

HUNGARY

Section A: General framework and trends in science, technology, and innovation policy

1. Please provide a brief overview of the main directions, objectives and elements of national policies for science, technology, and innovation, highlighting the following topics:

Main features of recent science, technology, and innovation policy developments (e.g., including new innovation strategies) and the rationale behind them:

Current situation:

According to the EU Innovation Scoreboard 2005, Hungary is 15th on the summary innovation index out of the 25 EU members

Weakest performance: is on innovation drivers, IPR and very low performance on Business R&D. It is due to low levels of S&E graduates, broadband penetration, and lifelong learning.

Best performance is on knowledge creation. On applications, Hungary performs above average on employment in medium-high and high tech manufacturing and in high tech exports, both linked to foreign investment. Hungary is successful in innovation diffusion. The main challenges: to increase the supply of new S&E graduates (currently 39% of the EU average) and to continue to support increasing levels of business R&D, which have grown from 0.26% of GDP in 1998 to 0.36% in 2003. Early stage venture capital, which could play an important role in encouraging spin-offs from foreign affiliates, also needs to be increased from its current very low level of 6% of the EU average.

All stakeholders have been starting to recognize in Hungary that innovation is the main driver for competitiveness, growth, creating the knowledge society.

Challenges for the Hungarian National Innovation System:

- Low innovation intensity of companies, especially SME's.
- Strong academic background, but with inadequate linkages to industry.
- Regional disparities.

Measures taken by the Government:

a) S&T Innovation Strategy (2006-2013)

In order to change this situation the elaboration of a Research, Development and Technological Innovation Strategy has been on progress on Governmental level with the co-ordination of the National Office for Research and Technology (NORT) to encourage the economic competitiveness. The timescale of the strategy is between 2006-2013. The overall objective of this strategy is transformation of the ratio of

private to public R&D expenditures to 2:1 till the end of the time-period in such a manner that the GOVERD should be remain 0,7 % of the GDP, while the BERD should be reach 1,4 % of the GDP. It means 2,1% GERD/GDP ratio that can be increased to 2,5% if Hungary will be able to use successfully the subsidies of the EU Structural Funds.

For the implementation of the above mentioned objective, our new strategic principles are the following:

- Strong focusing (on key technology areas)
- Commercialisation – utilization (new products, and new spin-off firms)
- Special regional efforts (building a well functioning innovation system)

We need to take concerted actions in some fields:

- By strengthening the R&D and innovation activities establish and develop competitive domestic enterprises and products on the global market.
- The concentration of the innovation capacities on sectorial and territorial base, the extension of infrastructure, improvement of the efficiency of the research units.
- According to the need of the knowledge based economy and society innovative labour force training, enhancing researcher training and further education.
- Correction of the R&D and innovation incentive legal environment

Besides that, some horizontal strategic approach should also be necessary to reach our objectives such as regionalism, human resources, Infrastructure (infocommunication devices), international R&D cooperation, sustainable development, security, equal opportunities.

b) National Development Plan (2004-2006)

In the previous STI Outlook, we described detailed information about the NDP. The long-term objective of the Hungarian National Development Plan, i.e. improvement of the quality of life and its general objective for the given period, i.e. reduction of the significant lag in the per capita income compared to the EU average are defined on the basis of the analysis. There are three specific objectives supporting this main objective: improvement of economic competitiveness, better utilisation of human resources and promotion of a better quality environment and regional development. The National Development Plan intends to achieve the specific goals through four development priorities: more competitive manufacturing sector, increasing employment and human resources, better infrastructure and cleaner environment, stronger regional and local potential. These are supplemented with the Technical Assistance priority assisting the implementation of Community Support Framework. The measures defined in order to achieve the above goals are implemented in the framework of 5 Operational Programmes.

c) National Strategic Reference Frame (2007-2013)

As foreseen, Hungary anticipates receiving over 6000 billion HUF Community development funding between 2007 and 2013. We are required to compile the National Development Plan II (called National Strategic Reference Frame) by the beginning of 2006, that defines the main avenues of development, as well as the central and regional operational programmes that define the detailed regulations for the use of EU Structural Funds.

Major changes in the legislative, administrative, organisational, institutional, or budgetary framework for the formulation and implementation of science, technology, and innovation policies (e.g., new Ministerial

structures, better inter-Ministerial coordination, increased involvement of non-governmental stakeholders):

You can find detailed information in the previous OECD STI Outlook about:

- The re-establishment of the Science and Technology Policy Council (TTPK) and its advisory body composed of eleven highly respected representatives of science and industry (Science and Technology Advisory Board, TTTT) in April 2003.
- The tasks and the mission of the National Office for Research and Technology (NORT) which is responsible for elaborating and carrying out the governmental science and technology innovation strategy.
- The task and mission of the Agency for Research Fund Management and Research Exploitation (KPI) which is responsible for managing the call for proposals of NORT RTDI program portfolio and operating as an (intermediary body) of the Research, Development and Innovation priority within the Economic Competitiveness Operational Programme, using the EU Structural Funds and national co-financing. Research and Technological Innovation Fund that was established by the Act XC. of 2003.

