of knowledge intensive as well as and R&D and innovation intensive industries. It also calls for considering science-, technology and innovation policy an integral part of economic policy to encouraging catch up with the most developed countries of the EU.

According this program, the most important tasks of the national innovation policy are:

- to increase the R&D and knowledge intensity of the Hungarian economy,
- to strengthen Hungary's fragmented knowledge infrastructure,
- to point out those research development priorities and economic sectors –, that may become the core growth area of the economy due to their impulses on R&D and innovative activities,
- to achieve efficiency, here R&D and innovation calls by competitive tenders should be a basis of financial support and their financial monitoring should less bureaucratic,
- to involve the entire public as well as all persons responsible during the preparation of decisions and implementation,
- to achieve long-term innovation strategy. Here the strategy suggests that a stable institutional system should be established – which can ensure both vertical as well the horizontal coordination of policies.

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<sup>30</sup> <http://www.kormany.hu/download/0/c3/30000/Nemzeti%20Reform%20Program.pdf>

<sup>31</sup> [http://ujszechenyiterv.gov.hu/download/32589/USZT\\_beliv\\_HU\\_vegl.pdf](http://ujszechenyiterv.gov.hu/download/32589/USZT_beliv_HU_vegl.pdf)

<sup>32</sup> <http://www.nih.gov.hu/hivatal/tti-strategia/kormany-tudomany-080519>

The government adopted the 2007-2013 mid-term STI strategy on the 28th of March 2007. This is the 1023/2007. (IV. 5) Government Decree. Its purpose is to transform Hungary as a country, where innovation and knowledge drive the economy, and companies can appear with competitive products and services in the global market.

The government of the Republic of Hungary will probably review the strategy and action plan by the end of 2011. According to the information received from ministry sources, it is known that a new strategy is being prepared.

**Table 5.1: The RIS's priorities and measures**

Priorities	Measures
<b>1. To improve framework conditions of the innovation in the region</b>	1.1. To improve the research potential of education and research institutions 1.2. To improve the dissemination of education and research institutions 1.3. To widen the possibilities of joining international R & D & I activities
<b>2. To develop the support system of innovation</b>	2.1. To develop innovative services and infrastructure 2.2. To improve the process of networking and clustering and to increase its efficiency and embeddedness 2.3. To improve the legal background of innovation 2.4. To strengthen the range of financing options and re-shape its regional support systems 2.5. To build the innovation monitoring system, the 'Observatory' 2.6. To strengthen the embeddedness of innovation society
<b>3. To improve the innovative companies' competitiveness in the region</b>	3.1. To improve the system of innovation, the protection of industrial property for the businesses 3.2. To improve the possibilities of market access and marketing for the businesses 3.3. To support the R & D & I activities connecting to the region's key industries 3.4. To improve the ability to attract capital of SME 3.5. To create R & D & I workplaces

Source: Regional Innovation Strategy Navigator Working version, 2011.

*The Western Transdanubian Regional Innovation Strategy's plan for the future, strategic objectives and measures:* - The current vision is that: „the local businesses of the Western Pannon Region will be able to achieve success in the market with the internal resources of innovation processes and to generate growth in the amount of produced gross value added”.



Strategic targets to achieve this are:

- to improve the innovation performance of the region's enterprises by developing the framework conditions,
- to improve the efficiency of the region's innovation and support systems,
- to increase the marketability of the innovation initiatives undertaken in the region.

The core innovative sectors and topics on which this strategy may focus – based on the capabilities and development of the region – could be the following:

1. vehicle industry ( e-mobility, sustainable transport),
2. creative industries (design, marketing),
3. information technology, electronics,
4. engineering, mechatronics,
5. environmental sustainability (renewable energy sources, building-energy),
6. health tourism.

