Status and developments of social science research in Central and Eastern Europe: a report to the European Science Foundation

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Status and Developments of Social Science Research in Central and Eastern Europe

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A Report to the European Science Foundation by Iiris Virtasalo

The data was collected and the report was written during 2006

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Front cover:
Berlin in the evening: *Brandenburger Tor*

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Aims and Objectives

This report was commissioned by the European Science Foundation (ESF) in the framework of the Member Organisation Fora instrument (Member Organisations in Central and Eastern Europe) from the Aleksanteri Institute, the Centre for Russian and Eastern European Studies. The aim of the study was to identify and analyse the situation and challenges in research in Central and Eastern European Countries (CEEs), particularly concerning research conducted in Higher Education Institutes (HEIs) and in the field of social sciences[1]. The main emphasis of the report is on state-run universities.

The countries under examination are Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. All these countries are members of the ESF with the exception of Latvia, which was included in the study because it was seen as an integral part of the area under investigation. The respective countries are new members of the European Union (EU).

The information on each country is presented in one of the main sections in this report.

Core Questions

Similarities and Differences in CEE countries

- Reorganisation of administrative structures
- Allocation of resources for research and development
- Doctoral education – future of career researcher
- Brain drain
- Cooperation among the CEE countries

National Research Policies

- Concrete strategies and their implementation
- Proportion of social sciences in national research policies

1. The social sciences are defined differently in the respective countries. However, the disciplines usually include sociology, political science, economics and international relations, and often also education, psychology and law.

Methods

The data were collected from several sources. Information was provided by ESF Member Organisations, the Latvian Academy of Science and the embassies of the countries under examination in Finland and Finnish embassies in the respective countries. Questionnaires were sent to the above-mentioned groups. The response rate was high, over 60%. Responses ranged from a few sentences to long, well-structured answers. Data were also collected from Internet sources and from the documentation offered by different EU organisations, the OECD and the Ministry of Education in Finland.

The report was written in cooperation with a group of country experts selected by the Aleksanteri Institute.

Acknowledgements

I would like to express my thanks to the contributors of this report. I have been assisted by numerous specialists and officials in the countries under investigation. The information and outputs I have received have been essential and were often provided at short notice.

However, I would like to emphasise that the conclusions and remaining errors are the responsibility of the author.

Overview

Reorganisation of Administrative Structures

Because of Soviet influence up to 1990, science policy and research organisation in CEE countries had specific characteristics. Governmental institutions, above all the national academies of science, were predominant in scientific research, research organisations were influenced by centralistic planning, cooperation was very much restricted to the communist regime, and scientific literature was to a great extent published in national or Soviet journals. The situation in the social sciences and humanities, shaped by the prevailing ideology, was even more desolate than that in the sciences.

Since the collapse of the Soviet regime, Central and Eastern European Countries have experienced deep structural changes. These ranged from transformation of the sectoral and industrial structure to changes in political and economic systems. The most profound change is naturally the change in the cultural code.

The transition of the education and research system has been slow and many of the outdated hierarchic administrative structures are still in place. Although structural reorganisation is on its way, the gap between Eastern and Western science communities continues to grow. Nevertheless, universities have had a gradual and varying increase in the share of R&D and there has been a decrease in the R&D role of the academies of sciences.

Although a reorganisation of national science systems, including restructuring higher education, the organisation and funding of research, was launched in the 1990s, the sectoral and subject profiles changed only gradually. The field of social sciences in CEE countries is still relatively much influenced by the legacy of the communist period – mental changes do not happen overnight as structural changes might. However, there are several new institutes devoted to the social sciences and humanities, such as Collegium Budapest, the New European College in Romania, the Centre for Advanced Study in Bulgaria and CERGE-EI in the Czech Republic.

Research and Development Funding

During the communist period, the research sector funds were channelled through ministries and academies of science. The collapse of communism and the economic transformation downsized research and development funding dramatically. It was followed by stabilisation in the mid-1990s and then by a recovery of research funding by the end of the 1990s and early 2000. During the 2000s, differentiation is emerging across countries in terms of relative R&D expenditures.

The aim of the EU is to increase investments in Research and Development to 3% of the GDP by 2010. R&D performed in the higher education sector is on the rise in Europe. In 2003, higher education expenditure on R&D as a percentage of the GDP amounted to 0.44% in the EU as a whole. Most of the new Member States (except Lithuania and Estonia) were below the EU average. Whereas in the established EU Member States most public expenditure on R&D is implemented by the higher education sector, in many of the new Member States a sizeable share of public R&D is still performed in the government sector[2].

In CEE countries the research is funded by ministries which operate through grant-awarding agencies and national programmes. The academies of sciences remain significant providers of funding. However, the role of the university sector is increasing as the general funding channelled to universities continues to rise.

In most of the respective countries the officials in the ministries are advised by a high-level advisory body that consists of politicians, officials and academics. These bodies influence very strongly the funding system, research priorities and the composition of research funding.

Despite the changes in political regimes and structures, the decisions concerning the funding of R&D are made by small groups of people, many of whom have been in authority for a long time. It would be very interesting to investigate further how the compositions of the advisory bodies in ministries and academies have changed. Often, the same people hold several different positions, i.e. a university professor might have several advisory posts.

The funding for social sciences is slowly growing. However, it is still evident that the social sciences are not among the priorities of public research and development funding. Many CEE countries have seen the emergence of independent, non-state centres for social science, often funded by foreign funding agencies. For example, the Central European University in Budapest is an important centre for social science disciplines, funded by the Soros Foundation.

Brain Drain and Science

The transformation period had a significant impact on the attractiveness of science. The reduction in state expenditures and the economic difficulties resulted in a steep reduction in scientific salaries that are now lagging behind the common wage trend. This has a direct

2. The government sector does not necessarily imply the 'government', since in many countries non-university research institutions are run by independent research associations. In the CEE countries, this sector was dominated by the national academies of sciences and the government.

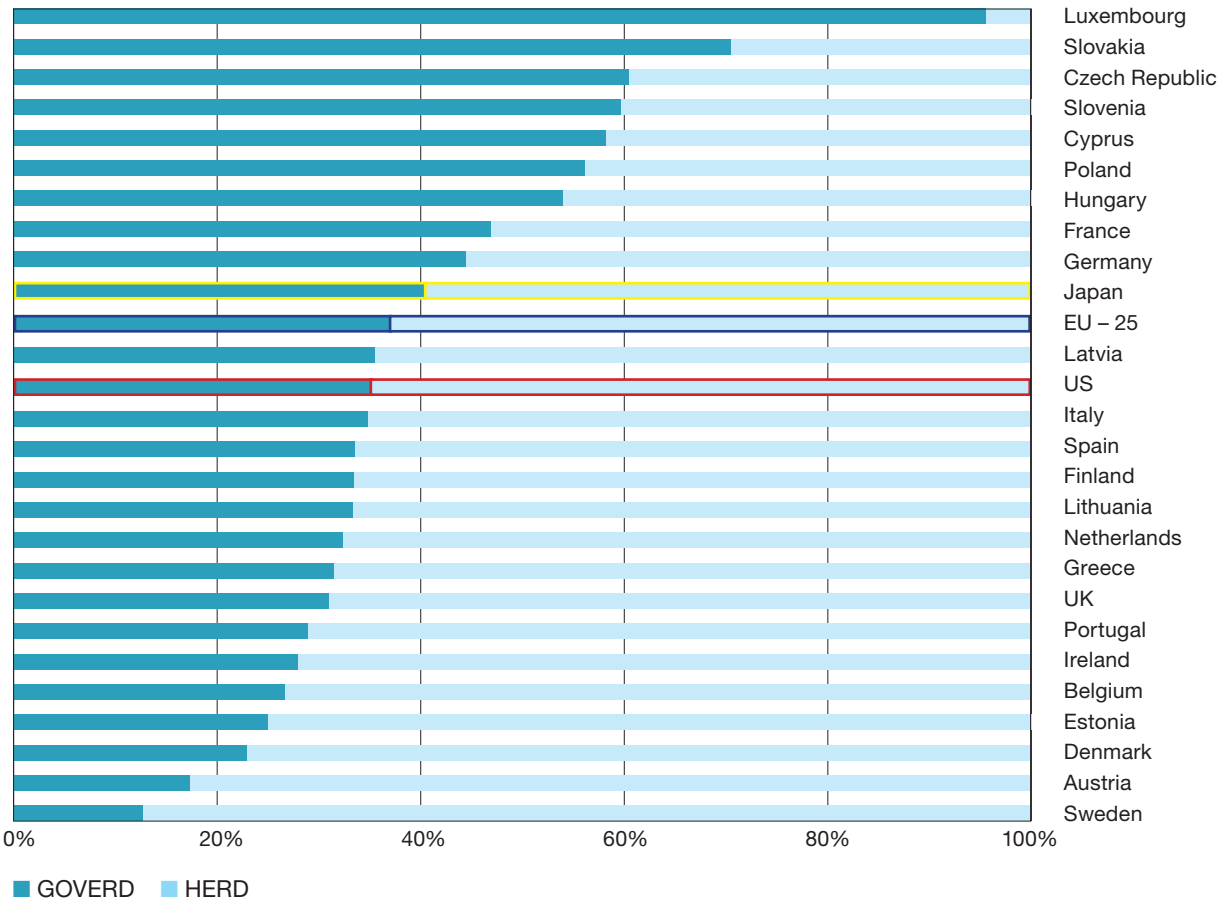

Figure 1. Shares of government and higher education R&D expenditure in total public expenditure on R&D (%) (2003)
(Source: DG Research – Data: Eurostat 1, OECD)

influence on the attractiveness and prestige of an academic career. Young people are turning their backs on scientific careers and are heading to the private sector or create their scientific careers abroad.

The rapid expansion of post-secondary and higher education is leading to a situation where there are more higher education graduates than corresponding jobs, so that some of the school-leavers might have to accept employment not matching their educational level. This problem is not just typical of CEE countries, for example in Finland the situation is very similar.

When the development of the educational system and the labour market are not in harmony with each other, then the brain drain from the country increases substantially, meaning also that these countries' limited resources are being wasted.

In response, significant policy attention has been paid to attracting young researchers, through targeted seminars, training and exchange programmes. However, the increase in the number of academic staff and the promotion of academic careers are too slow as compared to the rate of growth in the number of students.

Young mobile researchers, who have left their home country but are willing to return, are often faced with a poor ability to reintegrate into national research infrastructures, especially universities. Furthermore, young researchers with their new ideas may be seen as a threat to the established practices in their home countries. Thus, young mobile researchers are often discouraged upon their return from further participating in R&D. A related issue is the non-transparent career progress. Young scientists prefer to work at newly created institutions or universities. Because of the low recruitment of young scientists, staff at the academies of sciences are inevitably ageing.

The character, extent and impact of scientific migration from CEE countries is unclear and open to question. While the general view is that it poses a serious threat to the science base and competitiveness of sending economies, other work indicates some potential mitigating factors and positive returns. Surveys focusing on potential migration dominate the discussion at present and there is much conjecture about the number of people involved. It is imperative that more empirical work is undertaken to get a clearer picture of the migration of highly skilled people both to and from CEE countries.

Although there was an expectation of a considerable and prolonged external brain drain from Central and Eastern Europe to Western Europe and the USA, it appears that the situation has stabilised since the end of the initial transformation period. Bulgaria appears to be the country with the greatest level of brain drain among the CEE countries. There is also brain drain among other CEE countries, especially from Slovakia to the Czech Republic.

Internal brain drain seems to be far more substantial today as universities and research institutes cannot compete at the national level with highly qualified high-income areas. Major destinations of internal brain drain are the private sector, other research institutes and government administration.

Multiple Employment of Academic Staff

One result of the internal and external brain drain is the multiple employment of academic staff, especially senior researchers and professors. The goal of the HEIs in most of the CEE countries is, following EU recommendations, research-based education in the HEIs. However, basic research and teaching in universities is severely diminished by the lack of human resources. As a result of both an internal and external brain drain, the workload of those who have stayed has increased remarkably. It is typical, especially for a renowned scientist, to hold several positions in addition to his or her permanent post in a public university.

Along with the growth of the private HEI, the need for academic staff has grown substantially. The employment of personnel from the previously existing state universities, and the academies, is an example of the complexity of the process.

As in many countries, the situation has led to multiple employment of professors, particularly in the universities in Poland. For example, in Jagiellonian University, there were cases of professors having more than three contract jobs. This led to the formal prohibition of professors being employed in more than one university in a city.

Country	% of academic FTEs
Austria	14
Belgium	20
Czech Republic	17
Denmark	14
Estonia	18
Germany	12
Hungary	20
Ireland	22
Latvia	19
Lithuania	22
Norway	24
Poland	22
Portugal	23
Romania	15
Slovakia	13
Slovenia	24
Spain	23
Sweden	15
Turkey	33

Table 1. Social science researchers in Europe
(Source: Eurostat, data for various years from 2002 to 2004)

University Ranking

Although everyone is quite aware of the criticism concerning the different university ranking systems, it is interesting to take a brief look at the ranking of the CEE universities.

Shanghai Jiao Tong University releases annually the Academic Ranking of World Universities, which is probably the most frequently cited ranking of universities, except for some internal US rankings.

Shanghai ranks universities by using the criteria of quality of education and faculty, and research output in relation to the size of the institution. Although it is noted that in institutions specialising in humanities and social sciences the number of articles published in *Nature* and *Science* are not considered and the weight is put on other indicators, it seems quite clear that the universities with an emphasis on 'the hard sciences' are in a better position than others.

In any case, the result of the ranking is relatively insignificant for CEE universities. There is only one CEE university, Charles University, Prague, Czech Republic, among the top-100 European universities. Among the top-500 universities of the world are the Charles University in the Czech Republic, the Jagiellonian University, Cracow and the University of Warsaw in Poland; and the Eotvos Lorand University and the University of Szeged in Hungary.

Despite the weaknesses of the ranking system it might indicate that the universities in the CEE countries concentrate more on teaching than on research. Teaching is still the main role in many universities, although the goal is to move towards research-based education in HEIs.

None of the universities in the CEE countries is a member of the League of European Research Universities (LERU). The League is a group of European research-intensive universities committed to the values of high quality teaching within an environment of internationally competitive research.

Cooperation between CEE countries

During the state socialist period in Central and Eastern Europe, the research links in the region were established primarily within the COMECON (Council for Mutual Economic Assistance) while links with Western countries were relatively limited. After the change in the regime the countries of Eastern and Central Europe quickly revived their connections with the West. Nowadays, cooperation is emphasised with the EU-15 and the USA while cooperation with other CEE countries is less active.

The scientific cooperation among CEE countries is to a greater extent based on bilateral agreements. However, there is also regional cooperation among the Baltic countries, the V4/Visegrad countries (Czech Republic, Hungary, Poland, Slovakia) and the countries from South East Europe.

There exists traditionally good links with the Estonian, Latvian and Lithuanian academic communities. After reinstating the independence of the Baltic countries in the beginning of 1990s, the meetings of the three Baltic academies have been resumed and, starting from 1997, regular joint meetings of Nordic and Baltic academies have been held. Within these meetings, the Baltic Conferences on Intellectual Cooperation have been organised. The history of these conferences dates back to 1935 and the regularity was broken in 1940 by the Soviet occupation of the Baltic countries. The tradition was renewed in 1999. The last conference (2005) was held in Helsinki and focused on 'The Baltic: Past, Present and Future'. The next (2007) conference will be convened by the Latvian Academy of Sciences. The Council of the Baltic Sea States (CBSS), an overall political forum for regional intergovernmental cooperation, is also involved.

There is a cooperation strategy among the V4/ Visegrad countries. Ministers of Education and presidents of academies of sciences have regular meetings in order to discuss key, strategic issues of international scientific relationships. V4 countries established the 'Young Researchers' Award' and the Central European Journals in the field of social sciences and humanities. Within the V4 framework a special programme was created for the financial support of students from V4 countries to be able to study in these countries and for the support of foreign students wanting to study in V4 countries. The programme's office is situated in Bratislava, Slovakia.

The Visegrad Group closely cooperates with other regional bodies as well as with individual countries in the region. The Benelux countries (Belguim, Luxembourg, Netherlands), countries of the Nordic Council (Denmark, Finland, Iceland, Norway, Sweden) and countries of the Western Balkans are among the Group's priorities. Moreover, the Visegrad Group regularly cooperates with other countries in Central Europe – with Austria and Slovenia within the so-called Regional Partnership and with the Group's eastern neighbours as part of the so-called V4+ concept.