The Fund provides stable and reliable financing for RTDI activities. The independent government Fund is envisioned to promote demand driven innovation and the knowledge based competitiveness of companies. The Fund is financed by mandatory contributions of all companies registered in Hungary, matched yearly by the government budget. The so-called innovation contribution, based on the of the (adjusted) net turnover, for medium size and large companies grows from 0.2% in 2004 to 0.3% by 2006. Micro-enterprises and small-size enterprises are exempt from paying a contribution. Direct R&D expenditures, both intramural and ordered from public R&D units, can be deducted from the contribution thus stimulating innovation activities. The company payments into the transparent, dedicated RTDI Fund shall be used for the direct or indirect benefit of the private sector, as stipulated in the legislation creating the Fund. It is also a legal requirement that resources of the Fund be spent through competitive calls, and at least 25% should go for regional innovation purposes.

Use of the financial resources of the Fund:

Strategic issues relevant to the Fund shall be addressed by the Research and Technological Innovation Council. The majority of the members of the Council shall comprise of non-governmental representatives of the economic and scientific communities. The Council shall have a right of approval concerning the establishment of the utilisation plan and the strategy for the calls for proposals for the Fund, including determination of the means and tools of funding and decision-making relevant to the provision of financial assistance.

The Act on Research and Development and technological Innovation entered into force in 2005. (Act No. CXXXIV of 2004). (During the previous STI Outlook it was a plan yet). The main provisions of the Act are the followings:

Aims of the Act: The Act promotes the sustainable development of the Hungarian economy through Research and Development (R&D) and Technological Innovation (TI). It also aims at increasing the competitiveness of enterprises and at the effective exploitation of both regional research & development and regional innovation potentials. The act encourages the creation of high value added workplaces. It fosters improvement of both professional skills and the recognition of researchers performance.

Basic Principles: Without distorting market competition the Hungarian state supports the innovation activities of enterprises. Public funds are allocated through competitive calls and the projects are monitored

and independently evaluated. Small and medium-sized enterprises are eligible to receive funds under specific favourable conditions. Governmental financial measures promoting innovation are tailor-made for the specific needs of innovation activities.

Interpretative Provisions: R&D and TI definitions applied by the act comply with OECD and EU concepts like Pure Basic Research, Targeted Basic Research, National Innovation System, Consortium and Spin-off Company.

Governmental Tasks Concerning Research & Development and Technological Innovation.

The government, in cooperation with stakeholders shall create a mid-term scientific, technological and innovation strategy. The government shall submit a biennial report to the Parliament on the progress toward achieving the objectives of the strategy. The government shall promote participation in international scientific and technological co-operations. It shall encourage enterprises to exploit R&D results. It shall provide support for the creation of R&D infrastructure and for carrying out activities concerning R&D, the exploitation of research, as well as TI. The government shall define the system, the guidelines and content requirements for independent evaluation and monitoring. The National Office for Research and Technology is the governmental organization responsible for the formulation, implementation and coordination of the government strategy. The act describes the duties of ministers and that of the President and the Secretary General of the Hungarian Academy of Sciences concerning R&D and TI issues within their budget chapters.

Supporting Research & Development and Technological Innovation by Public Financing

- The government can establish research units, to be supported by the central budget. Basic Research is supported through a framework of competitive calls. The government shall provide public funding for strengthening R&D and TI by calls for proposals. The projects with the potential for indirect effects and technological breakthrough; having macroeconomic or social impact; as well as those fostering industry-academia or regional and trans-national co-operation shall receive priority.
- State financial contribution shall be provided in accordance with the actual resource needs of the project and within the framework of the financial provisions set out in the contract.
- Public research institutions receiving financial contribution based on international agreements or EU financial contribution shall be eligible for domestic pre-financing, in case advance funds are not provided for in the abovementioned contribution.
- Small and medium-sized enterprises or non-profit research institutions receiving financial contribution based on international agreements or EU financial contribution shall be eligible for interest-rate-subsidy on loans used for the funded projects.
- The funder shall have independent evaluation carried out on the progress toward achieving the program objectives and on the results of specific projects. The funder shall make use of the results and best practices revealed by the evaluation.
- The Hungarian Current Research Information System (HunCRIS) shall keep a record of research projects. All beneficiaries of R&D public funding shall take on the obligation to provide data to HunCRIS that shall be public.

Protection of Intellectual Property Rights and Promotion of the Use of Intellectual Property

- The beneficiaries of R&D project funding shall ensure that intellectual property rights are conferred to them. If several participants co-operate in a project, they shall conclude a civil law contract on their respective share of ownership of intellectual property rights. In case the funder

requires the intellectual property to be made available free of charge for public use, this requirement should be made explicit both in the call for proposals and in the funding contract.