#### **5.4. Cluster strategy**

The rapid spread of clusters in Western Europe was due primarily to their simultaneous significant role in the development of regionally integrated production systems, and in the reduction of SME's competitive disadvantages. In 2000 the OECD's conference on supporting clusters promoted the development of clusters in those countries, where this progress had not yet started. In the Western European countries, this progress already started in the early 90's. In 2008 Hungary also realised that the development of clusters is an important tool of the economic policy and therefore worked out a four-level project to develop clusters. The process of this development proceeds as follows:

- 1st level: start up clusters,
- 2nd level: developing clusters,
- 3rd level: creating accredited innovative clusters,
- 4th level: establishing core clusters.

The 1st and 2nd level clusters are the parts of the regional economic policy, while the 3rd and 4th clusters are assigned to the national level.

In Hungary, the cluster policy spread firstly in the Western-Transdanubian Region as a tool of small and medium enterprise support. Thus a characteristic feature of the regional cluster development processes is that it started from four areas: The first of these were the enterprises themselves who increasingly aimed at cooperation. The second was the fact that also the Western-Transdanubian enterprise developing organisations were in need of increased cooperation, so that the notion of clusters was also supported by the Western-Transdanubian enterprise developing organisations. Thirdly the government also realised that, the support of enterprise cooperation is a possibility to strengthen the competitive position of the region.

In the Western Transdanubian Region, the development of clusters was supported by the competitions written by the Western Transdanubian Regional Developing Council. In that time, the national level cluster formations were not legally controlled. Joining to the European Union in 2004 brought significant change in this point of view.

The main strength of the West Transdanubia in terms of economic development potential are in its geographical position, the high qualifications of the human resources, the high economic activity rate, and the complex economic structure as well as a high rate of foreign investments and substantial natural and tourism attractions. With this background, the development possibilities of the region, which are connected the creation of clusters are the following branches:

- Wood and furniture industry,
- Car industry,
- Food industry,
- Electronic industry,
- Tourism.

The clusters in the Western Transdanubian Region therefore also include the traditional industries not usually considered as particularly innovative, yet innovation, R&D and knowledge development are also parts of the activity of the small and medium enterprise support as well as of the existing cluster strategies in these areas. The main purposes of

innovation support are R&D, engineering planning, production and market entry of products or services.

## 5.5. Best practices

CLOE – Cluster linked over Europe

### **INTERREG III**

The purpose of the project is to share knowledge about the clusters between 15 European regions. The project therefore created an informal alliance consisting of more than 25 leading industry clusters, which exchange information about each other and their members. The concrete results of the project were:

- The exchange of practical experience about cluster development.
- A Cluster Management Guide published in 2006.
- A consolidated cluster action plan which resulted in policy recommendation to the partner regions.
- Study trips and relationship management of 4 Western Transdanubian cluster managers and coordinators abroad (guests: PANLOG, PANTEX, PANEL, PNB).
- Organization of 2 Czech and 1 Lithuanian clusters' excursion, study trip in the Western Transdanubia Region.

### **CEE-ClusterNetwork** – Central Eastern European Cluster and Network Area

This was a FP6 – Research and Innovation project involving 11 neighbouring (Upper-Austria, Lower-Austria, Salzburg, Tirol, Western Transdanubia, Czech Republic, South Tyrol, Poland, Slovenia, Slovakia and Croatia) cluster regions in Central and Eastern Europe that are keen to mobilise and support national and regional innovation policy actors to carry out and design co-operation activities together with other competent public authorities.

The results of the project were:

- The methodical establishment of Western Transdanubian Operative Program for clusters,

- 'CEE Cluster Agreement' – which is an agreement on strategies and objectives for the future innovation and cluster policy at the Committee of Regions in Brussels, in November 2007,
- Starting pilot studies, joint action plans and implementing activities.

For example: access of the cluster manager's training needs in whole Europe (supported application: INTERREG IVC – SCINNOPOLI, CENTRAL EUROPE – CEBBIS, non-supported application: SEE – FORINT).