The Central European Initiative (CEI) is an intergovernmental forum for political, economic and cultural cooperation and it is composed of 18 member states[3].

In South East Europe, there are regional organisations promoting cooperation, such as the Inter-Academy Council for South East Europe. Many projects function under the Stability Pact for South Eastern Europe, such as the Educational Cooperation Network, a cooperation project between the University of Ljubljana and KulturKontakt, Austria.

It is hard to estimate the real amount of cooperation and the extent of the actions taken by the above-mentioned organisations and initiative. In many cases, cooperation between the countries of the same region or even neighbouring countries is often seen as insufficient. However, new institutions, both public and private, are reported to be eager to cooperate internationally.

National Research Policies

The analysis of the 11 CEE countries shows that science and technology governance varies from country to country. Every country has its own specifics for science and technology governance because of historical experiences, cultural and public understanding of science, the institutional setting, policy-making experiences, general economic development of the particular country and its international and regional positioning.

Different countries face different challenges in terms of coherence and coordination with policies. Many

3. The CEI Member States are Albania, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary, Italy, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine.

countries are trying to find a balance between R&D and innovation policies. There are significant country differences in terms of the extent to which innovation policy measures are focused on the promotion of R&D in the business sector or on the research component. Most of the CEE countries emphasize the research sector and only Hungary and Slovenia are exploring more direct innovation-focused measures.

The maturity of R&D policies varies among the CEE countries. Some of the countries transfer only mechanically 'the best practice' from abroad while some countries have been spotting local deficiencies and have been adjusting their instruments accordingly.

Since it is not possible for any small national economy to be successful in all areas of R&D or to solve all R&D problems simultaneously, there is the need to define the key areas and to project an increase of resources for them. Research and technology policy is likely to be expanded and modelled on EU arrangements and to be extended towards downstream activities such as knowledge diffusion, in particular through support for regional innovation policy. In R&D, EU support through the Framework Programmes will establish criteria of international excellence which will operate as reference points for the restructuring of domestic R&D groups and organisations. For example, EU support for Centres of Excellence, which is already being followed by domestic networking and selection, has this effect.

All CEE countries have made improvements, though of very different degrees, in their research policies. In particular, this applies to evaluation and selection mechanisms and administrative procedures. In recent years, CEE countries also have gained substantial experience and knowledge of different types of science and technology policies and strategies and they also have had different experiences with the functioning of science and technology institutions.

The formulation and delivery of a science and technology policy is hindered by a lack of appropriate procedures and institutions, through which to channel different interests and lobby positions, and to balance all relevant inputs in the interest of the best possible policy decisions.

Concrete strategies and their implementation

Most of the CEE countries had set out their priority areas in their R&D policy documents. Despite the variations in the science and technology governance, the focuses of the national research policies are very similar indeed in CEE countries. Two interrelated themes dominate national research policies in CEE countries, i.e. a knowledge-based economy and economic growth. The analysis of recent government strategic plans shows that there is a desire amongst the CEE countries to strengthen the policies related to the development of the knowledge-based economy. Economic growth is accelerated by promoting the expansion of applied sciences and engineering and by encouraging cooperation between the academic and business worlds.

More precisely, the public priorities in R&D in most European countries are the information society technologies and life sciences, genomics and biotechnology for health, nanotechnologies, cognitive sciences and the national culture, history and language. The question arises as to how these objectives are set up and how they are guaranteed.

Linking national priorities with those of the EU RTD Framework Programme is the best way to access funding, and for better integration into EU-wide research systems and networks. At the same time, because of the shortage of resources, there is the danger that other fields are pushed aside. The challenge is a lack of integration between research agendas and economic policy.

Proportion of Social Sciences in National Research Policy

The social sciences are strongly dependent upon different national settings, national research traditions and national funding. However, the social sciences are not being focused upon by the national research policies in CEE countries.

The importance of the social sciences is admitted implicitly as a tool to manage and understand the rapid changes and development that the respective countries are facing. Unfortunately, this position is not very strong and it is not supported by adequate funding.

Despite the fact that the social sciences are very popular among high-school graduates and a great proportion of university students are studying social sciences, the funding implemented for social sciences is poor. In addition, governments of the CEE countries struggle to raise the necessary amount of private research funding. The social sciences are not as likely to get private funding as are natural and engineering sciences.

The position of social sciences is still relatively much influenced by the legacy of the communist period. During the period of socialism, social sciences were commonly in a worse position than other sciences, e.g. mathematics, physics or engineering, since the free practise of social sciences could have constituted a threat to the monopoly of the Communist Party. Social sciences were politically used in order to strengthen the ideology and the dominant communist hegemony.

As a consequence of the communist rule, social sciences were not seen as essential in the emerging new economies as many other disciplines were, and not enough resources were channelled into them. The benefits offered by social science research to society were not fully understood in CEE countries. Social scientists have not been seen as providers of adequate responses to complex societal issues and to facilitating social transformations. The strengthening of linkages between social science and policy making is required. It is essential that the public funding bodies understand the crucial role the social sciences can play in the development of society.

Conclusion

The present problems of the academic world in CEE countries, under-funding and the brain drain, are emphasised in the case of the social sciences. The discipline suffers more than many other fields of science from the overall lack of public research funding. Social sciences are not among the priorities of the national research policies and funding. The private sector is not likely to fund social science research on a large scale. However, there are several Western funding agencies that play a significant role in developing the social sciences.

The attempt to increase the level of R&D investment is dependent on the availability of numbers and the quality of human resources. Unfortunately, the social sciences are severely affected by the brain drain. Even if the number of researchers leaving the field was not as notable as in the natural sciences, the losses are significant. The discipline needed reinforcement more than many other fields of research but was not found to be attractive enough, especially among the younger age groups. The poor financial conditions in R&D and the comparatively low prestige of science related to a change in values in a market-oriented society are some of the reasons why young people are less inclined to build their careers in the sciences.

The status of social science research is ambivalent. On the other hand, the discipline is freeing itself from the legacy of the socialist era. Also, the need for cross-cultural research has never been greater as in the societies that have changed rapidly in the CEE countries. On the other hand, the social sciences have lost their more visible and better funded position in the academic world.

In addition to increasing resources, the development and position of the social sciences could be strengthened through cooperation. Cooperation in the field of social science would be very fruitful especially among the CEE countries. The similarities in CEE countries and the common goals of the research policies provide a self-evident basis for cooperation. The respective countries also share a common challenge, i.e. to raise greater support for the social sciences in the future. The countries could work together in order to strengthen the position of the social sciences in CEE countries. Sharing of best practices among EU countries is one way to stimulate the field of social sciences.

Country Reports

Bulgaria

Basic Information

The network of higher schools in Bulgaria (population 7.8 million) involves universities, specialised higher schools and colleges. They offer different degree-level educational programmes and various opportunities for the acquisition of higher education. The colleges are independent entities that could be public or private or within the structure of the HEIs. The total of 51 accredited HEIs includes 36 public and 14 private institutions. For the 2003-2004 academic year there were 195 666 students in public universities and 32 802 in private universities.

The University of Sofia (founded in 1888) is the oldest body of higher learning in Bulgaria and was the only university until 1971, when teacher-training institutes in Plovdiv and Veliko Turnovo were elevated to university status. Among the recently licensed universities are the American University in Blagoevgrad and the New Bulgarian University in Sofia.

Administration and Structures

Higher education in the Republic of Bulgaria is run by the Ministry of Education and Science, the National Assembly, the Council of Ministers and the National Evaluation and Accreditation Agency (NEAA). The Ministry of Education and Science is the main body exercising supervision over the higher schools and implementing the national policy in the field of higher education.

The Council of Ministers validates the guidelines of national policies in the field of higher education, makes motions to the National Assembly to establish, transform, rename or close down higher schools, as well as proposing the amount of annual budget subsidies to be allocated to each public higher school, and opens, transforms or closes down faculties. The Council of Ministers represents the interests of Bulgarian higher education and science before other state and international organisations and signs international contracts and agreements.

The Parliamentary Commission for Education and Science is the highest research-policy-making body. The Council of Ministers endorses the most important strategic documents in the research policy of the country though its role is mostly seen as an intermediary and coordinator between the Ministry of Education and Science on the one hand and the Bulgarian Parliament and other relevant ministries on the other.

The Ministry of Education and Science defines and implements the national research policy. The National Council for Scientific Research at the Ministry of Education and Science oversees the functioning of the main public research-funding instrument – the National Science Fund.

There has been a strong effort to reintegrate research and higher education in Bulgaria. As a result, many research centres are established within the structures of the HEIs. The staffs of these research institutes have become university teaching staff. Such centres are becoming an essential part of doctoral studies and research. Students can carry out their thesis research in the facilities of research institutes.

The organisation and governance of research is among the priorities of the HEIs and is encouraged. HEIs are entitled to plan and conduct joint research projects with each other, with scientific organisations and with other institutions. Some of the research institutes continue their work independently, for example the Bulgarian Academy of Sciences (BAS).

The Bulgarian research system is dominated by the BAS and the National Centre for Agrarian Sciences. Universities have increasingly embarked on research but still have limited capacity. An increasing amount of applied research is carried out in smaller private-sector organisations.

In practice, the Academy of Sciences performs the major part of any research activities and produces most of the research results in the country, and its scientific output, according to ISI statistics, amounts to 60% of the overall produced in the country.

Degree Structures and Development

Bulgaria has implemented a three-cycle degree system in its higher education system. The first degree, the bachelor's degree, requires a minimum 4-year course of instruction. A master's degree requires a minimum 5-year course of instruction, or an extra year after the bachelor's degree. The third degree requires a minimum 3-year course after the master's degree, and its graduates are awarded a doctor's degree. Training for a doctor's degree can, in addition to universities, be handled by such scientific research organisations as the BAS.

The National Evaluation and Accreditation Agency (NEAA) is the only national statutory body for evaluation and accreditation in higher education. Institutional accreditation is explicitly linked to the evaluation of the effectiveness of internal quality assurance processes and structures. The programme assessment method is moving from a programme-by-programme basis towards a subject-level evaluation. The Agency is exercising post-accreditation monitoring and supervision. The Agency is supported by a budget.

The management bodies of the NEAA are the Accreditation Council and its Chairman. The Council consists of 11 members – the Chairman and 10 other members – who represent the higher education fields of study. The Rectors' Conference quota in the Council is six members, including the Chairman and the Deputy Chairman.

Research and Development Funding

R&D expenditure shrunk from 2.7% of the GDP in 1989 to 0.2% of the GDP in 1996 and levelled off at about 0.5% of the GDP in 2003-2004. The same trend, though at a slower pace, can be seen in the dynamics of employment in R&D and the number of public and private organisations performing R&D.

Universities receive funds from the government as a block grant, which they are free to spend as they wish; they are also free to raise their own funds and spend those as they wish without limit. Approximately half of the public funding allocated to research is spent in the higher education sector.

The research system is primarily based on direct budget support. Competitive research programmes, though active since 1990, have increased their weight in the system only in the past two to three years.

The Bulgarian National Science Fund is the main programme-based funding instrument and was established by the Bulgarian Government in 1990. As of 2006, however, its contribution is dwarfed by the nine times larger direct institutional support facility through the central government budget. The main portion of the public funds for research is allocated to the academies.

National Research Policies and Strategies

In 2005 the Bulgarian Government adopted a comprehensive research policy document, the National Strategy for Scientific Research for the Period 2005-2013. It is the first integrated research policy document since 1989.

Currently, Bulgarian research policy faces a number of challenges. The horizontal relations between the (mostly) publicly financed R&D and science system and the private sector are weak. Inputs into R&D have been limited in Bulgaria in the past 15 years, and measurable output has been even lower. The introduction of a more structured, strategy- and law-based approach is driven by the country's EU accession and the alignment of national policies with EU requirements.

Bulgaria

Table 1. Sources of funds for R&D in Bulgaria

Years	Business Enterprise (%)	Government (%)	Higher education (%)	Private non-profit (%)	Funds from abroad (%)
1996	60.4% B	35.1% b	3.8% B	0.4% b	0.3% b
1997	23.3%	67.8%	2.4%	0.9%	5.7%
1998	23.6%	69.7%	2.7%	0.2%	3.8%
1999	22.8% B	69.7% b	3.2% b	0.2% b	4.1% b
2000	24.4%	69.2%	0.9%	0.3%	5.3%
2001	27.1%	66.2%	0.7%	0.3%	5.7%
2002	24.8%	69.8%	0.2%	0.2%	5.0%

Source: Eurostat, b – break in series

The Bulgarian Government has quickly developed a national innovation policy, in which R&D is a core element (e.g. the National Innovation Strategy and the National Innovation Fund). The National Strategy for Scientific Research for the Period 2005-2013 states the intentions and responsibilities of the government to develop science structures and to improve education. Its major objectives are the allocation of resources for carrying out scientific research, the development of human potential for scientific research, and the integration of Bulgaria into the European integrated market. The document reflects Bulgaria's intention to comply with the EU research criteria by applying indicators for the efficiency of scientific research and by creating and sharing new knowledge.

The National Strategy for Scientific Research for the Period 2005-2013 clearly gives preference to applied research as opposed to basic research. In terms of thematic priorities the strategy outlines the following areas:

- national identity and Bulgarian cultural heritage
- information technologies
- new materials and technologies
- agro- and biomedical research and technologies.

Doctoral Education

Along with universities, training for a doctor's degree can be handled by such scientific research organisations as the BAS and the Centre for Agrarian Studies.

The BAS can be regarded as the largest PhD school in Bulgaria. Each year the number of PhD students studying and preparing their theses in the different research units is close to 700. A specific unit of the Academy, the PhD Training & Career Development Centre, has been created to coordinate and administrate the educational activities in the BAS. This Centre organises annually a Bulgarian-Swedish school for PhD students entitled 'Contacts in Science'.

Cooperation and Mobility

Compared with the past, academic mobility has increased dramatically, despite obstacles encountered by both staff and students (visa requirements, financial resources etc.). On the negative side, many of the best students and graduates do not return after their study abroad, thus contributing to the brain drain from the region. There are still difficulties with the recognition of qualifications and periods of study, both internally between the countries in the region and in relation to other countries.

Bulgaria participates, inter alia, in the Erasmus Students' mobility and Erasmus Mundus programmes, Socrates and Leonardo da Vinci programmes. The HEIs and student organisations have the opportunity to sign contracts with international HEIs concerning the mobility of students and academic staff. The Bulgarian Government signs bilateral mutual agreements for teacher exchange programmes.

The main obstacle to outgoing student mobility is the insufficient financial support available for student grants. Universities do not have significant support funds, so the availability of national support funds for students is essential.

Teachers have the opportunity to obtain one year of leave that can be used for mobility schemes. The mobility of the academic staff is provided by special funds handled by the government, but there is a need for greater financial support.

The BAS has project-based bilateral agreements with the academies of sciences of Hungary, the Czech Republic, Poland, Slovakia, Romania and Serbia and with the National Research Council of Turkey. A good start has been made also in more recent cooperation projects, such as those with the academies of sciences of Croatia, Macedonia, Turkey, Albania, Montenegro, and Greek universities. There are also some more specific regional organisations, such as the Inter-academy Council for South-East Europe, of which the BAS is an active member.


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Croatia

Basic Information

Croatia (population 4.5 million) has six universities: the University of Dubrovnik, the University of Josip Juraj Strossmayer in Osijek, the University of Rijeka, the University of Split, the University of Zadar and the University of Zagreb, together encompassing 72 faculties, art academies and teacher academies. The number of students in higher education in 2005 was 150 000, of whom 12 000 were enrolled in private HEIs, of which there are 14.