- All public research institutions, public foundations and non-profit companies which qualify as research institutions shall ensure that they adopt the -Rules for Intellectual Property Rights Management, governing evaluation and registration of intellectual property, regulating the conditions for conferring intellectual property to a company as non-financial contribution and defining the terms of other means of intellectual property exploitation. The Rules for Intellectual Property Rights Management shall set out the rights and obligations of the personnel working on the project. It shall also govern evaluation, registration and exploitation procedures. The Rules for Intellectual Property Rights Management shall be approved by the head of the organization concerned, who shall not confer this right to anyone.
- Public bodies possessing intellectual property rights are entitled to confer these rights to a spin-off company as non-financial contribution if the spin-off company concerned has its Rules for Intellectual Property Rights Management referred to in § 18.
- State property is protected by a row of provisions: re-conferring of intellectual property by a spin-off company to another company as non-financial contribution is prohibited; the liability of a public body must not exceed its share in the spin-off company; the share of dividend the public body receives must not be less than its share of ownership; financial contribution of a public body to a spin-off company is limited to a low level; additional payments by public bodies holding shares in spin-off companies shall not be made; spin-off company shares held by public bodies shall not be sold at a lower price than that set out by the auditor; public bodies shall submit annual reports on the spin-off companies in which they are involved.
- Public and non-profit research institutions may receive funds for acquiring spin-off company shares through call for proposals.
- Public employees working for public research institutions may become members, executive officers or employees of spin-off companies.

Human Resources of Research & Development and Technological Innovation

- Within the framework of R&D and TI calls for proposals funding may be granted for education and training, PhD-training as well as international and intersectoral mobility.
- Secondary school teachers holding a scientific degree or scientific title are entitled to go on an unpaid sabbatical once in every seven years for a maximum period of six months. They are eligible to apply for fellowships for the period of the sabbatical.
- Projects attracting highly qualified or specially trained foreign fellows or personnel to carry out Research & Development and Technological Innovation activities in Hungary are eligible for public funding for this purpose through calls for proposals.
- If the employer has provided its prior consent to the researcher to work for a spin-off company, then – pursuant to their employment contract – it shall provide the researcher with an unpaid holiday.

Services Promoting Research & Development and Technological Innovation.

- Services promoting innovation are eligible for funding, particularly regarding the following activities: establishment and management of enterprises carrying out technological innovation; safeguarding capital supply of these enterprises; co-operation between research institutions and enterprises; protection and exploitation of intellectual property rights; promoting equal

opportunities concerning access to market information; acquiring and dissemination of knowledge; and improvement of infrastructure.

- Innovation services shall be provided in every region. Regional Development Committees shall ensure that Regional Development Agencies or other organizations become capable of co-ordinating regional innovation activities, including the network co-operation of service providers.
- The exploitation of intellectual property by small and medium-sized enterprises is supported by guarantee funds with partial state ownership.
- Projects using the services of research infrastructure abroad may be eligible for public funding through calls for proposals. The government may contribute to covering the costs of research infrastructure abroad if their services are available for Hungarian research institutions and enterprises, too. The government may support the creation, management and development of research infrastructure built in the framework of international co-operation in Hungary.
- The act contains provisions promoting public awareness, increasing public recognition and general appreciation of Research & Development and of Technological Innovation.

New policy measures to foster increased innovation and productivity growth in the service sector (both services in general and specific service-sector, finance, etc.).

The above mentioned measures will foster increased innovation and productivity growth also in the service sector.

2. Please describe major shifts or changes in the priority given to different areas of science, technology, and innovation policy listed below or the policy instruments used to achieve them: i) strengthening the science system; ii) supporting business innovation; iii) linking science to innovation; iv) developing human resources for S&T; and v) establishing framework conditions that are conducive to innovation (e.g., IPR regimes).

The emphasis of previous R&D programs was on small projects (100-150 million HUF), the current emphasis is on larger projects (2 billion HUF) geared towards satisfying industrial and regional needs.

Strong academic research base with strong linkages to companies focusing on the exploitation of R&D result for business purposes: Establishment of Regional University Knowledge Centers and their cooperation with the industry, aiming to effectively utilize the R+D results. (*12 center*), establishment of Innovation Clusters (*6 cluster*), establishment of Technology Incubators (*2 incubator in the field of biotechnology*)

Implementing new initiatives for promoting the researchers mobility and development of human resources.

According to the provisions of the Innovation Act, the NORT and the Hungarian Patent Office prepared a Guideline concerning IPR Management Rules that helps the universities to elaborate their own IPR Management Rules.

The NORT restructured its program portfolio and launched the following new RTDI Programs:

a) Regional Innovation Development Program (Gábor Baross Program)

The Gábor Baross program, by motivating innovation supports the development of the Hungarian regional economy and competitiveness. Its goals are:

- The development of the regional economy and competitiveness based on innovation.

- The establishment and reinforcement of regional innovation networks.
- The decentralization of arrangements motivating regional innovation.