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## 6. Conclusions: A Comparison of the Innovation Systems of CENTROPE Partner Regions

*Authors: Nóra Baranyai*

Comparing the innovation system within the CENTROPE area we must take into account the historical, political and national-structural differences between Austria, the Czech Republic, Hungary and Slovakia. Based on the regional/vertical division of power the CENTROPE area can be divided into two types of countries: Austria is a federal state, while the Czech Republic, Hungary and Slovakia are unitary states. This distinction determines the differences in relationships between the central and regional (provincial) level of the countries, and has an impact on the structure and finance of the innovation system as well. Accordingly, the control and the financing of the Austrian regional, provincial innovation system is more autonomous and more differentiated from the central level than in the other three countries. The other significant distinction is based on the historical past, the different political traditions, and differences in mentality and path dependencies as well as economic development. These are in particular still perceptible between the post-communist countries and Austria.

Despite this the legal regulation of the R&D and innovation system were worked out or fundamentally reformed roughly in the same period in all of the CENTROPE countries, after 2000 with the reforms often being related to the revaluation of this economical segment and to the adaptation of the European Union's guidelines and requirements. The acts contain a comprehensive regulation and the institutional background as well as the financial framework of the innovation systems.

We can differentiate between different types of structures of the central governmental institutions: while the management of the innovation system is somewhat more fragmented in Austria, by many ministries and regions having significant competencies in this field, as well as potentially also in the Czech Republic than in the other three countries which have more centralized management with the responsibility of some ministries. In the first case the insufficient level of coordination and competencies between different institutions can (and sometimes do) indicate problems, while in the second case strong government pressure and domination on the innovation system can be noticed.

The political culture and mindset also have an effect on the national institutional systems in the CENTROPE. In Austria and in the Czech Republic despite political and government

changes a stable innovation policy and system can be seen, which is a result of a long, stable social-political tradition (in Austria) and the determination of the political elite on managing the innovation as a priority (in the Czech part of CENTROPE). In contrast, in the other two countries (Hungary, Slovakia), government changes in most cases also imply a change of the previous policies as well as institutional reforms. These often lead to realignments affecting on the innovation system as well. Despite these differences the central, and especially the governmental institution system are similar in the CENTROPE area (see table 6.1).

**Table 6.1: The central institutions of the innovation system within the CENTROPE area**

Type of institution/organization	Austria	Czech Republic	Hungary	Slovakia
<b>Ministries</b>	Ministry of Economy, Family and Youth Ministry of Transport Innovation and Technology Ministry of Science and Research Other ministries: Ministry of Agriculture, Ministry for Education, Arts and Culture, Ministry of Science	Ministry of Education, Youth and Sports Ministry of Industry and Trade	Ministry of National Economy Ministry of National Development Ministry of National Resources Ministry of Public Administration and Justice	Ministry of Education, Science, Research and Sports Ministry of Economy and Construction
<b>Governmental agencies/organizations</b>	Austrian Science Fund Austrian research promotion agency Austrian Business Agency	Grant Agency of the Czech Republic (Czech Science Foundation) Technology Agency of the Czech Republic	National Development Agency National Innovation Office Hungarian Intellectual Property Office	Agency of MESRS for the Structural Funds of the European Union
<b>Advisory Board</b>	Austrian Council for Research and Technological Development	Council for Research, Development and Innovation	National Research, Innovation and Science Policy Council	Slovak Republic Government Board for Science and Technology
<b>Other institutions</b>		Academy of Sciences of the Czech Republic Technology Centre of the Academy of Sciences of the CR Association of Innovative Entrepreneurship of the Czech Republic National Cluster Association		Innovation Fund Commission for the Knowledge-based Society

The regional innovation system due to the traditions and the commitment of decision-makers also seems to be more consistent in Austria and in the Czech part of CENTROPE. Although there is an organization involving the regional or territorial R&D and innovation institutions in Hungary and Slovakia as well, the strong role of the central governmental in managing innovation policy, the lack of competencies of the regional actors and the financial dependence on national funds often hamper active participation in policy-making by regional actors. In the case of the Hungarian CENTROPE the situation is even further complicated by the fact that the county level government institutions covers a smaller, while the regional levels cover a larger territory than the Hungarian CENTROPE area.