Administration and Structures

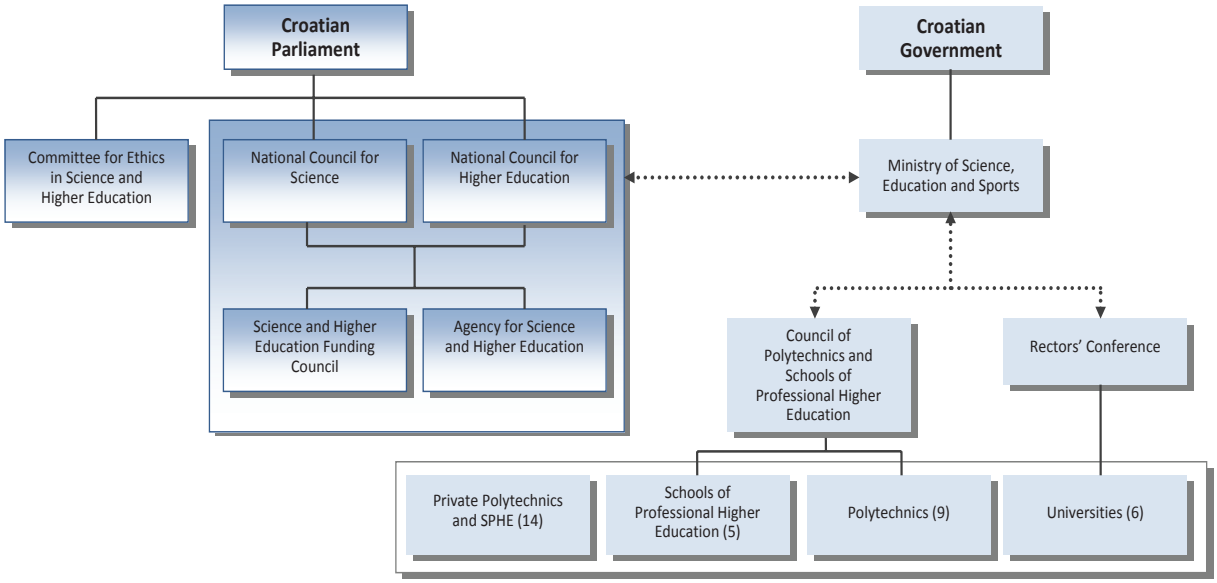
The Ministry of Science, Education and Sports (MSES) is the ministry responsible for higher education and research in Croatia. The National Council for Higher Education (NCHE) is an independent and professional body that consults the Ministry. The Croatian Parliament appoints the Committee on Education, Science and Culture responsible for proposing legislation under the authority of the Ministry of Science, Education and Sports.

The Agency for Science and Higher Education is a specialist institution established by the Croatian Government in order to provide professional services related to the assessment of scientific activity and higher education, as well as the recognition of diplomas and qualifications. The Agency is responsible for setting up the National Network for Higher Education Quality Assurance, which then forms part of the European quality assurance network.

The main responsibility for the development and quality is assumed by the National Council for Science (NCS) and the NCHE. The members of the NCS and the NCHE are appointed by the Croatian Parliament. The Science and Higher Education Funding Council was established in 2005 to provide the councils with expertise and professional assistance on budget planning and expenditures.

The Agency for Science and Higher Education (ASHE) is a competent and independent institution founded by the Croatian Government in March 2005. It performs expert work in issuing approvals to HEIs and in evaluating scientific organisations, etc. The Agency reports to the NCS and the NCHE on the activities and their results.

Research is an activity undertaken by all universities. Accreditation for postgraduate programmes is given only if the institution has adequate research facilities



The Structure of the Croatian Higher Education System (Source: Ministry of Science, Education and Sports)

and, in particular, if its faculty includes researchers qualified to act as mentors for doctoral theses. Universities may organise second-cycle and postgraduate courses in cooperation with research institutes.

Scientific activity is carried out by universities and their units, public scientific research institutes, commercial scientific research institutes, the Croatian Academy of Arts and Sciences, as well as other legal entities and their units as listed in the Register of Scientific Research Organisations and which is maintained by the Ministry of Science, Education and Sports.

Degree Structures and Development

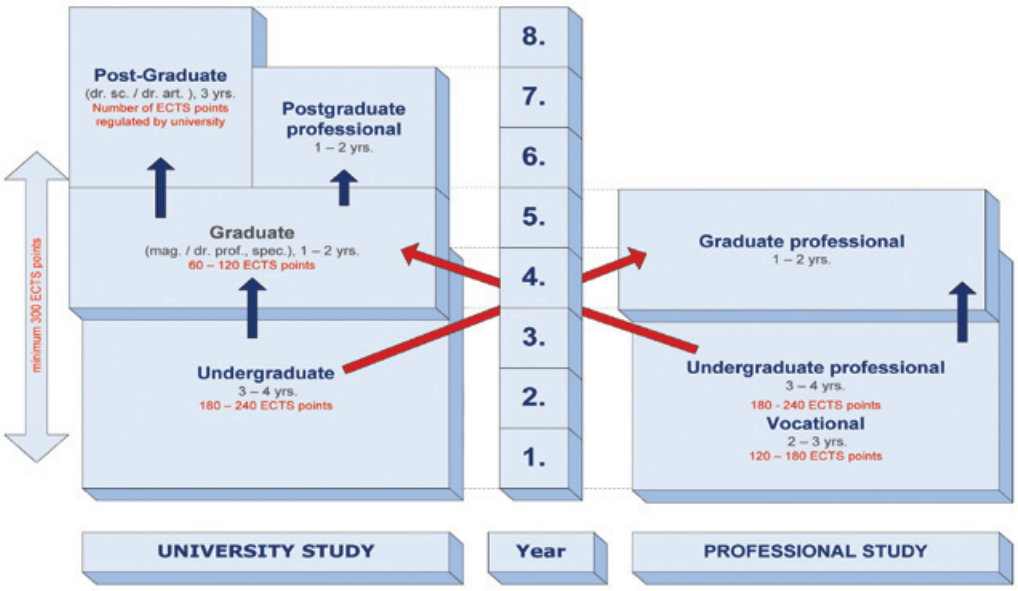
Two-cycle and three-cycle study programmes were introduced in the 2005-2006 academic year. Consequently, all HEIs in Croatia are expected to adapt their study programmes to the new system.

The intention is to provide the students with the opportunity to enter the labour market after finishing the first study cycle or to enrol in graduate and, subsequently, postgraduate study programmes. Therefore, the majority of HEIs transformed the usual four-year programmes into the widespread 3+2 model of the Bologna Process. Only a minority of HEIs maintained the 4+1 model and some adopted the so-called integrated programmes, such as Law (5+0) and Medicine (6+0). The evaluation of third-cycle studies began at the end of 2005 and it will be completed before the start of the 2006-2007 academic year.

The new doctoral studies will last at least three years and lead to the title of *doktor znanosti* or *doktor umjetnosti* (PhD in Science or PhD in Arts). The major difference is that the doctorate will not be awarded without the completion of a doctoral study programme. Doctoral studies include both taught courses and individual research. The process of separation of professional studies from university studies has already begun, but there is still a lot of work to be done on strengthening the infrastructure of polytechnics and schools of professional higher education. The transition period in which it will still be allowed to carry out professional studies at universities will last until 2010.

The national quality assurance system and the system of accreditation and certification are based on regulations issued by the Minister of Science, Education and Sport on the proposal of the National Council for Higher Education.

Quality assurance services are in the process of being formed in Croatia. Services will be performed by the Agency for Science and Higher Education. So far, the evaluation of institutions of higher education has been largely entrusted to Croatian academics. However, several universities and faculties underwent evaluations by international associations. The Croatian academic community understands that it would benefit from the participation of international peers. It is also interested in getting involved in international accreditation and evaluation, particularly in areas where it believes it has competent experts.



The Structure of Higher Education in Croatia (Source: Ministry of Science, Education and Sports)

Research and Development Funding

Funding for the majority of research grants is allocated in the national budget and awarded by the Ministry of Science, Education and Sports based on the recommendations of the National Science Council. The gross expenditure on research and development (GERD) reached 1.14% of GDP in 2003.

The National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia (NFS) is a new organisation, established in 2001 by the Croatian Parliament. Its raison d'être is to support scientific excellence in Croatia. The NFS is the first government agency responsible for funding scientific and developmental projects in addition to the MSES, which used to be the only financier of these activities.

National Research Policies

Research policy in Croatia consists of two basic components. The first is aimed at the development of national knowledge and a science base, while the second component is oriented towards fostering science-industry cooperation and the commercialisation of research results.

The key priorities of the Croatian research policy are defined in the Science and Technology Policy of the Republic of Croatia 2006-2010, accepted by the Croatian Government in June 2006. Four key priorities are identified: (1) increasing investments in research and development and their efficiency, (2i) restructuring Croatia's science system, (3) strengthening cooperation between science, government and industry in the creation of new knowledge and goods, and (4) increasing the participation of Croatian scientists and other entities in the EU Framework Programmes.

Table 1. Research grants in 2005* by type of institution

Type of institution	No of projects	%	Amount (HRK)	%
Universities	1271	70.50	82120000,00	65.00
Public institutes	324	18.00	31114000,00	24.60
Other institutes	200	11.10	12942000,00	10.20
Polytechnics	8	0.40	243000,00	0.20
Total	1803	100.00	126419000,00	100.00

* The amounts awarded in 2003 and 2004 were almost exactly the same

Croatia

In June 2000 the Croatian Government initiated a comprehensive project on strategic development of Croatia entitled *Croatia in the Twenty-First Century*. A range of 19 separately elaborated and interrelated strategies has been formulated, including a strategy for science. The rationale is to accelerate economic growth based on science and technology, which requires fundamental reforms of the educational and scientific systems.

Cooperation and Mobility

There are a total of 92 bilateral agreements and programmes of educational, scientific and research cooperation currently in force with 40 countries worldwide. On the project level, there is active ongoing cooperation with 11 countries in 189 scientific and research projects.

The cooperation mainly occurs on the basis of approved two- or three-year programmes. During the past three years an increase in the number of bilateral projects has been noticed in the existing cooperation framework, but also such cooperation has begun with new countries (India, China, Albania, FYR of Macedonia).

Bilateral projects are based mainly on the existing national projects and the cooperation is supported in the way that travel costs and research visits are funded with the aim of carrying out the agreed joint projects. Bilateral cooperation with EU Member States comprises scientific research and academic exchange. A serious effort is being undertaken to direct the cooperation programmes towards multilateral EU priorities and programmes, and to appear jointly within Sixth Framework Programme, Croatia is likely to join Erasmus Programme in 2009.

Croatia participates in the Central European Exchange Programme for University Studies (CEEPUS). Croatian students may apply for grants awarded by foreign governments, governmental and non-governmental organisations, foundations and private donations.

CEEPUS mobility facts:

Academic year 2004-2005
From CEEPUS member countries to Croatia – 179 months/scholarships (Incoming mobility)
From Croatia to CEEPUS member countries – 142 months/scholarships (Outgoing mobility)

Academic year 2005-2006
From CEEPUS member countries to Croatia – 289 months scholarships (Incoming mobility)
From Croatia to CEEPUS member countries – 129 months scholarships (Outgoing mobility)

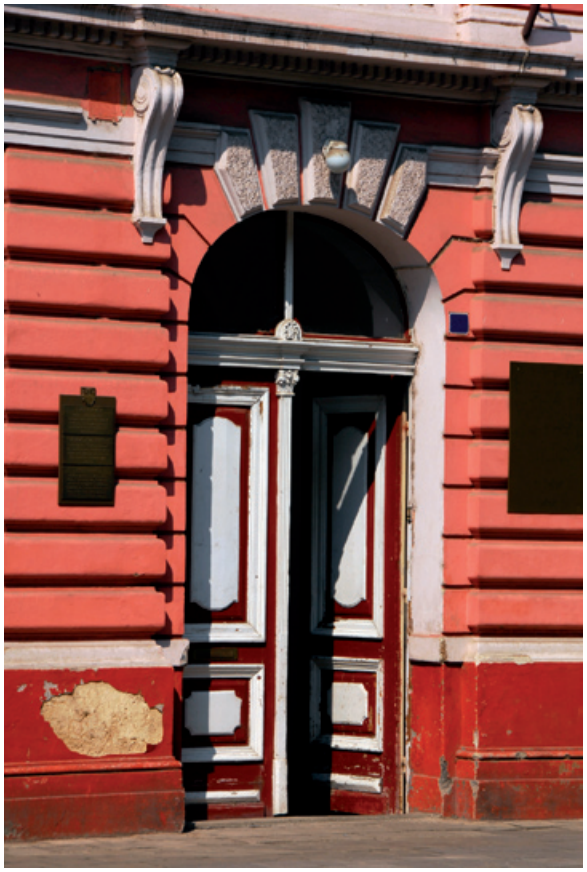
Participation of young Croatian researchers at International conferences held abroad:

Academic year 2005-2006
381 young researchers
89 senior scientists

Academic year 2004-2005
403 young researchers
41 senior scientists

Academic year 2003-2004
387 young researchers and senior scientists

Academic year 2000-2001-2002
530 young researchers and senior scientists.



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Czech Republic

Basic Information

The leading institutions of higher education in the Czech Republic (population 10.2 million) have long-standing traditions. The Charles University (founded 1348) and the Czech Technical University (founded 1707) are among the oldest universities in central Europe. HEIs comprise the major part of the tertiary education system. Altogether 64 HEIs belong to the Czech higher education system. There are 25 public institutions, two state HEIs (one military and one police) and 37 private HEIs. Ten of the universities are multidisciplinary universities.

The role of individual sections of the tertiary education sector in research and development is highly varied. Most private HEIs carry out very limited research activities. In R&D, the role of public and state HEIs is dominant.

Administration and Structures

The Ministry of Education, Youth and Sports is the decision-making power in the field of education. The Ministry has the primary responsibility for the development of the tertiary education system. The rights and responsibilities of the Ministry are strictly determined by the Act and are designed to achieve a good balance with the autonomy and academic freedom of HEIs.

Representation of HEIs consists of two bodies, the Council of HEIs and the Czech Rectors' Conference. Both bodies include representatives of public, private and state HEIs. The Ministry and the HEI representatives discuss proposals and measures that have a significant impact on HEIs.

The Representation Commission is a body consisting of the wider range of higher education stakeholders – there are representatives of the Czech Rectors' Conference, the Council of HEIs (including student representatives), representatives of registrars and trade unions. This body serves as an important advisory body to the Deputy Minister for Research and Higher Education especially in the issues regarding the state budget.

During the communist regime, scientific work carried out at HEIs was not a priority. The research was conducted in the Czechoslovak Academy of Sciences and applied research in numerous research institutes. After 1989, the HEIs were declared the highest educational and scientific institutions. The Ministry prepared several programmes aimed at encouraging and promoting scientific work at HEIs. In 1996, a programme

entitled 'Strengthening Research at HEIs' was initiated by the Research and Development Council. A subsequent programme, 'Research Centres', was designed to bring together the research capacities of HEIs and the Academy of Sciences and other institutions, and to promote the creation of scientific centres of excellence. The first round of the programme (2000-2004) has been evaluated as being very effective.

As a result of these changes, the Czech Science Foundation (focused largely on supporting basic research) and the Research and Development Council (whose task is to make recommendations to the government in the areas of R&D policy and funding) were established. Since it began functioning in 1993, the Academy of Sciences has undergone a profound transformation relating to scientific and organisational aspects as well as regarding human resources. It has become a modern, democratically administered cluster of autonomous, non-university research institutes engaged primarily in basic research. It has its own grant system and a demanding evaluation procedure, and an institution that cooperates closely with universities and other research institutes.

The scientific capacity of the Academy of Sciences still remains relatively large comparable to that of HEIs. In this respect, it is possible to speak about a 'dual' system of basic research in the Czech Republic. There are currently 4 274 researchers (in full-time equivalent) working in the tertiary education sector; this number represents a 26% share of researchers in the Czech Republic.

There are 19 Ministry research institutes: 14 in Prague, 3 in Brno, 1 in Teplice and 1 in Vyskov. Their key role is to provide research analysis and studies in the relevant field within the responsibility of the Ministry; e.g. the Research Institute of Labour and Social Affairs deals with issues such as employment, social conditions, equal job opportunities, development of the labour market, women's position on the labour market, etc.

Degree Structures and Development

The Bologna Process has been implemented in the vast majority of HEIs. In parallel, traditional long master's study programmes still continue before the accreditation expires but no new students are accepted. The doctoral programmes focus on scientific activities, research and development. Only graduates from master's programmes can be enrolled.

In order to comply with the legal obligations concerning quality assurance, HEIs are obliged to perform an internal evaluation, though according to their own preferred guidelines and criteria, and to make the results public. Despite this obligation, the developments in the field of internal evaluation of HEIs have been rather unsatisfactory.

The Accreditation Commission of the Government of the Czech Republic performs comprehensive evaluations of educational, scholarly, research developmental, artistic or other creative activities of the HEIs. The Commission is an independent expert body, composed of 21 members, appointed by the Czech Government. The Commission has foreign members to guarantee an external view of the Czech national higher education system.