The main elements of the program:

- Foundation of **Regional Innovation Agency** network. Since the end of 2004 the network helps the cooperation between R&D and entrepreneurs, providing information, with establishment of the innovation network and further with supporting the use of innovational services.
- The **Innocheck program**, which aims to support the innovation initiatives of small and micro-sized enterprises, through the enlargement of regional innovation tools via the introduction of the support system of innovation services.
- The Regional Innovation Development Program-package, established on the proposal of the Regional Development Committee (RFT) serves the innovation goals of the **decentralized regional division** of the Research and Technology Fund.

b) Focus Sector Innovation Program (Oszkár Asbóth program)

Focus Sector Innovation Program (FSIP) offers support to establish research and development clusters at international level. In the framework of this program, it is possible to build innovation clusters in different scientific area, having significant influence on the technological and economic development of the country. The major aim of the Oszkár Asbóth Program is to accelerate the development of focus sectors with the establishment of internationally significant innovation clusters, moreover the building up the intellectual infrastructure and economic background of the focus sector. Furthermore the goal of this Program is to coordinate the entire innovation process from the starting idea till the implementation. The Program wants to motivate the foundation and development of knowledge and technology efficient corporations,, catalyse foreign capital investments and would like to force the settlement of high-tech companies the innovation clusters.

As a result of this program, namely via the establishment of internationally competitive innovation and R&D clusters and new corporations, we forecast that new workplaces can be generated. The Program contributes to the evolution of working conditions of qualified young researchers and to the resettlement of the qualified scientists to Hungary.

c) Regional University Knowledge Centers (The Péter Pázmány Program)

The goal of the tender is that such Regional University Knowledge Centers (**RET**) are set up that cooperate with companies and other organizations, dealing with research and innovation in order to manage innovational projects focused on research and development at an international level. The task of the knowledge centers that have won are to create from the R&D results new products and technologies that are beneficial in the business sense.

With the establishment of the **RET**'s there lies an opportunity in the field of R&D that human and capital resources concentrate in the same place that can lead to the increase of technologic development in the given region. In the framework of the program, it is advisable that amongst the economic partners of the **RET**'s such enterprises should be present that motivate and support the R&D activities and at the same time users of the new research results and technologies. The task of the Regional University Knowledge Centers is to help the cooperation of professionals in R&D and the actors of the economic sphere. Hence, the industrial background that is already present is expected to strengthen and this would highly influence the development of the given region. The important financial support given to the knowledge centers

would allow the **RET**'s to employ more and more young pre and post doctors as well as successful senior researchers (settling home).

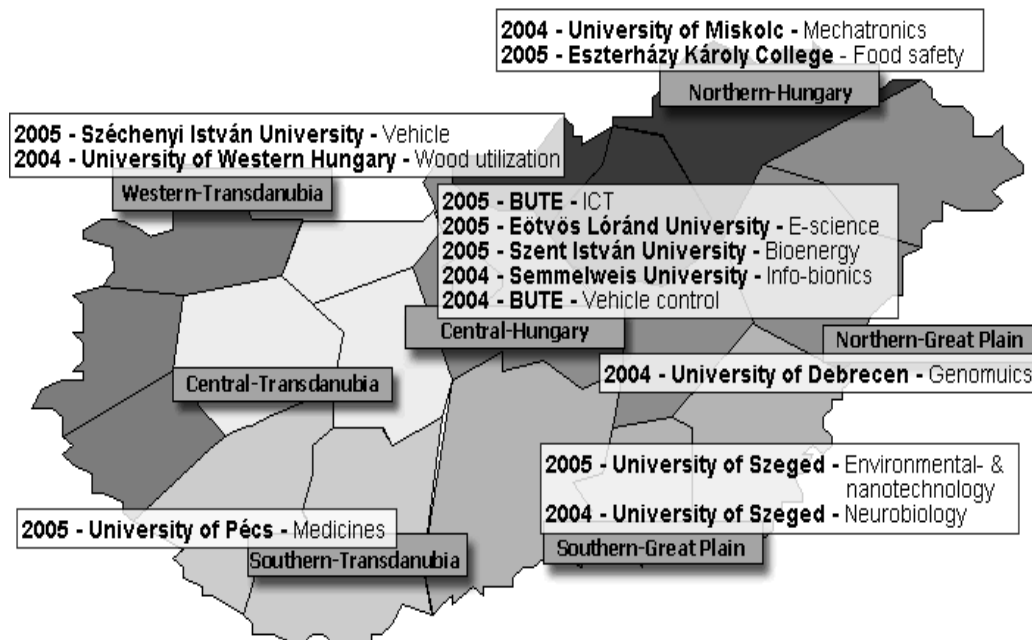


Figure 1: Established Regional University Knowledge Centers in Hungary

d) János Irinyi program

The János Irinyi Program introduced by the National Office of Research and Technology supports the establishment of innovative small and medium-sized enterprises (SME-s), so as their intensification. The program encourages the realization of innovative ideas of small and medium-sized enterprises; the introduction of research results into economy, the launch of new products on the market, the introduction of state-of-the-art technologies, the innovational services needed for product development and the establishment and utilization of technological incubators; that is the incubator-houses capable of incorporating modern technologies and offering intelligent services. In the framework of the program the innovative SME-s are offered help in order to receive a starting capital, needed for product development and the application of the incubation services. One component of this program helps to expand these processes, through which an idea develops into a marketable product, service or method. It helps the SME's to set up an experimental plant in order to produce or test the new product; moreover it assists in the surveys, needed before market introduction and also helps acquiring licenses from the authorities. The program offers support from the phase of prototype production until marketing and also in further experimental development works.

e) National Research and Development Programs (Ányos Jedlik Program)

This program of the National Office of Research and Technology named after Ányos Jedlik supports long-term strategic researches that promise major scientific and economic breakthrough in the area of research and development. (Earlier called NKFP)

The industry and universities so, that they could generate effective technologies and products from the R&D results. In the light of these perspectives, through the process of winning such tenders, consortiums lead by enterprises has an advantage.