Also central finance of the regional innovation system is typical within the CENTROPE area: the majority of revenues of the institutions come from central subsidies and grants, although as a result of the higher autonomy of regions and their greater powers in Austria and the strong commitment of individual regions such as South Moravia to innovation policy in the Czech Republic, the role of central government financing is weaker than in the Hungarian or Slovak CENTROPE. By contrast, the Hungarian system differs from that of other countries by the fact that besides the institutional system for regional development there is also an independent, regional innovation system in Hungary, which has been created by central government actions and with the help of the national R&D and innovation system.

**Table 6.2: Existing strategies within the CENTROPE**

	Austria	Czech Republic	Hungary	Slovakia
<b>National innovation strategy</b>	√	√	√	√
<b>Regional innovation strategy</b>	√	√	√	√
<b>National cluster strategy</b>		√		
<b>Regional cluster strategy</b>	(√)			

Source: Own Research.

With respect to the national innovation strategies we can also conclude, that all the countries have an own strategy oriented towards innovation, while at the same time several other national documents deal with the different aspects of innovation. This is especially the case in Hungary and Slovakia, where these different strategies also sometimes contradict each other. The structure of national and regional innovation

strategies is, however, complete (see table 6.2) within the CENTROPE region although the strategies are not always contradiction free and in some countries (such as Austria) may be subject to change due to the newly accepted national strategy.

Significant deficiencies can, however, be observed with respect to strategies in the field of cluster strategies. Although there are many active clusters in CENTROPE, only the Czech Republic had a National Cluster Strategy for the period 2005 to 2008 which was not extended, however. Mostly only the regional innovation or development strategies deal with in cluster development and support. Furthermore, the regional cluster-strategies are very often absent within the CENTROPE area, even in countries such as the Czech Republic where a national cluster strategy existed for the period 2005 to 2008. In this respect the regional level is involved in the implementation of cluster policy, only.

With the exception of the Czech innovation strategy all the national innovation strategies formulate a vision for their respective countries: Austria wants to be “one of the most innovative countries in the EU by 2020”, while for the post communist states the most important goal is “to catch up with the developed countries” (Hungary) and “to achieve the economic level of the most developed economies of the EU” (Slovakia). The national innovation strategies are often oriented towards the long-term, but are not always adapted to the planning and budget period of the EU: the Austrian strategy is planned till 2020; the Czech one describes 5-years periods, while the Hungarian and Slovak strategies reflect the EU budget periods. In the national strategies the governments draw up the main strategic issues of innovation, which acts as a framework for the regional planning, innovation strategies and activities.

As a consequence there are also several strategic documents on the regional level within the CENTROPE area. On the one hand, these comprise all regional strategy document parts referring to innovation, on the other hand in many regions there are also separate regional innovation strategies of different regions within a country. Among these we can define different types of development of innovation strategy: the first type is the Austrian case, where not only regional innovation and technological strategies, but also regional development strategies can be interpreted as regional innovation documents, and many regions have separate strategies for innovation and regional development, which only rarely refer to each other. The second type is the Czech and to some degree also Slovak model, where besides the own strategy of a region/city there are also joint regional innovation initiatives, which are results of a collaboration of the different regions (Slovakia)



or the administrative actors of different levels of government within a region (the Czech Republic). The third case is Hungary, where the regional innovation strategy as well as the regional innovation system cover a larger territory than the CENTROPE area.

Finally, we also find that there is some co-ordination between CENTROPE regions of one country in the Czech and the Slovak CENTROPE and there are some signs of a developing co-operation on a strategic level between the Austrian provinces, such strategic co-operation is virtually absent in a cross-border context. Most of the co-operations in R&D and innovation policy are based on a project level, which also means that these co-operation levels are of a temporary nature only.