Since May 2001, the Accreditation Commission has been a member of the European Association for Quality Assurance in Higher Education (ENQA). It is also one of the founders of the Central and Eastern European Network of Quality Assurance Agencies in Higher Education (CEEN) and participates actively in the dissemination of good practice and the exchange of experiences.

National Research Funding

The Council for Research and Development plays the main role in shaping the proposal for the state R&D budget. Upon budget approval, the Ministry of Finance allocates the approved R&D budget shares to the individual providers of R&D public funding. The main providers of R&D public funding are the Czech Science Foundation – the grant agency of the Czech Republic – the Academy of Sciences and, above all, the Ministry of Education, Youth and Sports. In the area of research and development, the strategy suggests a gradual year-on-year increase in public expenditure with the aim of raising R&D expenditure to 1% of the GDP before 2010 and the increased funding should be directed preferably to industrial research.

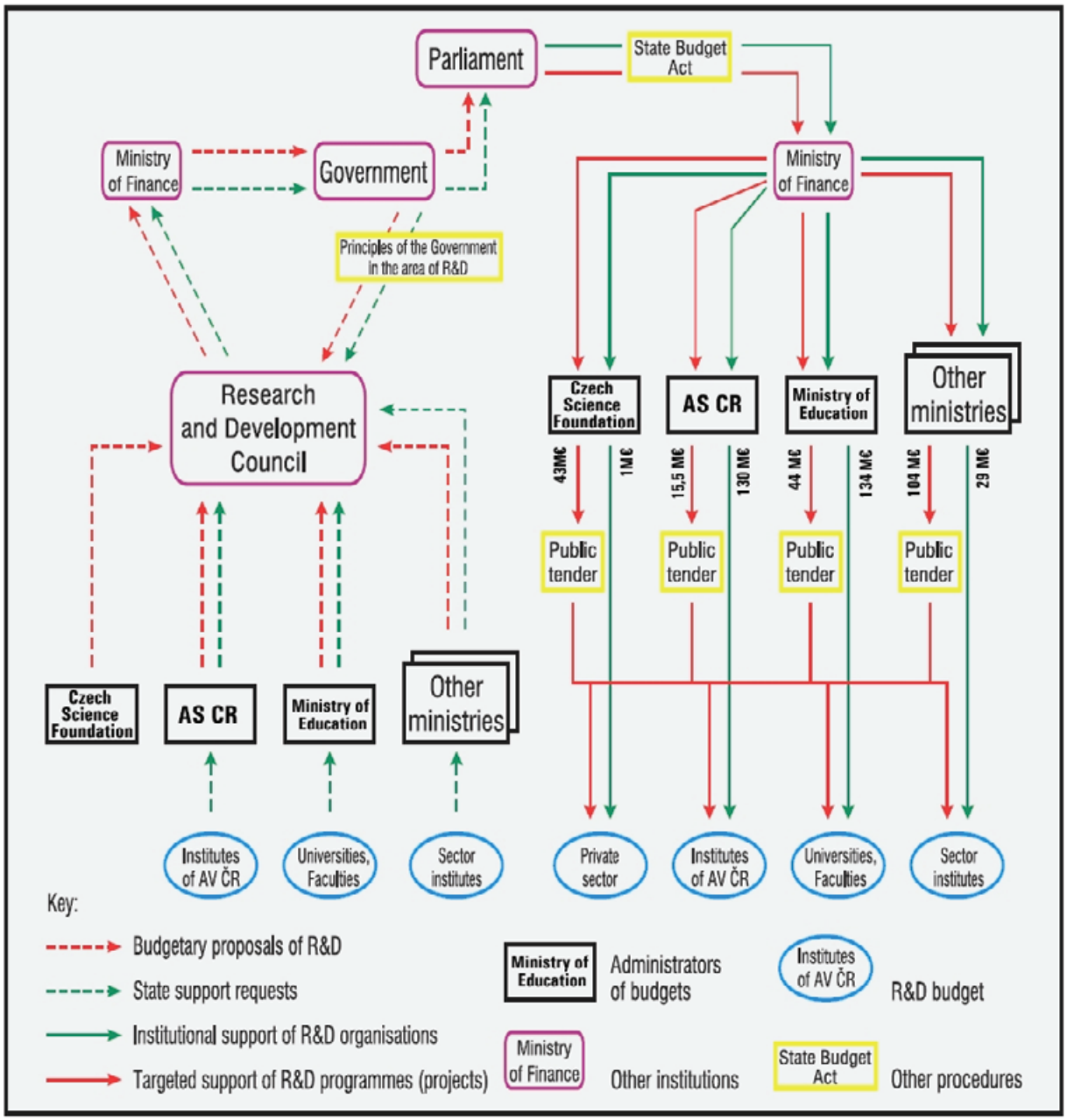
Public HEIs obtain their institutional support for R&D from the Ministry in two forms, through targeted research financing and through institutional research financing. Targeted research financing means support for research connected with providing master's and doctoral programmes. The institutional support is for research plans, specific research at universities and international cooperation.

In the Czech Republic, the share of R&D funding of the governmental sector is still larger than the share of HEIs. However, the share of the universities has increased to 15% (2003). The governmental sector receives 23% of the total R&D expenditure.

A considerable portion of the targeted support flows to public HEIs from international cooperation in R&D. In the case of the Fifth Framework Programme of the EU, public HEI teams were the commonest partici-

pants – 170 teams compared with 82 teams from the Academy of Sciences. Private funding for research at HEIs is generally low. According to OECD data, in 2003 only 1% of the total R&D funding at Czech HEIs came from industry.

The Czech Science Foundation promotes the progress of scientific and technological development in the Czech Republic. Grants are provided to all kinds of Czech state and private research and development institutions and to private persons who are Czech citi-



The Structure of Support for Science in the Czech Republic

zens and reside permanently in the Czech Republic. Basic funds are made available by the state budget, but contributions from other sources, such as industry, foundations, private donations etc. are also possible. Grant proposals can be submitted in five scientific fields: technical science, natural science, medical science, human and social science, and agricultural science.

National Research Policies and Strategies

The main elements of the Czech research policy are based on the National Research and Development Policy, and the National Innovation Policy. The policies deal with the need to create a modern and effective research system in the Czech Republic, which is more similar to systems in advanced EU countries and which enables the creation of a knowledge-based society.

The main challenges for research policies are the fulfilment of the one-third R&D investment by the private sector. The National R&D Policy emphasises the necessity to create adequate framework conditions to motivate the private sector to invest the indicated share and the creation of a functioning linkage between industry and R&D institutions in order to achieve competitive products and services by taking advantage of new technologies. The support of student exchanges and programmes and international cooperation in the field of R&D are also target goals.

The National Research and Development Policy of the Czech Republic was formulated in 2000. On the basis of the Policy, the National Research Programme I for the period 2004-2009 was launched. It contained five main thematic programmes: I. Quality of Life; II. The Information Society; III. Competitiveness and Sustainable Growth; IV. Energy for the Economy and Society; V. Modern Society and its Changes. In 2005, the National Research Programme II for the period 2006-2011, which is more oriented to applied research, was approved.

The first national innovation policy of the Czech Republic was adopted in July 2005. In order to exploit the research potential and to strengthen its position in competitiveness rankings, the Czech Republic prepared the National Innovation Policy of the Czech Republic for 2005-2010. The strategy places great emphasis on R&D as the main source of innovation. The role of HEIs in this process is also stressed. More graduates from technology fields and the natural sciences are requested, and it is assumed there will be close cooperation between HEIs and industry.

Four strategic objectives of the National Innovation Policy are to strengthen research and development as the source of innovation, to establish a working public-private partnership, to secure human resources for innovation, and to make the performance of state administration in research, development and innovation more effective.

As a new input into the National Research Policy and as an amendment to the National Research and Development Policy, a set of seven Long-term Principal Research Directions was adopted in 2005. The components are Sustainable Development, Molecular Biology, Power Sources, Materials, Competitive Mechanical Engineering, Information Society, and Security.

Doctoral education

In order to promote doctoral studies, the Ministry allocates funds for doctoral scholarships to HEIs. The number of doctoral students has increased threefold in the past few years (more rapidly than the total number of students), but the number of graduates is still low, with the time taken to obtain a degree ranging from five to eight years. (Funds for doctoral scholarships and for doctoral programmes began to be allocated only according to the number of students who did not exceed the standard length of study (three years).)

The considerable research training capacity of the Academy of Sciences has continued. It is used now for the provision of doctoral programmes in cooperation with HEIs. The committee for the state doctoral examination and the defence of the thesis is composed of both researchers from the Academy of Sciences and teachers from HEIs. The degree is awarded by the HEI. In the given fields of study, expert councils for monitoring the doctoral programmes have been established. The members of these councils come from both HEIs and the Academy of Sciences. Many researchers from the Academy of Sciences also teach at HEIs, both in doctoral as well as in bachelor's and master's programmes.

The Czech Science Foundation launched a programme entitled 'POST-DOC' in 1998. The aim of this programme was to support young graduates of doctoral programmes and to increase their income so that they could continue their scientific work in the Czech Republic. In 2003, the Czech Science Foundation also announced another type of programme for doctoral teams and their teachers; in this programme, they can obtain three-year grants for financing such things as doctoral research, the mobility of doctoral students and their participation in international conferences. The Research Centres programme has also played an important role in this respect.

Cooperation and Mobility

The support provided for student mobility abroad is directed mainly at students of public HEIs. It is usually connected to an international academic programme, bilateral and intergovernmental agreements and/or agreements of HEIs. Problems include a limitation of financial sources, a lack of interest in mobility amongst the students and language problems. The still insufficient language competence of students and especially academic staff limits the number of outgoing and, in particular, incoming students (except the Slovaks). Recognition issues, noticeable mostly at national level, pose another limitation to student mobility. At most institutions, there is still a lack of a more comprehensive strategy to attract foreign students – connected also with the insufficient number of study programmes accredited in foreign languages, mainly English. The number of foreign students grew between 1999 and 2003 from approximately 5 500 to 14 500.There is a cooperation strategy among the V4/Visegrad countries (Czech Republic, Hungary, Poland, Slovakia).

Estonia

Basic Information

The number of HEIs in Estonia (population 1.3 million) is 37. Based on the form of ownership, HEIs can be categorised as state, public and private. There are 6 public universities, 5 private universities, 7 state professional HEIs, 9 institutions offering vocational higher education and 10 private professional HEIs. Notable institutions include Tartu University (founded 1632), Tallinn Technical University (founded 1918) and the University of Tallinn (founded 2005).

Administration and Structures

The science reform implemented in the 1990s led to the integration of research institutes – mostly former institutes of the Estonian Academy of Sciences (EAS) – into public universities. Nowadays, the main players within the Estonian research system include public universities, technology companies and government policy and funding structures. There are few private universities operating in Estonia, and their focus is mostly on education. The largest public research university is the University of Tartu, followed by the Tallinn University of Technology, Tallinn University and the Estonian University of Life Sciences.

The Estonian Ministry of Education and Research is responsible for the planning, coordination, execution and surveillance of research and education policy. The Scientific Competence Council (SCC) is an advisory body to the Minister of Education. The Ministry of Economic Affairs and Communication is responsible for innovation and technology policy.

The economic control of the activities of public universities rests with the State Audit Office. It is an external auditor for the Estonian Government with the aim of auditing the use of funds in the public sector and and their performance. The resulting recommendations and conclusions are reported to the Parliament and the Government.

During the Soviet era, the Estonian Academy of Sciences was the entity responsible for the research institutes and for implementing Soviet research policy. The Academy is no longer responsible for research institutes but plays an advisory role in advancing the general level of research and development in Estonia. The EAS unites scientists and scholars and acts as an umbrella organisation for a number of associated learned societies, one research institute and the Estonian Academy Publishers. The EAS represents

Estonian science internationally, supports Estonian membership in international scientific unions, and funds and operates a scientific exchange programme with partner organisations abroad. The EAS is not separate from the Estonian science landscape. The members of the Academy do their research at the Estonian universities and R&D institutions; they sit on the boards, councils and commissions dealing with policy and funding issues. The EAS has signed agreements of association with six Estonian R&D institutions.

There is strong cooperation between the Estonian Science Foundation (ETF) and public universities. There have been two major reforms in the history of the ETF. The first took place in 1998 and during this reform the ETF was transformed from a governmental institution into an independent foundation. The second reform took place in 2006 and as a result the number of expert commissions was reduced from eight to four.

Degree Structures and Development

Estonian HEIs have adopted a two-cycle higher education system corresponding to the bachelor's and master's degree system. In July 2002, the Amendment to the Law on University and Other Binding Laws was adopted, stating that, beginning from the 2002-2003 academic year, students are admitted only to reformed bachelor-level, master-level and doctoral-level study programmes and professional higher education study programmes.

The system of assessment of the quality of Estonian higher education is a continuous process consisting of four parts: self-analysis of universities (faculties or departments), a foreign expert appraisal, the decision of an autonomous body called the *Kõrghariduse Hindamise Nõukogu* (Higher Education Quality Assessment Council – HEQAC), and self-improvement of HEIs.

An institution of higher education and its curricula are accredited by the HEQAC, which is appointed by the Estonian Government and which operates under the jurisdiction of the Ministry of Education and Research. The HEQAC comprises 12 members and is formed, and its membership is approved for three years, by the Government on the proposal of the Minister of Education and Research. The names of candidates for the post of member of the council are submitted to the Minister of Education and Research by universities, institutions of professional higher education, research and development institutions, registered professional associations, associations of employers and associations of student bodies.

The research and development institutions are accredited by the Science Competence Council comprised of nine recognised scientists nominated by the councils of public universities and the EAS. Among other duties, the Science Competence Council is also responsible for making proposals for approval of the results of international evaluation of R&D institutions based on the evaluation results, and for making proposals for the reorganisation of state R&D institutions or for termination of their activities.

Research and Development Funding

The new law on the Organisation of Research and Development was adopted in 1997. This law defines the roles of the principal governmental institutions and funding bodies. The instruments of the Estonian R&D funding system are targeted financing, research grants, national research and development programmes and funding of research and development infrastructures.

Targeted financing is decided upon by the Minister of Education and Research by recommendation of the Science Competence Council. Both basic and applied researches are funded. The Estonian Science Foundation is an expert research-funding organisation. It awards research grants to individuals and research teams on a competitive basis in all fields of basic and applied research including the humanities and social sciences. The ETF also aims to support researchers early in their career and represents the Estonian research community at the international level. Public universities are the main grant applicants to the ETF. In 2005, public universities received approximately 87% of the state budget appropriations and state institutions about 10%. The rest of the money was divided between private companies and non-governmental organisations. Technical and medical sciences received proportionally most of the appropriations – about 16% each. Social sciences as a discipline received approximately 10% of the appropriations and all other disciplines between 8% and 12%.

National research and development programmes are launched and funds allocated by the ministry responsible for the implementation of the programme. Development and innovation-oriented research is financed under the innovation policy of the Ministry of Economic Affairs and Communications. The share of the national R&D budget that goes towards innovation policy is, however, significantly lower as compared to the budget that goes towards basic research. The Ministry of Economic Affairs also finances R&D programmes that involve product development, cooperation with enterprises and entrepreneurs, and technology programmes for priority areas. Funds are managed by the Foundation Enterprise Estonia. Through Enterprise Estonia, the allocations of EU structural funds are also

implemented to finance R&D infrastructures, including the infrastructures of the Centres of Excellence.

One of the recent developments in research policy is the institution of baseline funding. The baseline funding was created in 2005, as universities claimed they need it for matching the requirements of ERA research projects. While targeted and grant funding are distributed to specific research groups or individual researchers, baseline funding is given to universities for whatever use they feel to be most appropriate.

The EAS is not a funding agency. It draws its funds from the state budget and uses a limited number of funding mechanisms to support top-level research and to enhance international cooperation, e.g. research professorship grants and science awards and scholarships to researchers and students.

Notwithstanding the well-established funding system, the main issue of concern is low R&D funding (still less than 1% of the GDP).

National Research Policies

The key areas for Estonian research policy are user-friendly information technologies and development of the information society, biomedicine and materials technology. The long-term priorities in R&D and innovation consider the development of a knowledge-based society and the development of a national innovation system, international cooperation and increasing R&D funding.