The consortiums present in the supported project may implement basic and applied research and experimental development in order to reach their results. The **Ányos Jedlik program** may endorse that the young researchers stay in the scientific career and may help the home-settlement of post doctors and successful senior researchers.

The **Ányos Jedlik** program wishes to reach its further goals via the support of R&D projects implemented in the fields of the below seen thematic sub-programs:

- 1) subprogram: Science of life
- 2) subprogram: Information and communication technologies
- 3) subprogram: Environmental protection
- 4) subprogram: Agricultural and biotechnology
- 5) subprogram: Science of material

subprogram: The social challenges of technological changes studies, analyses

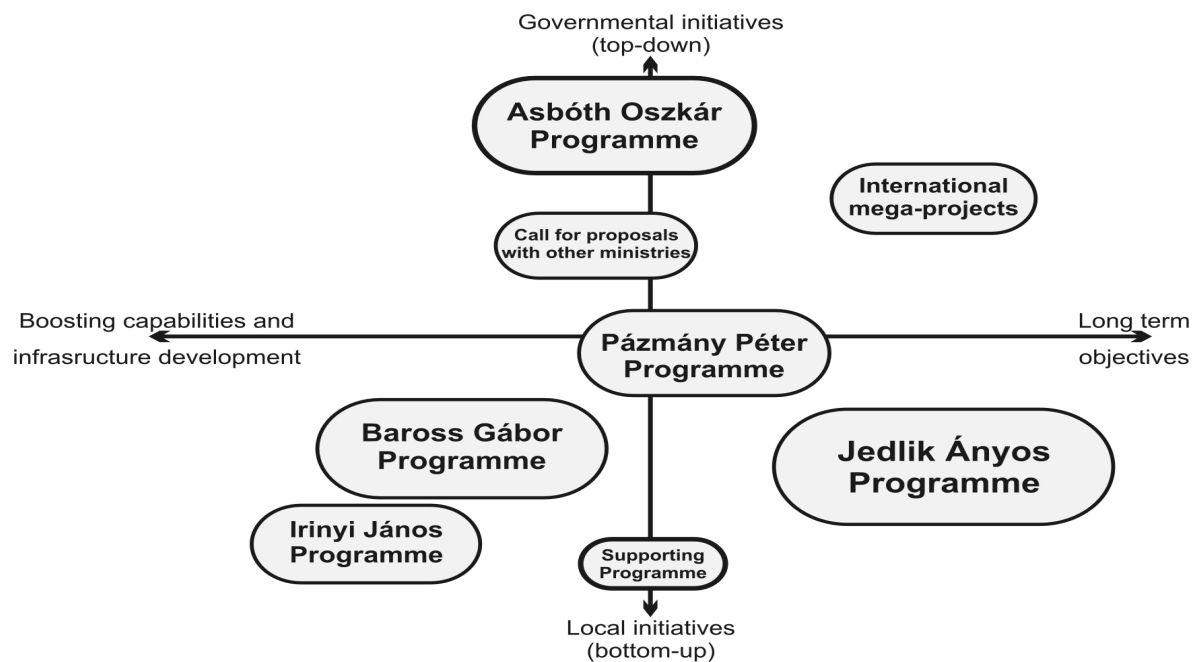


Figure 2: Program portfolio funded by the Research and Technological Innovation Fund and its connection with the strategic goals

3. Please describe the primary challenges that are expected to be addressed in future science technology and innovation policy initiatives and/or that have been identified in forward-looking exercises, such as foresight and technology road mapping (i.e., in the 2007-08 timeframe).

- a) A quarter of all the available funds go to enterprises. The remainder goes to the universities and research institutes. NORT committed itself to increase the ratio of the financial subsidies arising from the Research and Technological Innovation Fund that go to the companies.
- b) Strengthening the regional decentralization process. Establishment of the National Innovation Agency which main mission should be to coordinate the Regional Innovation Agencies and gives innovation services for them. Hungary should continue the decentralization of the different R&D and innovation programs.
- c) As far as the Technology Foresight is concerned, to assure the future contribution of foresight to Hungary's economic prosperity and social well-being either on national or newly emerged regional level, is necessary to maintain and develop capabilities in foresight and related approaches to systematic analysis of policy and strategy. A cadre of experienced and expert people was built through TEP but this benefit is already fading and requires active reinforcement. The establishment of one or more research centres with a remit to engage the national and regional communities of policymakers in foresight, technology assessment and evaluation methods is a sound way to proceed. Applied research on key trends, methodological development, training and a forum for policy discussion are all valuable functions that could emerge. They could keep in touch with international methodological advances such as increased use of online tools for networking, consultation and dissemination.