**Table 6.3: Priorities in the Regional Innovation Programmes**

Austria	Czech Republic	Hungary	Slovakia
Development of human resources*	Technology transfer	Improving framework conditions for innovation	Innovations and technological transfers*
R&D support	Consulting for SMEs	Development of the support system for innovation	Information of society
Communicating R&D policy	Human resources	Improving the competitiveness of innovative enterprises	Research infrastructure
Better integration of innovation policy	Internationalization		Research and development support
Creation of enterprise friendly framework**			Transformation of traditional school into modern one
Increase the number of high-tech enterprises			Knowledge-based economy development**
Intensify technology transfer			Human resources development
Concentration of R&D investments			Qualified jobs' creation
Secure qualifies human resources			

\*Vienna

\*\*Lower Austria

Source: Own Research.

\*Bratislava region

\*\*Trnava region

Nonetheless, although the priorities of the regional innovation strategies reflect responses to the local and regional problems as well as strengths or weaknesses, several common goals, which may represent potential areas of cross-border co-operation, exist among CENTROPE regions. They, however, often refer to quite general objectives such as: The

development of human resources (i.e. developing education and the improving the quality of the work force), the development of the technology transfer, the increase of cooperation between the science, education and business. Any attempt at a more strategic level cross-border co-operation (as opposed to the current project based cross-border co-operation) would probably have to also entail a major effort of concretization of what can be achieved through cross-border initiatives in these broad based priority topics.

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CzechInvest. <http://www.czechinvest.org/en>

Council for Research, Development and Innovation:  
<http://www.vyzkum.cz/Default.aspx?lang=en>

Grant Agency of the Czech Republic. <http://www.gacr.cz/>

Technology Agency of the Czech Republic. <http://www.tacr.cz/en/>

Academy of Sciences of the Czech Republic. <http://www.cas.cz/index.html>

Centre of the Academy of Sciences of the Czech Republic. [http://www.tc.cz/home\\_/](http://www.tc.cz/home_/)

Association of Innovative Entrepreneurship of the Czech Republic. [www.aipcr.cz/eng/](http://www.aipcr.cz/eng/)  
Regional Development Agency of South Moravia. [www.rrajm.cz/homepage](http://www.rrajm.cz/homepage)  
South Moravian innovation Centre. <http://www.jic.cz/home>  
South Moravian Centre for International Mobility. <http://jcmm.cz/en/>  
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RECAMO project. <http://www.recamo.cz/en/>  
Masaryk Memorial Cancer Institute. <http://www.mou.cz/en/>  
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Czech Furniture Cluster. <http://www.furniturecluster.cz/?lang=en>  
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Mendel University in Brno. <http://www.mendelu.cz/en/?lang=en>