Research policy focuses primarily on basic research in the universities and on a general research infrastructure. Many research policy programmes and funding streams have been established in support of a research infrastructure and basic research.

National Research Strategies

Estonian research and innovation policy objectives are outlined in 'Knowledge-Based Estonia. Research and Development Strategy 2002-2006'. The document was approved by the Riigikogu (Parliament) on December 2001. The EAS was one of the main agencies responsible for the preparation of this document. The strategy formulates the aspiration of Estonia to become a knowledge-based society where research and development are valued highly as one of the preconditions for the functioning and development of the entire society. Research and innovation policy also puts much emphasis on increasing the international experience and thereby the competitiveness of Estonian researchers. The strategic goals of the Estonian R&D strategy for 2002-2006 are to ensure sustainable economic growth, improve the standard of living and social welfare by renewing the knowledge basis, including improvement of research quality, and to improve the competitiveness of firms.

The finalisation of the new research, development and innovation strategy document for 2007-2013, 'Knowledge-based Estonia II', is currently undergoing the political approval procedures and will likely be approved before the beginning of 2007. After adoption by the Parliament, the document will replace the existing 'Knowledge-Based Estonia 2002-2006'. The draft strategy sees Estonia as an innovative, highly competitive, successful country within the European research and economic area. The document emphasises the necessity for a long-term perspective in R&D investments. The commission appointed to prepare the strategy is headed by the Vice-President of the EAS, Professor Jüri Engelbrecht.

Implementation of Research Strategies

Although government input into R&D has increased in recent years, it has not been quite as significant as it was projected to be according to 'Knowledge-Based Estonia 2002-2006'. The strategy projects total R&D investments at 1.5% of the GDP by the year 2006, with the Estonian Government contributing a significant share of this. The actual investment into R&D in 2006 is about two-thirds of what was expected, but it is growing slowly. Moreover, a significant part of the funding has come from EU Structural Funds.

As a part of the knowledge-based Estonia strategy the Ministry of Education has created and strengthened 10 Centres of Scientific Excellence with additional special funding. The Centres of Excellence are expected to bring together the true cutting-edge research in Estonia. The Centres were selected through an open competition on the basis of an international assessment of their scientific merit. The new group of Centres of Excellence will be nominated during year 2007. The Centres are establishing working collaboration with similar structures in other countries, especially in Finland and Sweden. The Estonian strategy of Centres of Excellence involves not only hard science but also social sciences and humanities. Centres from these fields are the Estonian Centre of Behavioural and Health Sciences and the Centre of Cultural History and Folkloristics in Estonia.

Doctoral Education

Perhaps the most important change in science and research in Estonia has been the re-establishment of research- and doctoral-level education as a core

university mission. Human resources are a constant concern for Estonia's R&D. Much work needs to be done to keep young people interested in scientific careers and to ensure the sustainability of the research staff.

Strengthening graduate education, especially through the integration of research and teaching at the doctoral level, is in contrast to the location of doctoral programmes outside the universities in Soviet times.

The support for young researchers is regulated, although the system still has bottlenecks because of the small budget. Various methods are used to attract more young people to choose research careers (PhD stipend, involving PhD students in the work of the Centres of Excellence, various mobility support mechanisms, research rewards for high school and university students, etc). The Centres of Excellence are also expected to integrate PhD students in their work in order to improve the quality of PhD studies as well as to attract more PhD students to stay on the scientific career track.

The Estonian Science Foundation plays a significant role in the promotion of doctoral education. The involvement of doctoral students in projects, funded by the ETF, is one important criterion considered in the evaluation of project proposals. The foundation also awards scholarships to doctoral students, who are involved in ETF-funded projects. The ETF has developed a new programme called 'My First Grant' to encourage young scientists to apply for grants.

As the PhD studies are organised by the universities only, the EAS as an organisation supports talented young researchers through its own tools, e.g. by supporting the Estonian Academy of Young Scientists, by attracting young researchers to participate in the scientific exchange programmes whenever the partner's rules of eligibility allow, etc. The interaction of Academy members with younger colleagues in universities, research institutes and laboratories, involving them in teamwork, drawing them into top-level science networks and integrating them into Centres of Excellence, is of substantial value for young scientists, including PhD students.

Cooperation and Mobility

Estonian researchers and students have been active in exploiting the opportunities offered by Erasmus, Marie Curie and other EU mobility programmes. The biggest factor influencing student and staff mobility out of the country is a shortage of funds. The legislative framework supports mobility schemes – student loans are portable, and there are very few signals regarding failure of academic recognition of studies abroad. As regards foreign students in Estonia, the total number amounts to 2.4% of the overall student body. The number of exchange students connected with the Erasmus programme is 440 in the 2004-2005 academic year.

Most HEIs in Estonia consider internationalisation to be a very important factor in their development. There are examples where universities have published elections of professorships internationally, opening the competitions to international peers. It is expected that in the near future most of the universities and professional HEIs will have several long-term contracts with foreign teaching and research personnel. These steps are strongly supported by the Government, also financially. The next goal is to open up Estonia's own research system to foreigners. This is not easy because of Estonia's remarkably restrictive immigration policies as well as its traditionally rather closed university structure. Intensive internationalisation of the Estonian research system has been a major recent effort, cutting across most policy measures prepared by the Ministry of Education and Research and the Ministry of Economic Affairs and Communications.

Since 2000, Estonia has also been a full member of the European Science Foundation. Being actively involved in various intergovernmental and non-governmental institutions, the Estonian scientific community has its representatives and votes in shaping the future European R&D policy. Estonia is also engaged in the IPTS/JRC EU project entitled 'Enlargement: Building Linkages on Prospective Activities'. Chairing the ALLEA WG on National Strategies of Research in Smaller European Countries, Estonia has established good links between academies.

The ETF has no particular strategies for regional cooperation with the CEE countries, but international cooperation (e.g. with the Nordic countries) remains one of the main priorities of the ETF. From the CEE countries the ETF has close contacts with the Latvian Council of Science and with the Lithuanian State Science and Studies Foundation. The main priorities of the Estonian Science Foundation are the promotion of international cooperation and the involvement of young scientists in active research. The ETF participates actively in the EUROCORES programmes of the European Science Foundation and in different international initiatives (e.g. in EMBO) on the basis of bilateral contracts.

The EAS's international activities fall into the following major areas: representation of Estonian science in various international organisations, participation in various EU structures, bilateral cooperation and joint scientific events. There is no specific focus on cooperation with CEE countries; however, bilateral cooperation agreements have been signed with many academies of those countries, though. The specific role and influence of cooperation with the Nordic and Baltic countries should be emphasised. The impact of

collaborative links with Finland is vital, in basic and applied research as well as in science policy and strategy. Both the Academy of Finland and the Finnish Academy of Science and Letters are the EAS's long-term partners, the former being its major partner in the scientific exchange programme and also an example for developing science-policy tools, the latter being a good partner in organising joint conferences. There is a long tradition of collaboration with the Finnish Academies of Technology, in particular, in energy research and policy. The first international evaluation of Estonian research and research teams (in 1990s) was conducted through the support and direct involvement with the Royal Swedish Academy of Sciences. Traditionally good links exist with the Latvian and Lithuanian academies of sciences.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Hungary

Basic Information

In Hungary (population 10 million), there are 17 state universities, 1 non-state university, 13 colleges, 26 church-run universities and colleges and 9 colleges run by foundations. In addition to major institutions such as the Loránd Eötvös University in Budapest, the Lajos Kossuth University in Debrecen, the Janus Pannonius University of Pécs, and the Attila József University in Szeged, there are hundreds of specialised schools and colleges. The Central European University, an institution for graduate and postgraduate studies founded in 1991 by George Soros, primarily serves students from the former Soviet bloc.

Administration and Structures

The Ministry of Education and Culture is responsible for higher education and research. (The Ministry of Education and the Ministry of Culture were combined during summer 2006.) The Higher Education and Research Council is an independent body of experts performing pre-decision-making tasks, issuing opinions and making proposals in issues relating to the funding and development activities of higher education.

The management bodies of HEIs are the Hungarian Rectors' Conference and the College Directors' Conference. The bodies are entitled to represent HEIs and to advocate for the interests of those institutions. The National Doctoral Council is a body comprised of the chairs of the doctoral councils of the HEIs.

The 1993 Act on Higher Education provided organisational autonomy and academic freedom to universities and colleges. It established two institutions to provide professional advice on the development and control of higher education: the Hungarian Accreditation Committee (HAC) and the Higher Education and Scientific Council (HESC). HEIs have the right to define their own course structure, develop their own structural organisation and adopt their own regulations. HEIs can independently select and classify their staff and specify their duties. The rights of the HEIs include the development of the internal organisation and the operation of the institution and the right to establish, transform and terminate units and to define the organisational and operational rules.

The Hungarian Academy of Sciences (HAS) is an independent public law association based on the principle of self-government. The HAS supports the development of the sciences, scientific research and the

publication of scientific books and journals, and represents Hungarian science in Hungarian public life and in the international scientific arena. To perform these tasks, the HAS, among others, establishes and maintains research institutes and supports (in the frame of project application systems) research groups affiliated to universities, libraries, museums, etc. HAS research institutes are legally independent entities. This status concerns both research activities and economic management. The operation of the institutes is directed by CARU (Council of Academic Research), which has 30 members: half of whom are elected by the General Assembly of the HAS, the other half being delegated by the research units.

Common grant applications, common research projects and publications between universities and the HAS are signs of the growing (mutual) interest in cooperation.

Major changes in the role of the HAS since 1994:

- In contrast to the Academy's position in the socialist era, the HAS has lost its role as a 'quasi' Ministry for Science.
- The right to train PhDs and award PhD degrees has been transferred to the universities. The HAS, however, reserves the right to award the honorary degree of an 'academy doctor' to outstanding scientists.
- It is the Academy's duty to report on science to the Parliament every second year.
- Scientific degree holders in Hungary may be members of the public law association of the HAS. Their number in 2006 exceeds 11 400. Members participate in the scientific committees of the HAS; moreover, they delegate 200 outstanding non-academician scientists to the General Assembly of the HAS. These elected representatives are entitled to vote on every issue, except the election of new academicians.
- In the late 1990s, institutes with similar research profiles were merged, aiming at more effective utilisation of the facilities.
- Several HAS research groups were moved to university research departments.
- Basic research ceased to be the exclusive profile of HAS institutes. The overwhelming part of their activities is linked to strategic and applied research programmes.

Degree Structures and Development

From 2006, the structure of the Hungarian higher education system offering university- and college-level education has been replaced by the new multicycle course structure to meet the Bologna Process. Both colleges and universities may launch bachelor's, master's and PhD programmes in the new training system, provided that they fulfil the necessary requirements.

Table 1. Research personnel (FTE) by sector

Sector	Researchers year 2000	Researchers year 2005
Government	8 204	7 652
Higher education	8 859	8 194
Business enterprises	6 471	7 393
Total	23 534	23 239

Source: Central Statistical Office, Budapest

Table 2. Distribution of research personnel by field of science in 2005 (%)

Field of science	%
Natural science	16.0
Engineering and technology	28.0
Medical science	14.0
Agricultural science	6.0
Social science	15.0
Humanities	21.0
Total	100.0

Source: Central Statistical Office, Budapest

The complete shift to a multicycle course structure was rendered possible by the new Act on Higher Education adopted at the end of 2005. The fundamentals of higher education reform are defined by the objectives set in Bologna and are embodied in the Hungarian Universitas Programme. One of the goals of the programme is to modernise the course structure in higher education in order to suit the students' needs better and to respond to students needs and to labour market demands.

HEIs are required to develop internal quality assurance systems, and the institutions are free to choose the specific manner of implementation. At the moment, nearly one-third of all institutions operate a full quality assurance system (ISO, TQM/EFQM etc.).

The Hungarian Accreditation Committee is an independent body of experts that operates a national accreditation system, and evaluates institutions, programmes and new universities and colleges applying for operating licences. The Hungarian Accreditation Committee has an International Advisory Committee with nine permanent members and invited foreign experts.

Several Hungarian institutions have participated in international quality assurance projects, such as the European University Association (EUA) Quality Culture or ENQA TEEP Projects 1 and 2.

Research and Development Funding

Although a considerable proportion of Hungarian R&D potential is concentrated in higher education, relatively little of the expenditure has been allocated to it (2005). Considering the number of research areas, the participation of HEIs is nearly two-thirds (65.9%). As regards the number of employees, the participation of higher education is one-third only.

The R&D budgets of universities are largely dependent on government subsidies. There are two main types of subsidies: the normative research support and the various governmental funds (e.g. the Hungarian Scientific Research Fund, in Hungarian Országos Tudományos Kutatási Alap, OTKA). Besides the cooperation between universities and private enterprises, participation in international scientific projects is the main income source.

The Hungary Academy of Science figures in the state central budget as an independent budget chapter. The Appropriation Bill channels basic provisions for the academic research institutes into three blocks, with definite shares:

1. Institutes of Mathematics and Natural Sciences (in the year 2005 these units received 48% of the total basic provision).
2. Institutes of Biosciences (27%).
3. Institutes of Social Sciences and Humanities (25%).

The institutional distribution of the above-mentioned basic provision forms the task of three curatoria of the Council of the Academic Research Institutes. The curatoria evaluate the research performance indicators of the institutes and make recommendations to the Council. The General Assembly of the HAS makes the final decision.

The central budget has a major role also in project financing. On average, the proportion between basic provisions and project financing is about 60-40%. In social sciences and humanities, project financing is about 20-25%.

In the past three years, the proportion of funds granted to universities (where no distinction between public and private universities has been made) within the grand total of funds allocated by the Hungarian Scientific Research Fund has been about 60%, the remaining 40% going to other research institutions, of which the share of the research institutes of the HAS has been around 30%. In the past few years, the ratio of basic funds distribution among the three major branches of research (biosciences, technical/engineering sciences, humanities/social sciences) had been roughly 40:40:20, but in the last round of decisions this has shifted to 42.5:40.5:17, which signals some decrease in funding for the humanities/social sciences. Within this latter branch, the proportion between the humanities and social sciences cannot be computed precisely, because the panel structure does not reflect this cut (i.e. there are panels covering areas from both profiles), but the rough proportion appears to be 50:50, with social sciences slowly gaining and humanities slowly losing ground in the past three years.

Table 3. Distribution of R&D expenditures by sector, 2005

Sector	%
Government	28.0
Higher education	26.0
Business enterprises	46.0
Total	100.0

Source: Central Statistical Office, Budapest

National Research Policies and Strategies

According to the new programme, which the Hungarian Government initiated after its re-election in June 2006, the RTDI priorities are to: support business R&D and innovation, promote cooperation between businesses and research institutes, establish an innovation-friendly legal and economic environment, set up development poles to reduce regional disparities in RTDI, and coordinate the rules and actions of the Research and Technology Innovation Fund and other funds promoting R&D.

The Hungarian Government is committed to the development and operation of an efficient innovation system. To reach this goal, the institutional and legal frameworks have been revised. Consequently, the Science and Technology Policy Council has been established and is chaired by the Prime Minister.

Table 4. R&D expenditures of higher education by financial sources in 2005

R&D expenditure (million HUF)	Source of funds (%)				Total
	Business	Government	Private non-profit	From abroad	
52 246	12.0	82.0	1.0	5.0	100.0

Source: Central Statistical Office, Budapest

The most recent R&D policy document is the 'Science and Technology Policy – 2000'. It was drafted by the Ministry of Education (since June 2006 this has been called the Ministry of Education and Culture), discussed by the Science and Technology Policy Council, and finally approved by a government decree in August 2000. Its major outcome has been the launching of the National R&D Programme, renamed after the famous physicist as the Jedlik Ányos Programme. The national research and development programmes cover the following five fields:

- Improving the quality of life
- Information and communications technologies
- Environmental research and materials science
- Research on agriculture and biotechnology
- Research on the national heritage and contemporary social challenges.

The Law on Research and Technological Innovation stipulates that the Government should prepare a Science, Technology and Innovation (STI) strategy, and should report to the Parliament on the implementation of this strategy every second year. The STI strategy document has not been completed yet, although the original deadline was 31 May 2005. There have been two drafts prepared by the National Office for Research and Technology and the HAS.

Doctoral Education

Since 1994, only universities have been entitled to award PhD doctorates. The doctoral schools are educational organisations that operate within a university and comprise various organisational units of the university with the possible involvement of other HEIs and research institutes outside the institution. Currently, there are approximately 150 doctoral schools in Hungary.