Section B: Public sector research and public research organisations

2.1 1. Please describe major policy changes related to the financing of public R&D, to include the following:

2.1.1 Changes in overall levels of R&D funding for public research organisations during last few years.

The present Hungarian national innovation system on public R&D institutional level consists of three main components: the Hungarian Academy of Sciences, other public research and technology institutions and the universities.

In accordance with Act XL of 1994, the Hungarian Academy of Sciences (HAS) is an independent public body based on the principle of self-government. There are special rights and duties of the Academy to

- support the development of sciences, scientific research, and the publication of scientific books and journals;
- regularly evaluate scientific research results as well as encourage and assist publication, dissemination and utilisation thereof;

represent, within its sphere of responsibilities, Hungarian science in Hungarian public life and at international scientific field.

The HAS has 18 institutes for natural sciences, some of which have sub-institutions comprising all fields of natural sciences, and it has 15 institutes for social sciences and humanities reaching from arts to economics. It also has numerous research groups in all areas in the Hungarian universities. The Academy's share in the number of total R&D personnel is almost 20%. According to the different fields of sciences, this share is the highest in natural sciences (based on the share in R&D expenditures of all R&D units, it is almost 60%), and by phases of research its share is decisive in the field of basic research (also based on the share in R&D expenditures of all R&D units, it is more than 40%).

There are some other public research institutions which neither are under the portfolio of the Ministry of Education nor the HAS, but belong to the portfolios of other ministries or the local governments. The Ministry of Agriculture and Rural Development, the Ministry of Environment and Water Management, and the Ministry of Economics and Transport have to be mentioned in this connection.

Universities are increasing in importance. During 1998-2000, a fundamental integration process took place in the Hungarian higher education sector. The aim was to better cope with the growing number of students, to introduce more flexibility and diversity in the system, and to comply with long-term policy objectives of the government. Therefore the universities which were formerly compartmentalised and strongly specialised with usually rather narrow profiles of specialisation, were transformed into integrated, multidisciplinary universities. This change was made in order to render it possible to increase the number of students, to broaden curricula, and to reach an intellectually critical mass for research. In the higher education sector the overwhelming proportion of the research units is part of the higher education (1421 units). The R&D budgets of universities are largely dependent on governmental subsidies. There are two main types of subsidies: the normative research support and the various governmental funds and programmes. Besides, the co-operation between universities and private sectors and the participation in multilateral and bilateral scientific programmes are the main income sources of the universities.

In addition to, a new Act on Higher Education has been entered into force on 1st March 2006. The main goals of this bill are integrating the Hungarian higher education into the Bologna process and

restructuring the educational, financial and governance system of the universities. These elements would have advantageous impact on the public private partnership between the enterprises and the universities.

2.1.2 If funding data is available, please provide it below:

Today only 60% of the Academy's income is guaranteed from public sources (block grants); the remaining 40% have to be generated from other competitive government programmes or other sources. This has also led to a shift as far as research type is concerned. Formerly being described as an institution doing nearly exclusively basic research, the HAS now claims to be involved in a number of applied programmes together with industry.

2.1.3 Shifts in the allocation of funding across the following areas (please provide quantitative information if available):

2.1.3.1 1) different types of public research organisations (e.g. universities vs. government research institutions)

R&D expenditure by sector of performance and source of funds in 2004:

	Government sources (million HUF)	Business enterprise sources (million HUF)	Non-profit sources (million HUF)	Funds from abroad (million HUF)
Government R&D institutes	46 273	3 847	702	2 578
Higher education institutes	36 045	5 745	269	2 522
Business enterprise R&D units	3 101	57 759	50	13 692

2.1.3.2 2) different socio-economic objectives (e.g. general advancement of knowledge, health, national security, environment, energy)

Ratio of R& D expenditure by socio-economic objectives (in %)

	Government R&D institutes	Higher education institutes	Business enterprise R&D units	Average
<i>Development of agriculture, forestry, fishing</i>	16,6	12,2	2,6	9,4
<i>Promotion of industrial development</i>	6,7	8,2	60,1	30,2
<i>Production and rational use of energy</i>	0,2	2,2	1,6	1,3
<i>Development of infrastructure</i>	11,5	4,6	17,2	12,2
<i>Control and care of the environment</i>	3,6	4,6	2,6	3,4
<i>Health</i>	9,7	20,1	13,4	14,0
<i>Social development and services</i>	17,2	8,6	1,3	8,0
<i>Exploration and exploitation of the Earth</i>	8,3	1,8	0,1	3,1

<i>and the atmosphere</i>				
<i>General advancement of knowledge</i>	24,3	36,1	0,5	17,0
<i>Exploration and exploitation of Space</i>	0,1	0,2	0,1	0,1
<i>Defence</i>	1,5	0,0	0,3	0,6
<i>Other civil research</i>	0,5	1,4	0,3	0,6
<i>Total</i>	100,0	100,0	100,0	100,0

2.1.3.3 3) different fields of science and technology (e.g. information and communications technology, biotechnology, and nanotechnology.)