## Annex 1: Universities in CENTROPE

	Name	Location	Students	
<b>Slovak CENTROPE</b>	Comenius University in Bratislava	Bratislava	24,292	
	University of Cyril and Method in Trnava	Trnava	5,910	
	Bratislava International School of Liberal Arts	Bratislava	57	
	Paneuropean University	Bratislava	4,214	
	Slovak Medical University in Bratislava	Bratislava	2,653	
	University of health and Social Work Sv. Alžbety	Bratislava	1,1745	
	Trnava University in Trnava	Trnava	7,414	
	Slovak University of Technology in Bratislava	Bratislava (1 faculty Trnava)	17,697	
	University in Sládkovičove	Sládkovičovo	3,014	
	University of Economics	Bratislava	12,697	
	School of Economics and Management in Public administration in Bratislava	Bratislava	4,287	
	Police Academy in Bratislava	Bratislava	1,478	
	Centraeuropean University	Skalica	1,109	
	Academy of Performing Arts	Bratislava	977	
	Academy of Fine Arts and Design	Bratislava	616	
	<b>Czech CENTROPE</b>	Mendel University Brno	Brno	10,617
		Masaryk University Brno	Brno	38,216
STING Academy Brno		Brno	941	
Karl Englis College Brno		Brno	575	
Rašín college, Brno		Brno	464	
NEWTON College, Brno		Brno	279	
B.I.B.S – Brno International Business School		Brno	478	
Private College of Economic Studies Znojmo		Znojmo	789	
College of Business and Hotel management, Brno		Brno	359	
Real Estate College – Institut of Frank Dyson, Brno		Brno	20	
Brno University of Technology		Brno	21,695	
University of Veterinary and Pharmaceutical Sciences		Brno	2,899	
University of Defence		Brno	1,912	
Janacek Academy of Music and perormig Arts		Brno	695	
<b>Hungarian CENTROPE</b>		Széchenyi István University, Győr	Győr	10,786
	University of West Hungary,	Sopron	14,261	
	Theological College, Győr	Győr	153	
	Berzsenyi Daniel Tanarkepzo Foiskola Szombathely	Szombathely	245	
<b>Austrian CENTROPE</b>	University of Vienna	Wien	85,708	
	Medical University of Vienna	Wien	7,381	
	Technical University Vienna	Wien	23,438	
	University of Natural Resources and Life Sciences,	Wien	9,127	
	University of Veterinary Medicine	Wien	2,320	
	University of Economics and Business Administration	Wien	26,825	
	Danube University (Universität für Weiterbildung)	Krems	5,054	
	Academy of fine Arts Vienna	Wien	1,211	
	University of Applied Arts Vienna	Wien	1,586	
	University of Music and Performing Arts Vienna	Wien	3,091	
	Danube Private University	Krems	44	
	Modul University Vienna	Wien	231	
	PEF, Privat University for Management Vienna	Wien	79	
	New design University St. Pölten	St.Pölten	218	
	Konservatorium Wien University	Wien	908	
	Sigmund Freud University Vienna	Wien	716	
	Webster University Wien	Wien	537	
	University of Applied for defence and Sports	Wien	314	
	University of Applied Sciences Campus Wien	Wien	3,215	
	University of Applied Sciences bfi Vienna	Wien	1,502	
	University of Applied Sciences St. Pölten	St.Pölten	1,698	
	University of Applied Sciences Technikum Wien	Wien	2,939	
	University of Applied Sciences Wiener Neustadt	Wr. Neustadt	2,763	
	University of Applied Sciences Burgenland	Eisenstadt / Pinkafeld	1,453	
	Fachhochschul-Studiengänge der Wiener Wirtschaft	Wien	2,362	
	University of Applied Sciences Vienna	Wien	305	
	IMC University of Applied Sciences Krems	Krems	1,750	
Lauder Business School	Wien	296		

Notes: Data for Austria, the Czech Republic and Hungary refer to the year 2009/10, Data of Slovakia to the year 2010/11.