About two-thirds of HAS researchers are involved in graduate and postgraduate education. Modification of the Higher Education Act is a key question: The HAS intends to be involved in doctoral training as a scientific institution. Recently, only individuals have been invited to participate, HAS institutes are excluded from founding doctoral schools. However, there are several HAS institutes that host graduate and postgraduate students as 'external departments' without any (or with very small) financial compensation.

OTKA's role is limited and indirect: being a research-funding organisation, OTKA does not run or directly fund doctoral schools, and offers no grants to doctoral students. OTKA however offers a grant called 'Schools of Research', the aim of which is to facilitate the forming of research groups around renowned leading scholars, consisting mainly of postdoctoral fellows and doctoral students, and part of the grant may be used for creating research positions in the hosting institutions for both the postdocs and the doctoral students involved.

Cooperation and Mobility

Hungary has become a full member of most European and Euro-Atlantic research organisations and programmes (e.g. EU R&D Framework Programmes, COST, EUREKA, CERN, EMBL, ESA/PRODEX and the NATO Science Programme). Hungary has 33 intergovernmental science and technology agreements.

The Act on Higher Education adopted at the end of 2005 makes adequate provisions to facilitate cooperation between Hungary and other countries and removes barriers from joint programmes and joint degrees. The student has the right to become acquainted with international practice and to study in another HEI located in the European Economic Area, and to obtain a student loan for this purpose, or to receive a grant in case he/she executes studies in state-funded training. The National Credit Council is responsible for the national development of the credit system, its harmonisation and the promotion of its function in international student mobility. The intensity of outward mobility well exceeds that of inward mobility. The main obstacles to inward mobility are a scarcity of financial resources and the limits posed by language.

With the cooperation of nearly 40 HEIs, the Campus Hungary Association was established to make Hungarian higher education popular abroad and to recruit foreign students.

The HAS establishes project-based bilateral agreements with each CEE country. The Office for International Cooperation of HAS manages these activities. Individual scientists and HAS research institutes are cooperating with CEE institutes and researchers within several research projects.

There is a cooperation strategy among the V4/ Visegrad countries (Czech Republic, Hungary, Poland, Slovakia). Both Ministers of Education and Presidents (or Secretaries General) of the scientific academies have regular meetings in order to discuss key, strategic issues of international scientific relationships (e.g. brain drain, ERA, ESF, FPs, the role of national academies, etc.). V4 countries established the Young Researchers' Award and the Central European Journals in the field of social sciences and humanities. Within the V4 framework, a special programme was created for the financial support of students coming from V4 countries to be able to study in these countries and for support of foreign students from other countries to also be able to study in V4 countries. The office of the programme is situated in Slovakia.

The Visegrad Group closely cooperates with other regional bodies as well as with individual countries in the region. The Benelux countries (Belgium, Luxembourg, Netherlands) the countries of the Nordic Council (Denmark, Finland, Iceland, Norway, Sweden) and the countries of the Western Balkans are among the Group's priorities. Moreover, the Visegrad Group regularly cooperates with other countries in Central Europe; with Austria and Slovenia within the so-called Regional Partnership and with the Group's eastern neighbours as part of the so-called V4+ concept.

Table 5. Hungary participation to the 5th and 6th RTD Framework Programme

FP5

Specific Programme	**Projects with at least one Hungarian participant**	**Projects coordinated by Hungarian-based organisations**
	Thematic Programmes	
Quality of life and management of living resources (LIFE QUALITY)	108	5
User-friendly information society (IST)	90	6
Competitive and sustainable growth (GROWTH)	95	2
Energy, environment and sustainable development (EESD)	104	7
	Horizontal Programmes	
Confirming the international role of Community research (INCO II)	37	29
Promotion and encouragement of SME participation (INNOVATION SMEs)	13	
Improving human research potential and the socio-economic knowledge base (HUMAN POTENTIAL)	121	33
	5th (EURATOM) Framework Programme	
Research and Training in the field of Nuclear Energy (FP5 EURATOM)	57	15
Total	**625**	**97**

FP6

Thematic Programme	**Number of Hungarian participations in**		**Number of projects with at least one Hungarian participant in**	
	Submitted proposal (calls 1-2)	Negotiated contracts	Submitted proposal (calls 1-2)	Negotiated contracts
Information society technologies (IST) Programme	420	65	292	54

Source: Research And Development In Hungary 2003-2004

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Latvia

Basic Information

There are five universities in Latvia (population 2.4 million). The most recognised institutions of higher learning include the University of Latvia (founded 1919) and Riga Technical University (founded 1862). The national higher education system also comprises 15 state Institutions of Higher Education, such as the Latvian Academy of Culture, the Jāzeps Vītols Latvian Academy of Music, the Art Academy of Latvia (1921), the Liepaja Pedagogical Academy (1921) and 13 private HEIs. State and private HEIs are regulated by the same laws and other legislative acts.

Administration and Structures

The Ministry of Education and Science oversees the whole higher education sector and is the main research policy maker. The Higher Education Council develops the national strategy in higher education and implements cooperation between higher educational establishments, state institutions and the general public. An important role is played by the Latvian Council of Science, which distributes research funding and offers advice and expertise on research policy making.

A major international evaluation of the status of Latvian science was undertaken in 1992 by experts of the Danish Research Councils. As a consequence of this evaluation, the Latvian Academy of Sciences was reorganised and evolved from a Soviet-type institution of administration and separate research bodies into an association of prominent scientists. The Latvian Council of Science was formed as an independent institution.

Over the last years, a huge effort has been made to reintegrate research and higher education. The majority of state research institutes have transformed their legal status and are now formally incorporated into the universities. The integration of these scientific institutes within the various universities has now practically been achieved. In Latvia, there are 20 university research institutes with independent legal status, 12 state research institutes and 15 other state research organisations. Twenty-five of the research institutes are supervised by the Ministry of Education and Science.

The Latvian Academy of Sciences now serves as a representative body of scientists and as an adviser on research policy. The Latvian Academy of Sciences hosts the State Commission on Scientific Qualification. The latter reviews all doctoral theses that are submitted at any of the promotion councils in Latvia.

Degree Structures and Development

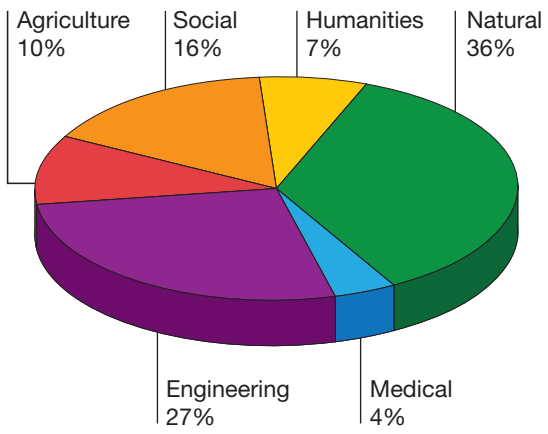
A bachelor-master structure was introduced in Latvia in the early 1990s and was first applied to academic higher education. The two-cycle system has been fully implemented also in the professional higher education sector with the exception of medicine, dentistry and pharmacy. A master's degree or equivalent (e.g. a degree in medicine) is required for admission to doctoral studies. Doctoral studies last from three to four years and are organised as study programmes.

In Latvia, all accreditation evaluations of HEIs and study programmes are made by a non-governmental, non-profit organisation – the Higher Education Quality Evaluation Centre Ltd (HEQEC) in accordance with recommendations of the Council of Rectors as well as in compliance with the requirements of the European Union.

A self-assessment report of a HEI is a necessary pre-condition and the first step of an accreditation of the institution itself and of its study programmes. The report contains, inter alia, a description and assessment of study programmes or their elements and an evaluation of their organisation and practical implementation. Representatives of the administration, academic staff and students are involved in the preparation of a self-assessment report.

Research and Development Funding

After the renewal of independence in 1991, many important changes took place in Latvian science. These changes affected not only the content, structure and administration of science but also the number of personnel and sources of funding were considerably affected.



R&D personnel by field of science in 2000
Source: Central Statistical Bureau of Latvia

Approximately half of the total R&D funding in Latvia comes from the Government. Public funding of R&D is distributed mostly by the Ministry of Education and Science, but recently the Ministry of Economics also has started to distribute funds to support cooperation between research organisations and the business sector. The private sector contributes about one-third of the total R&D funding. An important part of R&D funding comes from abroad. This part is comprised of money from the EU Structural Funds and the EU Framework Programmes as well as other international programmes and foreign companies.

Latvian research funding has increased remarkably during the last years. This increase is due to two reasons: an increase in the GERD financed by Government and the inflow of EU Structural Funds. In 2003, Government expenditure on R&D was approximately 16 million EUR. Three years later it had more than doubled, at approximately 38 million EUR.

Approximately 50% of the public funding allocated to research is spent in the higher education sector. Inside the higher education sector approximately two-thirds of the research funding is allocated to research carried out by the formerly independent research institutes and now attached to universities and the remaining one-third of funding to higher education institutions as such.

National Research Policies and Strategies

The most recent attempt to set out research policy goals has been the development of the draft Guidelines for Development of Science and Technology for 2006-2013. In June 2006, the draft Guidelines were approved by the Committee of the Cabinet of Ministers but the document still has to be revised and approved by the Cabinet. According to the draft Guidelines, the main aims of the science and technology policy is to develop them as a basis for the long-term well-being of the civil society, the economy and the culture and to guarantee a knowledge-based economy and sustainable growth. In order to implement these aims, the following tasks have been set out:

- to rejuvenate and develop the current human resources and infrastructures;
- to transform universities into internationally competitive R&D centres, which regional higher education establishments and other public and private research organisations cooperate with;
- to ensure a substantial increase in public R&D investments and to develop funding mechanisms

which increase co-funding from the private sector;
- to strengthen the international competitiveness of national R&D performers and to support international cooperation in science and technology;
- to support knowledge and technology transfer and develop an institutional environment and support mechanisms to facilitate innovation.

The aims set out in the earlier research policy documents – the National Concept of the Republic of Latvia on Research Development (1998) and the Guidelines for Development of Higher Education, Science, and Technologies for 2002-2010 (2002) – are still partly relevant, e.g. on issues such as the development of human resources for science and technology, or support for science-industry cooperation.

Cooperation and Mobility

Latvian staff and student mobility has been stimulated by the EU Tempus and Socrates programmes, as well as by support through bilateral projects. However, the main obstacle for outgoing student and staff mobility is the insufficient financial support available for student grants. Universities do not have significant support funds, so the availability of national support funds for student grants has become essential.

Traditionally good links exist with the Latvian and Lithuanian academies of sciences. After reinstating the independence of the Baltic countries at the beginning of the 1990s, the three Baltic academies have met regularly and, starting from 1997, regular joint meetings of Nordic and Baltic academies have been held. Within these meetings, the Baltic Conferences on Intellectual Cooperation have been organised. The history of these conferences dates back to 1935 but their regularity was broken in 1940 by the Soviet occupation of the Baltic countries. The tradition was renewed in 1999. The last conference (2005) was held in Helsinki and focused on 'The Baltic: Past, Present and Future'. The next (2007) conference will be convened by the Latvian Academy of Sciences.

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Lithuania

Basic Information

Lithuania (population 3.4 million) has introduced a binary system of higher education based on two types of HEIs: universities and colleges. There are 50 HEIs in Lithuania: 28 colleges and 22 universities. Fifteen of the universities are state universities and 7 non-state universities. The majority of Lithuanian HEIs are public.

The most prominent institutions of higher education include Vilnius University (founded circa 1579), Vytautas Magnus University (founded 1922; reopened 1989) in Kaunas and Vilnius Technical University (founded 1969). The formation of colleges in Lithuania started only in the last decade on the basis of the best higher schools that existed in the country. The year 2005 was the start of the establishment of colleges as a fully structured and operational system of non-university tertiary education in Lithuania.

Administration and Structures

The main public authority responsible for higher education and research is the Ministry of Education and Science (MoES). The Higher Education Council of Lithuania is an expert body of the Ministry on strategic issues regarding higher education development. The Science Council of Lithuania is an expert body of both the Seimas (Parliament) and the Government on the organisation of research and study activities as well as on financial issues. The Lithuanian State Science and Studies Foundation promotes the implementation of state policy in the field of science and studies through the administration of monetary resources.

An important priority of the MoES is the integration of state research institutes into the system of higher education. This transformation is expected to enrich the material base of HEIs, offer opportunities for research in newer fields and improve the quality of studies at master's and doctoral levels. With these objectives in mind, the new law on Higher Education makes it possible for HEIs to have research institutes as basic structural units. It will be possible to open institutes in new or interdisciplinary fields or to integrate existing public institutes into universities with suitable profiles.

Significant steps have already been taken to reform the national research sector. The research institutes that formerly belonged to the Academy of Sciences have now acquired full autonomy. Some institutes have been closed down, but a principal policy of the

Government has been to preserve the capacity of the R&D sector during the times of reform.

Lithuania retains the system of research being carried out at the universities and research institutes. Since the reform in 2002-2003, some of the institutes have been linked up with universities. At the moment, there are 18 university research institutes and 17 state research institutes. The cooperation between universities and state research institutes is maintained through common university-institute research projects and papers, joint doctoral studies, scientists delivering lectures to the students, etc. Another important precondition to increase research activities at the universities is that the budget allocation for each university directly depends on the results of evaluation of the research activities at the university concerned.

Degree Structures and Development

The higher education system is currently undergoing a reform, which should end in 2010. The degree structure based on three main cycles has existed since 1993. The first cycles last 3.5 years to 4.5 years and lead to a bachelor's degree (210-270 ECTS) or a professional qualification. The second cycles last 1.5 to 2 years and lead to a master's degree (90-120 ECTS) or to a professional qualification. Some study fields still do not comprise separate first and second cycles and lead directly to either a master's degree and/or a professional qualification (pharmacy, medicine, etc.).

Only second-cycle graduates of integrated study programmes may pursue third-cycle studies at the universities. The standard duration for doctoral programmes is 4 years.

The Lithuanian Centre for Quality Assessment in Higher Education *(Studijų kokybės vertinimo centras)* carries out external evaluations. The Centre is a public administration institution. Its activities include coordination of the regular self-assessment process of HEIs, arranging and carrying out external evaluations of the activities of HEIs (study programmes), evaluations of newly developed study programmes in HEIs and evaluations of the requests for establishing new higher education or research institutions.

The self-evaluation report is the basis for external evaluation and accreditation in HEIs. Students are involved by means of internal procedures and questionnaires and one student is included in the group responsible for the self-evaluation report.

Research and Development Funding

Public R&D is allocated via three major streams: institutional funding (0.26% GDP), targeted, customer-oriented R&D and public R&D procurement (0.19% GDP), and competitive R&D (0.03% GDP).

The institutional funding goes directly to R&D and HEIs and is mainly aimed at maintaining existing structures and payments for the scientific staff. Competitive-based R&D funding is allocated via the Lithuanian State Science and Studies Foundation. Here institutional projects, independent science group projects, and joint business and R&D sector projects are funded. In addition, the R&D projects, commissioned by enterprises, are funded on a competitive basis.

In the period 2004-2006, the Ministry of Economy launched an independent scheme to promote R&D in business, which is not oriented towards ministerial needs, but is pure support for business R&D projects on a competitive base. The measure is similar to the Lithuanian State Science and Studies Foundation's support for R&D, but has a greater financial weight, and also does not oblige business enterprises to cooperate with R&D institutions.

National Research Policies and Strategies

R&D policy remains primarily a concern of the MoES, while the innovation and economy development strategy is designed within the Ministry of Economy. Although some efforts at integration and coordination were made, political boundaries remain significant.

The strategic reform of the R&D sector itself is no less important than linking it with other sectors of the economy. The historical separation of R&D activities not only from the business but also from the higher education sector needs to end. The restructuring of research institutions, the establishment of transfer agencies, the reinforcement of R&D policy development and implementing institutions are major issues that will be addressed in the coming period.

At the conceptual level, in the Lithuanian long-term Science, Research and Development Strategy (until 2015), a systemic approach towards R&D as an integral part of the national competitiveness strategy is clearly required. These are the strategic objectives declared that should be reached by 2015:

1. to bring the science-industry cooperation system in Lithuania into line with European innovation development practice within the first 7 years.
2. to increase R&D spending to 3% of the GDP by 2010; private sector investment in R&D should reach 2% of the GDP.