EXPENDITURE OF R&D UNITS BY FIELD OF SCIENCE

<i>field of science</i>	<i>Natural sciences</i>	<i>Engineering and technology</i>	<i>Medical sciences</i>	<i>Agricultural sciences</i>	<i>Social sciences</i>	<i>Humanities</i>	<i>Unclassifiable by field of science</i>
Expenditure (million HUF)	28 584,6	84 903,5	16 067,8	15 414,8	13 328,7	14 596,7	8 629,4

2.1.4 Changes in the use of different types of funding instruments for financing R&D or the balance among them, e.g. institutional funding (block grants) and project funding (contracts and grants), or public funding vs. private funding. To what extent have funding mechanisms become more competitive?

2.2. Please describe major initiatives to reform the organisation and governance of universities and other public research organisations to improve the quality of their R&D or their ability to contribute to economic growth and other social objectives. Please consider reforms such as:

2.2.1 Initiatives to increase the flexibility and/or accountability of universities and other public research organisations (e.g. granting more autonomy, performance measurement systems or stronger evaluation, new funding structures).

2.2.2 New organisational structures for performing R&D, such as larger-scale research teams, centres of excellence, multi-disciplinary research centres, research networks, etc.:

In the framework of a programme of the National office for Research and Technology Regional University Knowledge Centers (RET) are set up and cooperate with companies and other organizations, dealing with research and innovation in order to manage innovative projects focused on research and development at an international level. The task of the knowledge centers is to create from the R&D results new products and technologies that are beneficial in the business sphere. With the establishment of the RET's there lies an opportunity in the field of R&D that human and capital resources concentrate in the same place which can lead to the increase of technological development in the given region. The economic partners of the RET's are such enterprises that motivate and support the R&D activities and at the same time users of the new research results and technologies. The task of the Regional University Knowledge Centers is to help cooperation of R&D professionals and the actors of the economic sphere. Hence, the industrial background that is already present is expected to strengthen and this would highly influence the development of the given region. The financial support given to the knowledge centers would allow the RET's to employ more and more young pre and post doctors as well as successful senior researchers (settling home).

2.2.3 Revised procedures for setting research priorities at the institutional level in universities and public research organisations (e.g. involvement of outside stakeholders):

See the programme information at the point 2.2.2

2.2.4 Reformed rules governing ownership and licensing of publicly-funded research results, support for technology licensing, etc., whether or not these measures are focused on a specific type of IPR (patents, copyright, etc.) or certain technological fields:

Act No. CXXXIV of 2004 on Research and Development and Technological Innovation stipulates that beneficiaries of R&D project funding shall ensure that intellectual property rights are conferred to them. If several participants co-operate in a project, they shall conclude a civil law contract on their respective share of ownership of intellectual property rights. In case the funder requires the intellectual property to be made available free of charge for public use, this requirement should be made explicit both in the call for proposals and in the funding contract. All public research institutions, public foundations and non-profit companies which qualify as research institutions shall ensure that they adopt the -Rules for Intellectual Property Rights Management, governing evaluation and registration of intellectual property, regulating the conditions for conferring intellectual property to a company as non-financial contribution and defining the terms of other means of intellectual property exploitation. The Rules for Intellectual Property Rights Management shall set out the rights and obligations of the personnel working on the project. It shall govern evaluation, registration and exploitation procedures too. The Rules for Intellectual Property Rights Management shall be approved by the head of the organization concerned, who shall not confer this right to anyone.

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State property is protected by a row of provisions: re-conferring of intellectual property by a spin-off company to another company as non-financial contribution is prohibited; the liability of a public body must not exceed its share in the spin-off company; the share of dividend the public body receives must not be less than its share of ownership; financial contribution of a public body to a spin-off company is limited to a low level; additional payments by public bodies holding shares in spin-off companies shall not be made; spin-off company shares held by public bodies shall not be sold at a lower price than that set out by the auditor; public bodies shall submit annual reports on the spin-off companies in which they are involved.

2.2.5 Other

2.3 3. Please identify major shifts or changes in priority among the approaches for strengthening public sector research, including efforts to: i) increase levels of funding; ii) alter the structure of funding (e.g., institutional vs. project-based funding; public vs. private-sector funding); iii) reform the governance of public research organisations; iv) implement new structures for performing research (e.g., centres of excellence, multi-disciplinary centres); v) changing guidelines for ownership and management of IPR; and vi) implementing new evaluation procedures).

2.4 4. Please describe any new or recent changes in policies adopted by government, public research funding bodies or public research institutions to improve access to data resulting from publicly funded research.

See the programme information at the point 2.2.2

2.5 5. Looking to the future, what are the main challenges that the science system is expected to face and the main issues that policy makers will need to address? What future actions are anticipated?