## Annex 2: Clusters in CENTROPE

### Austria

- Life science cluster of the Vienna region (LISAVR) – <http://www.lisavr.at/siteLayout.php>
- Mobility Cluster Vienna - <http://www.clusterwien.at/>
- Food cluster Lower Austria – <http://www.ecoplus.at/en/ecoplus/cluster/food>
- Green building cluster Lower Austria – <http://www.ecoplus.at/en/ecoplus/cluster/green-building>
- Plastics-cluster of Lower Austria – <http://www.kunststoff-cluster.at/>
- Logistics cluster of Lower Austria – <http://www.ecoplus.at/en/ecoplus/cluster/cluster-logistics-lower-austria>
- Mechatronics cluster in Lower Austria – <http://www.mechatronik-cluster.at/>
- Well-being cluster Lower Austria – [http://rdir.at/ecoplus/cluster/wbc\\_en/34800.htm](http://rdir.at/ecoplus/cluster/wbc_en/34800.htm)
- Umweltcluster Wien – [http://www.wirtschaftsagentur.at/service/technologienetzwerke/fokus\\_umwelt/](http://www.wirtschaftsagentur.at/service/technologienetzwerke/fokus_umwelt/)
- IT-cluster of Vienna – <http://it.clusterwien.at/page.aspx>
- ICT Cluster Burgenland – <http://www.ict-burgenland.at/>
- Plastics-Cluster Burgenland – <http://www.kunststoff-burgenland.at/pages/en/plastics-cluster.php>
- Austrian Traffic Telematics Cluster (ATTC) – <http://www.attc.at/>
- Rail Technology Cluster Austria (RTCA) – <http://www.rtca.at/>
- Austrian Aeronautics industries group – <http://www.aaig.at/>
- Austrian Automotive Association – [www.aaa.or.at/](http://www.aaa.or.at/)
- Network Metal – <http://www.netzwerk-metall.at/>

### Czech Republic

- Water Treatment Alliance – <http://www.wateralliance.cz/>
- Czech Furniture Cluster – <http://www.furniturecluster.cz/?lang=en>
- CEITEC Bioinformatics cluster – <http://www.ceitec-cluster.com/>
- CREA Hydro&Energy – <http://www.creacz.com/>
- ENERGOKLASTR – <http://www.energoklastr.cz/cz/>
- NetSecurity Cluster – <http://www.nsmcluster.com/en/>
- Innovation in transport – <http://www.nca.cz/cs/katalog-eskch-klastr>



## Hungary

- Arrabona West-Transdanubian Regional Cluster for Environment Protection – no homepage found
- Biogas and Fermentation Cluster – no homepage found
- Hungarian Furniture Industry Cluster – <http://www.mabuk.hu/index.html>
- West-Transdanubian Winery and Wine Tourism Cluster – <http://www.soproniborvidek.hu/hu/nyertesprojekt.php?link=klaszter>
- West-Pannon Eco-cluster – <http://www.okoklaszter.hu/>
- Pannon Automotiv Cluster – [http://www.autocluster.hu/content\\_2-en.html](http://www.autocluster.hu/content_2-en.html)
- Pannon Wood and Furniture Industry Cluster – <http://www.panfa.hu/>
- Pannon Local Product Cluster – <http://www.zalaifalvak.hu/index.php?cid=394>
- Pannon Information Technology Cluster – <http://www.it-klaszter.hu/>
- Pannon Logistics Cluster – <http://www.panlogklaszter.hu/>
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- Pannon Textile Cluster – no homepage found
- Professio Metal Works Vocational Education Cluster – <http://professio-gyor.hu/>
- Regional Pellet Cluster – <http://www.pannonpellet.hu>
- Sopron Region Informatics Cluster – <http://www.itklasztersopron.hu/>
- Sopron Region Logistics Cluster – [http://www.gysevcargo.hu/en/our\\_services/logistics/sopron\\_region\\_logistics\\_cluster/](http://www.gysevcargo.hu/en/our_services/logistics/sopron_region_logistics_cluster/)
- T-Arrabona Second-Tier Supplier Cluster – no homepage found
- Content and Knowledge-industry Cluster – <http://ttklaszter.pannonprojekt.hu/>
- West-Pannon Audiovisual Cluster – no homepage found
- Hungarian Vehicle Engineering Cluster – <http://www.engineering-cluster.com/>

## Slovakia

- Autocluster – West Slovakia (AKS) – <http://autoklaster.sk/>
- Electronics Cluster West Slovakia (EKS) – <http://www.elektroklaster.sk/>
- The Energy Cluster CENTROPE – <http://www.centrope.com/de/newsletter-3-2011/energie-cluster-centrope>
- Energy Cluster West Slovakia – <http://www.enks.sk/>
- Tourism Cluster - West Slovakia – <http://www.trnava-vuc.sk/>

Source: Own research.