3. to achieve a 20% share of the GDP in high-tech industries by 2010.
4. to raise the computer literacy rate to 70% within the first 5 years.
5. to integrate the R&D system of Lithuania into the EU research area
6. the use EU structural funds for research and development in Lithuania.

The main goals declared in the Lithuanian Long-Term Strategy for Research and Development is to strengthen the country's science and technology potential, and to ensure the speed and efficiency of R&D development and the increase of competitiveness of Lithuania to the best of its ability, given its restricted resources.

The aims of the Lithuanian Science and Technology White Paper Implementation Programme are to promote sustainable countrywide development, to ensure systematic long-term research and technological development, and to create a society in which the importance of developing R&D and innovations is emphasised as a key driver of the country's economic growth and competitiveness.

The Scientific Research and Experimental Development policy in Lithuania 2002-2006 is designed to address the main Lithuanian R&D priorities. The main priorities for 2002-2006 are scientific research to ensure a quality of life for the people, to promote a knowledge-based society, scientific research aimed at nanotechnology design, scientific research and experimental development aimed at solving nuclear security and radioactive waste management problems, and to increase the international competitiveness of Lithuanian industries.

The integration of R&D into other sectors of the economy, especially linking it to business needs, is a key target in order to achieve the 3% Lisbon target. The goals related to it are strengthening the R&D base, upgrading the competencies of scientists, establishing and developing technology platforms, among others.

Doctoral Education

Doctoral studies may be jointly organised by higher education and research institutions. The Lithuanian State Science and Studies Foundation allocates grants to doctoral students.

The Lithuanian Society of Young Researchers (LSYR) is a knowledge-based, autonomous, apolitical, non-profit nationwide organisation, open to young researchers/scientists/students from various science and research fields. The LSYR has a delegated representative at the Lithuanian Science Council.

Cooperation and Mobility

The numbers of mobile students from and to Lithuania have been growing constantly over the past years. The organised mobility is implemented mainly through the EU Leonardo da Vinci and Socrates programmes as well as through funds allocated for this purpose by the Ministry. The Erasmus programme is very popular, HEIs are able to award Erasmus grants to only half the applicants. Formal obstacles to student migration within the EU decreased considerably after joining the EU. The MoES supports the initiatives that might enhance the country's higher education visibility.

Staff mobility is primarily seen as the responsibility of each HEI. The Socrates-Erasmus programme plays an important role in the mobility of teaching staff. Staff coming to a Lithuanian HEI for a long-term stay are restricted by two factors: the HEI does not advertise open positions internationally and, so far, the rules of migration do not facilitate this kind of mobility.

Traditionally, good links exist between the Latvian and Lithuanian academies of sciences. To facilitate and enhance trilateral collaborations, the Estonian, Latvian and Lithuanian academies of sciences have run joint research programmes (in energy research, Baltic Sea studies, the humanities and social sciences).


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Poland

Basic Information

The total number of HEIs in Poland (population 38 million) at the end of 2005 was 242 (excluded higher vocational schools), 100 of which were state institutions and 142 non-state institutions. There are 17 multidisciplinary state universities in Poland. There are 21 university-level HEIs, 20 of which are state institutions, and 1 private (Catholic university). Prominent universities include the University of Warsaw (founded 1816), the Jagiellonian University (1364-1400) in Kraków, the University of Wroclaw (1505-1811), and the John Paul II Catholic University of Lublin (1918). The non-state HEIs continue to grow in number.

Administration and Structures

In 2005, the Ministry of National Education and Sports (MENiS) and the Ministry of Science and Information Technologies (MNil) were amalgamated into the Ministry of Education and Science (MEiN). However, the newly created MEiN has been (spring, May 2006) divided again into two separate ministries, namely the Ministry of National Education (MEN) and the Ministry of Science and Higher Education (MNiSW). The division of responsibilities is such that the former deals with primary- and secondary-level education, whereas the latter oversees higher education and manages public funds allocated for R&D projects.

The Council for Science (*Rada Nauki*) plays both an advisory and an expertise role in the area of scientific policy within the Ministry. The Council for Science constitutes a formal representation of the research community. It consists of a maximum of 70 members. The scientific community elects 33 of the members and the Minister appoints others on the basis of his or her own decision or from among candidates designated by other ministers and organisations or research institutions. In February 2005 the Council for Science replaced the pre-existing Committee for Scientific Research (KBN), which used to be elected on the sole basis of democratic procedure and was a decision-making body in the area of science financing.

In Poland, there exists a three-module organisational structure of science, which means that research activities are conducted by institutions belonging to one of the three bodies: HEIs, institutions of the Polish Academy of Sciences (PAN), and research & development institutes.

HEIs constitute a major component of the Polish research potential. Research is also conducted by other state institutions: institutes of the PAN, scientific research institutions and central laboratories supervised by sector ministers as well as by the so-called in-house research services in both state-owned and private companies. In view of the number of research staff employed and the volume of R&D expenditure in individual fields of research, HEIs form the key link in the national research system. Within the HEI sector, research efforts are undertaken mainly by public universities.

Cooperation among the universities and research institutes has been strengthened after Poland's accession to the European Union. Numerous joint research projects are carried out under the EU Framework programmes.

There is a discussion about establishing a state organisation, the National Research and Development Centre (NCBR), for realisation of the science policy. The NCBR would finance strategic R&D activities in a horizontal manner. The goal of the NCBR would be to increase the attractiveness of the Polish HEI in the international arena and to increase the funding for Polish science. The new system would involve the best teams from the universities, the PAN, the Research and Development Units (JBR) and private R&D centres. Currently, the Ministry of Science and Higher Education (MNiSW) carries out screening of all research institutions in order to select the best ones for future cooperation with the NCBR.

Degree Structures and Development

The process of introducing two-cycle programmes[4] began in Poland in the mid-1990s, but has gathered momentum after the start-up of the Bologna Process. However, progress in this area varies considerably between HEIs. Two-cycle programmes may be introduced in 100 of the 106 fields of study; in the remaining six fields (law, psychology, pharmacy, medicine and dentistry, medicine, veterinary medicine), only long-cycle master's programmes may be offered. Particularly in prominent HEIs with long traditions, the academic community is rather reluctant to introduce two-cycle programmes, claiming that high-value degree programmes should last at least five years (only the MA degree remains exclusively as it was in the previous higher education system).

The quality system at Poland's HEIs includes state accreditation and environmental accreditation (evaluation). The body responsible for state accreditation since 2002 is the State Accreditation Committee. The main tasks of the State Accreditation Committee are to draw up opinions on the founding of a HEI, to give opinion and approval for establishing and implementing new degree programmes and extramural branches and to evaluate the quality of teaching.

The activities of the Committee extend to all the state-owned and non-state-owned institutions of higher education. It is the only statutory organ that covers the entire higher education sector and operates for the benefit of the education quality evaluation, whose opinions and resolutions have a legal effect.

Undergoing a State Accreditation Committee accreditation procedure is compulsory. If a field of study receives a negative rating, the Minister is obliged to suspend the enrolment for the particular field of study or to revoke the right to provide the field of study.

Research and Development Funding

Funding for science is distributed by the Ministry of Science and Higher Education. It has two distinct methods of granting funds for research activities. The first is the institutional funding of all universities, main research institutes and units. The second is in the form of grants for research projects selected through competition.

There has been a significant change in the decision-making process concerning the allocation of funding. The key decision maker is no longer the State Committee for Scientific Research (KBN), but the Minister responsible for science, who works in consultation with the Science Council. This means that the Minister maintains overall control of the implementation of financial resources allocated to science.

Universities, institutes of the Polish Academy of Science and the Research and Development Units (JBR) are all supported by a system of grants and the statutory budget from the MNiSW. The Ministry allocates funds to research according to a ranking system. The allocation amount depends on the institute's position in the ranking list (there are four ranking categories). Ranking lists are compiled every four years taking into account the institute's achievements. According to the recent ranking, 95% of the research centres of the PAN are categorised as being in the top category.

4. The level of the HEI in Poland available now: I. 1st-level study (*studia licencjackie i inżynierskie*) concluded with the diploma of *licencjat* or *engineer* (2.5 or 3 years) and 2nd-level study (MA study) concluded with the MA diploma, lasting for 2 years, II. 5-years' MA study. Further levels of education are: 3rd-level study: Ph.D. study (4 years). Moreover, there are programmes (postgraduate study) offering other than HES courses or PhD courses (*studia podyplomowe*), usually in a very specialised discipline for a 1- to 2-year course.

Poland

National Research Policies and Strategies

The Polish Framework Programme (since 2005) is the first attempt in Poland to significantly focus on scientific research, which is crucial to the socio-economic development of the country. It shall serve as a fundamental instrument of the country's research policy outlined in the governmental strategy documents such as the National Development Plan (2007-2013), the Operational Programme Research, New Technologies and Information Society (2007-2013), and the principles of the country's Scientific Research and Innovation Policy until 2020.

The National Reform Programme (2005-2008) was adopted by the Council of Ministers at the end of 2005. The programme can be considered as an attempt at setting up a comprehensive strategy spelling out the main objectives and priorities of the R&D policy.

The principal objectives of the programme can be summarised as follows:

- Consolidating public finance and improving public finance management
- Developing entrepreneurship
- Increased enterprise innovation
- Infrastructure development and upgrading and ensuring competitive conditions in network sectors
- Job creation and retention and reducing unemployment
- Improving the adaptability of employees and companies through investment in human capital.

The National Development Plan 2004-2006 for the modernisation and development of an up-to-date research infrastructure and equipment targeted at strengthening the bond between science and the economy is being successfully implemented.

The Plan covering the period 2007-2013 is being developed as a compound socio-economic blueprint integrating all national undertakings and activities financed at either a national or community level. It involves the development of the operational sectoral programmes such as the Operational Programme 'Research, New Technologies and the Information Society' (2007-2013) which aims at the generation of a greater impact of knowledge and innovation on a long-term sustainable socio-economic development and at the structuring of a knowledge-based economy in Poland.

According to the National Development Plan 2004-2006, Poland should reach a target of 1.5% of the GDP in R&D expenditure by 2006. This is not realistic in practice since the GERD in 2004 was estimated at only 0.58%. Also, attaining 0.9% of GDP spending on R&D funded by business does not seem possible, as business expenditure on R&D (BERD) in 2004 represented only 0.17% of the GDP. That is why the implementing document of the National Reform Programme (KPR 2005-2008) introduced changes to the BERD and GERD targets, i.e. up to 2008, the BERD should reach a level of 0.55% of the GDP, while the GERD should reach 1.65%.

Doctoral Education

A doctoral degree may be provided by the organisational units of HEIs and other research institutions, which are authorised to award the degree of doctor.

Moreover, they may be provided in the form of environmental studies, delivered by the authorised units with the participation of other HEI organisational units or research institutions.

The PAN units are authorised to confer doctoral degrees. Of the 78 PAN units, 57 are engaged in educational activities, such as doctoral studies, which are run independently, or inter-institutional doctoral studies jointly organised in cooperation with the universities. Furthermore, the President of the PAN annually awards 20 doctoral fellowships to outstanding young researchers.

Cooperation and Mobility

Polish HEIs have been very active in international cooperation for many years. They participated in the EU Tempus programme, and subsequently in the Socrates-Erasmus programme. Poland is also an active participant in the EU Socrates Mundus programme. Moreover, joint degree programmes are being established together with foreign HEIs.

Under the aegis of the ESF, and also with bilateral links, consortia of researchers from the universities and units of the PAN have emerged that carry out collaborative activities jointly with foreign partners. International research institutes are created in close collaboration with foreign scientists. The activities of the majority of PAN institutes are supervised by international research councils.

A cooperation strategy exists among the V4/ Visegrad Group (Czech Republic, Hungary, Poland, Slovakia), which operates closely with other regional bodies as well as with individual countries in the region.

Independently the Polish Academy carries out bilateral agreements with every V4 country as well as with all CEE countries. The cooperation is mainly directed towards the realisation of joint research projects, and the organisation of joint conferences, symposia, workshops and summer schools for young researchers.

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Romania

Basic Information

The national higher education system in Romania (population 22 million) comprises both state and privately accredited education institutions and units. The state higher education sector includes 56 public HEIs and 20 privately accredited HEIs. Around 140000 students were enrolled in private HEIs in the 2002-2003 academic year.

Administration and Structures

The HEIs are coordinated, financed and supervised by the Ministry of Education and Research, which is the national authority for Education. The Ministry was created in 2001 out of the former Ministry of National Education and the National Agency for Science, Technology and Innovation. The National Rectors' Council comprises all the rectors of accredited HEIs and is an active body consulted by the Ministry. The National Council for Higher Education Financing (CNFIS) is a consultative council. Its main responsibilities are to present to the Minister of Education proposals regarding the financing needs of higher education and to propose the distribution of the funds provided by the national budget to the higher education system.

In July 2005, the National Authority for Scientific Research (NASR) was established under the auspices of the Ministry of Education in order to undertake the Ministry's specific responsibilities in the field of research, technological development and innovation.

During the late 1960s and early 1970s, Romania concentrated much of its R&D activities in state-owned research institutes in specific industry branches and in institutes of the Romanian Academy rather than in universities or industry. Post-1990, some institutes fragmented and most lost large numbers of staff. The current structure, therefore, is one in which there over 600 research organisations, including 264 public institutions associated with various ministries (of which 37 are designated as National R&D Institutes in 19 specific fields, and a further 65 fall under the auspices of the Romanian Academy), 270 state or privately owned companies which have R&D as their primary activity; and 74 universities which, in reality, undertake only a modest amount of research. In addition, it is estimated that as few as 5% of firms in the Romanian manufacturing sector undertake R&D activities.

In contrast, the Romanian university sector performs only a small amount of mainly basic research

(accounting for only 4% of R&D expenditure in 1993, rising to 14% in 1998). In addition, Romania has an academy structure dominated by the humanities, an industry with almost no R&D capacity whatsoever, and a very large and heterogeneous mix of public- and private-sector research institutes competing for scarce resources and attempting to survive in a relatively novel and often hostile market economy.

The Romanian Academy is incorporated and functions autonomously. Its activity is mainly financed by the state.

Degree Structures and Development

In Romania, a new higher education structure of study cycles has been adopted in order to comply with the Bologna Process. Accordingly, the legislation of June 2004 stipulates the organisation of university studies into three consecutive cycles: the first cycle or bachelor's degree studies (180-240 ECTS), the second cycle or master's degree studies (90-120 ECTS and in particular cases 60 ECTS), and the third cycle or doctoral studies; the master's studies represent a mandatory preparatory base for the doctoral studies.

Earlier, the short-term university education (3 years) led to the *Diploma de Absolvire*. The last cohort of students enrolling in the short-term programme was in 2004-2005. The long-term university education led to a *Diploma de Licenţă*, a *Diploma de Inginer* or a *Diploma de Arhitect*. The duration of the long-term studies varied according to the field, from 4 years (e.g. social sciences) to 6 years (e.g. medicine and architecture).

According to the law approved in April 2006, external evaluation of quality in higher education will be carried out in Romania by the Romanian Agency for Quality Assurance in Higher Education. The Agency is an independent public institution with competencies in accreditation, academic evaluation and quality assurance. As regards quality assurance and evaluation, the Agency periodically establishes and revises the national standards and performance indicators for higher education. It has the right to use international experts and provides its own register of evaluators. In order to inform the stakeholders, the Agency makes public the reports of external evaluations, evaluates at the request of the Ministry of Education and Research the quality of HEIs and programmes, publishes a memorandum on its activity every year, and every four years provides an analysis of the quality of the entire higher education system.

Research and Development Funding

Funding for R&D stands at only 0.4% of the GDP, with the public and private sectors contributing approximately half each. It should also be noted that these levels are much lower than those in the early 1990s. The GERD as a percentage of the GDP halved over the decade 1993-2003, with a nadir in 2000. During this period, the government-funded share of the GERD fell most steeply but recovered in 2000. As part of its EU accession agreement, Romania committed itself to an attempt to raise the GERD to 1% of the GDP by 2007, and there has since been a commitment to approach the Barcelona target of 3% of the GDP by 2010, with 1% coming from the public sector and 2% from the private sector. In consequence, the state budget for R&D in 2005 increased by 60% over the figure for 2004 and was set to rise again in 2006. At current rates of increase, the target figure of 1% of the GDP will be met in 2010.

The National University Research Council (NURC) is the main Romanian funding organisation for university and postgraduate research programmes. The NURC is the interface between the university research community and the Ministry of Education in its capacity as a government representative, playing a crucial role in the allocation of funding for university research and the evaluation of scientific research performance. The NURCI is also intended to create a stimulating environment for scientific research in general and for the formation of highly qualified young researchers in particular.

National Research Policies and Strategies

The strategies set by the Romanian government for the period 2005-2008 are to establish a long-term connection between the research development sector and industry, to increase the public expenditure on research, to stimulate the participation of the private sector in the research development sector and to strengthen the institutional capacity.

The National Development Plan (NDP) for 2007-2013 has an overall emphasis similar to many of the main strands of EU policy expressed in the new Lisbon Agenda. Its focus is on improvements in the competitiveness and capacity of the R&D and innovation system, improvements in the compliance of products and services with EU quality and environmental standards, and on improvements in the business infrastructure and environment for enterprises and progress in terms of the development of the information society.

The NDP recognises that R&D and innovation are key drivers of economic growth and its contents are

redolent of a national innovation system approach in that a comprehensive policy mix spanning human resources, the science base and industry is envisaged. These policies are currently being elaborated in the updated National Plan for R&D and Innovation (NPRDI) 2007-2013, which in turn builds on previous formulations. The first version of this plan was introduced in 1999, updated in 2001 to cover the period 2001-2004, and updated again in 2004 to cover the period up to 2006. The latter two versions were prepared by the Ministry for Education and Research (MER), which is also responsible for preparing the new version for 2007-2013.

The National Plan for R&D and Innovation has been operational since 1999 and currently includes 15 national R&D programmes in various science and technology fields that promote the creation of new products, technologies and services for increasing the efficiency of R&D activities in support of economic competitiveness, collaborative R&D projects through research-industry partnerships and the promotion of science and technology excellence by developing centres of excellence.

The Reform Programme of Higher Education and University Research was implemented in the period between 1996 and 2002. The Programme represented a major component of government strategy for developing higher education, a strategy that followed three main areas of development:: the diversifying of instruction levels offered by the higher education system; the introduction of new areas and development of the existing ones, according to the market economy demands; and the increase in the academic performance and the introduction of modern methods of learning. The third component of the of the Programme supported development for postgraduate education and university scientific research.

The IMPACT Programme, launched in July 2006, will run until 2010 to stimulate the development of RDI projects responding to the themes of the Priority Axis 'Increasing Economic Competitiveness through R&D and Innovation' of the 2007-2013 National Development Plan. This programme can be considered as a new policy measure adopted as a specific response to the Lisbon Strategy objectives. The Programme supports consultancy services for preparing applications for structural funds.

Partners for Excellence is a programme initiated in 2004 by the National Agency for Partnership between Universities and the Socio-Economic Environment (APART) that has been established to promote a strong partnership between HEIs and the socio-economic environment. In Romania there is a lack of correlation between the higher education courses on offer and current employment possibilities in the labour market.

Cooperation and Mobility

Student and teaching staff exchanges were set up in 1991 within the Tempus programme between Romanian and EU universities. HEIs in Romania have been involved in the Socrates and Leonardo da Vinci programmes since 1997. During the 2002-2003 academic year, 45 universities participated in Erasmus activities, involving approximately 2 400 students. Starting with 1998, Romanian universities have taken part in CEEPUS-developed projects.

There exists bilateral science and technology cooperation based on inter-governmental agreements and amounting to around 400 projects a year. Extensions and reinforcement actions of the bilateral cooperation with the EU Member States and other states in the European area, including the states of the former Yugoslavia, have led to 275 projects in 2003 and almost 300 in 2004.


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Slovakia

Basic Information

In the Slovak Republic (population 5.3 million), there are 33 HEIs, of which 20 are are public, 3 are state and 10 are private. The public HEIs, established in 2002 by transformation from state HEIs, are organisations with a non-profit type of economic management.

Administration and Structures

In Slovakia, the responsibility for higher education falls under the remit of the Ministry of Education. Activities are carried out through its Section for Higher Education, which is also responsible for the implementation of the Bologna principles in higher education. The Government has its own advisory body, the Council for Science and Technology. The Council has a right and a duty to discuss any document of substantial relevance to science and technology (R&D) and to express its opinion before the document is submitted to the Government.

The other authorities involved in higher education policy development are the representative bodies of HEIs, namely, the Higher Education Council as a supreme body of HEIs' self-government, the Student Higher Education Council as a supreme representative body of university students and the Slovak Rectors' Conference.

Research institutes and institutions are usually integral parts of the particular universities. The primary goal in the near future is to initiate the complex accreditation and diversification of HEIs toward research universities.

The institutional structure of the science and technology system seems to have changed little in the transition period, in spite of formal changes at the top level of the system. Essentially, the whole science and technology system was, and continues to be, divided into four sub-systems:

1. The Slovak Academy of Sciences (SAS)
2. Other governmental research institutes
3. HEIs
4. Branch institutes and commercial research organisations (which have the greatest potential for innovation)

The Slovak Academy of Sciences carries out basic and strategic applied research. The Academy of Sciences supports scientific disciplines which have attained an international level of quality and which are

necessary for the advancement of the Slovak Republic. The Slovak Academy of Sciences is subdivided into three scientific sections encompassing 56 scientific institutes and 13 auxiliary organisations, which conduct supporting activities. The Academy promotes the professional development and training of young researchers and cooperation with establishments of higher education.

The Association of Slovak Scientific and Technological Societies (ZSVTS) is also an important supplier of continuing professional education. This association is co-funded by the Government and by private organisations.

The Ministry of Education is preparing a science and technology budget proposal in close cooperation with other branch ministries and with the Ministry of Finance. Once the resources are within the budget of a particular ministry, the Ministry of Education has very limited power to influence its use within the other ministry. The Ministry of Economy coordinates technology transfer, innovation and runs a National Agency for the Development of small- and medium-sized enterprises.

Degree Structures and Development

In the Slovak Republic, higher education is based on two cycles which involve three degree levels. The first cycle encompasses the bachelor's study programmes, while the second cycle deals with the other two levels: the second level entails the master's, engineer's and doctor's study programmes and the third level the PhD study programmes. Legal regulations do not allow progression to the third level (PhD study programmes) immediately after completing the first level (bachelor's study programmes).

The evaluation of higher education at the national level is ensured through the Accreditation Commission. It was established by the Government as its advisory body. The members of the Accreditation Commission come from the academic community. The mission of the Accreditation Commission is to monitor, assess and independently evaluate the level of education, scientific or artistic activity in HEIs and faculties and to help improve it. The accreditation is carried out every four to five years according to a schedule. The evaluation is aimed at the quality of provision of the educational and teaching process.

The Accreditation Committee is a member of the ENQA (European Network for Quality Assurance in Higher Education) and the INQAAHE (International Network for Quality Assurance Agencies in Higher Education).

Research and Development Funding

Public research funding is provided by the Government via two channels: through the state budget chapters (ministries and other central authorities, e.g. Slovak Academy of Sciences) and through funding agencies (Scientific Grant Agency and Agency for Support of Research and Development). The research funding is competitive (grants) and institutional (mainly for Government institutes).

The universities obtain public funding for science and technology within the framework of institutional funding of R&D organisations and workplaces and through competitive funding of science and technology on the basis of a public competition. The public HEIs' expenditures are now covered on average by up to 90% from the state budget, the rest comes from their own resources.

In 2000-2004, the portion of costs for higher education research of the total costs for HEIs represented about 10%. The finances for higher education research are allotted from the HEI expenses and are specially monitored. Their internal division and mode of breakdown, based primarily on the performance of the HEI in R&D and the quality of research projects, have both been stabilised. A part of these finances is designed for the operation and development of infrastructure for research and development and the rest is disseminated through grants for projects in basic research, applied research, international scientific-technical cooperation and research for the needs of education. The Slovak Academy of Sciences is an independent institution with its own state budget chapter.

From 2002, HEIs may also receive their finances for research through the Agency for Support of Science and Technology and through state programmes. The Ministry of Education attends to the support of infrastructure for R&D in HEIs.

The Slovakian Government also decided that research and development would be one of the priority areas that should be financially supported by the structural funds for the period 2007-2013. During 2005, the state budget allocated more support to the R&D sector and the Government decided to carry out an administrative reform of its research and technology policies as well as to reform the public R&D sector. One result was the creation of the Slovak Research and Development Agency, which is the only research and development grant agency in the Slovakia. In 2000, the Government approved a new model of science and technology funding. Its aim was to increase transparency in the provision of state budget funds and the efficiency of their application.

Despite political declarations about the importance of research and innovation, financial support for public

and private research remains low. Even if Slovakia has seen strong economic growth, the contribution of R&D to the economy has been limited. This can be seen in the negative trend in the development of R&D expenditure during the same period. With a Gross Domestic Expenditure on R&D (GERD) of 0.53% (2004), Slovakia is far behind the EU-25 average (1.86%).

National Research Policies and Strategies

Both the Competitiveness Strategy for the Slovak Republic until 2010-National Lisbon Strategy and its predecessor the National Reform Programme of the Slovak Republic 2006-2008 state the following major priorities in the field of science, research and development and innovation: supporting highly qualified scientists, performing research of international with the business sector and effective public support of business activities in the areas of R&D and innovations.

One of the main measures taken by the Slovak Government is the launch of the MINERVA programme for science and technology. MINERVA (*Mobilisácia Inovácií v Národnej Ekonomike a Rozvoj Vedecko-vzdelávacích Aktivít*) – the mobilisation of innovation in the national economy and the development of scientific-educational activities – resulted from the Competitiveness Strategy for the Slovak Republic until 2010.

The aim of MINERVA is to pursue activities to support the development of a knowledge economy in Slovakia. In April 2005, the Government presented its first plans for MINERVA. MINERVA is based on four pillars: education and employment, research and innovation, building an IT-based society, and the business environment.

Doctoral Education

Doctoral education is conducted in universities. In terms of human resources, science remains rather unattractive to young people and, furthermore, the age structure of scientists is of concern.

The Science and Technology Assistance Agency prepared the programme 'Young Generation of Researchers' in order to motivate young researchers to perform systematic scientific work, and to promote human resources management of young researchers and their competence in the new grant systems.

Cooperation and Mobility

The international dimension of education is developed in the Slovakia through student mobility carried out by means of international exchange programmes as well as the bilateral or multilateral cooperation programmes accomplished between Slovak and foreign HEIs. Participation at various scientific conferences and research projects is also essential in terms of international cooperation.

Slovakia participates in the CEEPUS (Central European Exchange Programme for University Studies) programme reaching both university students and teachers (student and staff mobility), as well as in the joint Austria-Slovakia project, which is based on bilateral cooperation between Slovakia and Austria.

There is a cooperation strategy among the Visegrad Group (Czech Republic, Hungary, Poland, Slovakia), which closely cooperates with other regional bodies as well as with individual countries in the region.


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Slovenia

Basic Information

In Slovenia (population 2 million) there are 3 accredited state universities and 13 independent HEIs. In spring 2006, a new university was established (Politehnika, Nova Gorica), the first example of a public-private partnership in this area.

The University of Ljubljana, which was founded as a Jesuit College in 1595 and reopened as a Slovene University in 1919, has departments including the natural sciences, social sciences, humanities and arts, education, law, medicine, and engineering. The University of Maribor, founded in 1975, is vocationally oriented. The third state university, the University of Primorska, was established in 2003. In the University of Primorska, undergraduate and postgraduate study programmes are conducted by three faculties, the Faculty of Humanistic Studies, the Faculty for Management and the Faculty of Education.

Administration and Structures

The Ministry of Higher Education, Science and Technology is responsible for higher education and research in Slovenia. The Council for Higher Education elaborates the Master Plan for Higher Education, conducts accreditation procedures and gives opinions on various other matters. An advisory body to the Government in the R&D area is the National Science and Technology Council, with members from the research community, HEIs, the business community and government. The Slovenian Research Agency, a special public agency, was established for the implementation of the R&D policy.

The four universities and public research institutes constitute the main public research capability. There is a significant cooperation between universities and the research institutes. There are also important research centres at universities. In Slovenia, there are 47 non-university research institutions, 18 of which have the status of national research institutes. The premier centre is the Slovenian Academy of Sciences and Arts, established in 1938, but this has no role in doctoral education.

According to Slovenian officials there is a tendency to have research-oriented student-centred universities. At undergraduate level, the students become acquainted with basic research work, while graduate and doctoral studies are research oriented. There is a considerable collaboration between faculties and also some interdisciplinary study organised within universities.

Slovenia

Degree Structures and Development

The higher education system in Slovenia is undergoing reforms according to the Bologna Process. Universities follow the 3+2+3 system, however, the 4+2+2 system is also present. Curricular reform is currently under way for the 2009-2010 academic year.

The University of Ljubljana and the University of Maribor have participated in the EUA institutional evaluation. Since Slovenia does not have an independent agency for quality assurance, the universities perform self-evaluations of education and research. There have not been any external evaluations yet.

Research and Development Funding

The level of R&D investment in Slovenia has been around 1.5% of the GDP for several years. Slovenia introduced Lisbon and Barcelona targets into its R&D policy and plans to achieve a 3% investment in R&D by 2010.

Most of the financial resources come from the Government through the Ministry of Higher Education, Science and Technology and are then channelled through the Slovenian Research Agency. All research organisations and individual researchers have to be registered on the central register at the Slovenian Research Agency if they want to apply for public funding.

Several different financing schemes have been developed, with research programme financing being the largest. Funding is available for applied projects to support participation in international research projects, for various infrastructure co-financing programmes as well as for a special scheme on targeted research projects, where research is commissioned by different Government offices to support their decision-making process.

National Research Policies and Strategies

The basic R&D policy document, which specifies key objectives in the area of research policy, is the National Research and Development Programme (NRDP), prepared for five-year periods. The current programme was prepared by the Ministry of Higher Education, Science and Technology and adopted by the Parliament in December 2005 for the period 2006-2010. The key objectives include:

- increasing public R&D investment to 1% of the GDP by 2010
- shifting the balance of public research funds from basic non-targeted research in favour of targeted (and applied) research
- the introduction of support measures to stimulate growth of investment of the business sector in R&D to help achieve a 2% target
- growth in the number of researchers with PhDs in the business sector
- a higher rate of establishment of new high-tech firms, including the promotion of spin-offs from universities
- continuous participation in international research, especially in ERA
- support of the growth of patents, as an indicator of the business relevance of the research
- growth of high-tech exports and growth of added value to the Slovenian economy.

(info taken from the document, published at www.mvzt.si).

In addition to the NRDP, several other strategic documents in the area of R&D and innovation were accepted by the Government during 2005, which are important for the R&D policy in years to come:

- the Slovenian Development Strategy 2006-2013 (putting strong emphasis on R&D and innovation as important factors of economic growth)
- the National Research and Development Programme (setting R&D priorities, committing to a 3% GDP target for R&D, seeking closer cooperation of public R&D and the business sector)
- the Reform platform (a set of proposed policy reforms in different areas, stressing strongly the need to increase R&D and innovation efforts to increase the competitiveness of the national economy; partly connected to the National Reform Programme for Achieving the Lisbon Strategy Goals).

These documents are novel in the sense that for the first time both research and development results and increased innovation efforts by the business sector are seen as the key inputs into increased competitiveness and therefore more dynamic economic growth. This clear linkage of R&D and economic policy has not been so explicitly pronounced in the previous R&D documents.

Cooperation and Mobility

All HEIs have introduced projects within the framework of the EU Socrates-Erasmus programme, which include in particular the exchange of students and teaching staff. International activities targeting the joint provision of study programmes are also on the increase. Some HEIs already offer students the opportunity to complete a period of study abroad. In general, mobility is constantly increasing; however, there is a great dis-

proportion between outgoing and incoming students.

The Centre of the Republic of Slovenia for Mobility and European Educational and Training Programmes (CMEPIUS) was established in October 2003 and continues the work of the previous EU Programmes Agency.

The Slovenian Academy of Sciences and Arts co-operates with the national academies on the basis of bilateral agreements for the exchange of scientists and research projects.

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List of Acronyms and Abbreviations

CEE	Central and Eastern Europe
GERD	Gross Domestic Expenditures on Research and Development
GDP	Gross Domestic Product
HEI	Higher Education Institute
NRP	National Research Policy
R&D	Research and Development
RTDI	Research & Technological Development & Innovation

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