Section C: Government support for private sector R&D and innovation

1. Please describe major policy changes in the instruments used to support private sector R&D and innovation, including:

Tax treatment of business R&D (e.g. tax credits for R&D expenditure, changes in corporate tax regimes that could affect business R&D activities):

The Act XC of 2003 on *the Innovation Fund for Research and Technology* (came into effect on 1st January 2004) gives exemption from the contribution to the Fund to the extent of the companies' eligible costs resulting either from the companies' own R&D activities or from R&D activities ordered from public research sites.

Direct public funding of business R&D and innovation (e.g. grants, contracts, loans, etc.):

For funding of business R&D and innovation the following main public resources are available:

The *Innovation Fund for Research and Technology* provides direct financial means for research and development and the utilisation of research and development findings, and also to promote the exploitation of new scientific and technological achievements, including the funding of national research and development programmes and projects; improvement of the infrastructure conditions of research and development and technological innovation, including participation in the establishment and operation of international research and development networks and infrastructure, in accordance with Hungary's international commitments; services, innovation bridging and networking activities which strengthen research and development and technological innovation, including the costs of organising conferences and technical fairs and the preparation of publications; technological innovation in regions and micro regions; to increase the innovation capacities of regions and micro regions and supplement their innovation resources; international scientific and technological cooperation, including the provision of interim financing to resolve the liquidity problems arising from the system of post-financing used in international competitions; human resources for research and technological innovation, create research and development jobs, to promote the supply and training of young researchers, to encourage the exchange of experiences and domestic as well as international mobility of research and development professionals, and to support the reintegration of recognised researchers returning to Hungary into the Hungarian academic community; acquirement of domestic and foreign scientific and technological knowledge and to support its practical application .

The National Development Plan (Environmental Protection and Infrastructure Operational Programme) includes support for R&D. The *Environment Protection and Water Management Fund Appropriation* provides grant and interest subsidy for the objective of research and development among others like environmental protection, energy saving, rehabilitation of polluted industrial sites and public water-management objectives, training and investment. Furthermore (Economic Competitiveness Operational Programme) grant is available for R&D and innovation and improvement of the cooperation between research institutions and undertakings where the aim of the aid is to improve the development of society and economy through environmental, agricultural, technical and sociological R&D for better informational techniques, innovations and infrastructure.

Public procurement policies, new contractual guidelines, more competitive selection processes, etc:

There is no significant change regarding the public procurement policies, new contractual guidelines or competitive selection processes.

Changes in IPR regimes to create additional incentives for business investments in innovation, such as via new or revised guidelines for specific types of inventions (e.g. genetic, software, business methods), or new or strengthened mechanisms for enforcement of IPR (e.g. specialised courts):

In case of SMEs, there is a special IPR tax allowance. The emerging costs of getting and maintaining of the patents, utility model and design in the area of Hungary can be deducted from the corporate income, supposing these costs can not be regarded direct costs of fundamental research, applied research and technological development.

Other forms of public support for innovation (e.g. consulting services and extension programmes):

There are several channels of public support for innovation including consulting services, support programmes, aid schemes, calls for applications, financial services (risk and seed capital, soft loan, interest subsidy, grant).

The elaboration of the structures and the priorities of the National Strategic Reference Frame is in progress. One of the key elements of the NSRF can be the development poles, that should promote the development of the regions based on innovation. The core of the development poles should be the regional centres with strong university knowledge bases, surrounding other parts of the regions with general economic development purposes. The concept of the competitive poles contains also local development plans with regional impacts for the countryside cities.

2 Please describe policy changes in programmes to support R&D and innovation in SMEs and new technology-based firms, e.g., via efforts to:

Establish and develop venture capital funds and/or second-stage financing for the support of new technology-based firms or spin-offs from public research organisations:

There are initiatives to ease the availability of risk and seed capital and to broaden the financial background for spin-offs. New programmes are announced for spin-offs for granting R&D projects. Universities establish separate bodies to ensure a more market-oriented approach of IPR application of own R&D results.

Provide additional R&D funding targeted to SMEs and new technology-based firms

In general SMEs are privileged in the public funding, but there is no significant change regarding this issue.

Encourage entrepreneurship through training, information services, or other means:

Training and public services are important issues, but there is no significant change regarding them.

3. Please identify major shifts or changes in the mix of instruments used to provide public support for private sector R&D and innovation, to include: i) direct financing of R&D, ii) R&D tax incentives, iii) support to entrepreneurship and SMEs and iv) IPR protection and other framework conditions. What shifts in the policy mix are anticipated in coming years?

Fiscal measures related to R&D came relatively recently in effect and the most important of them are the following:

- 300% RTD tax allowance if the company lab is located at university or public research institute
- In case of SME's, there is a special IPR tax allowance. The emerging costs of getting and maintaining of the patents, utility model and design in the area of Hungary can be deducted from the corporate income, supposing these costs can not be regarded direct costs of fundamental research, applied research and technological development.
- 100% RTD corporate tax allowance (also available for subcontracted R&D activities if partner is public/non-profit research site)
- Tax credits on investments, including R&D investments (rate depends on volume, company size and geographic location)
- Tax free employment of PhD, MSc or MBA students (up to the official minimum wage) in the field of educational and research activities and other services closely related to these activities.
- Option to create tax-free investment reserves, including R&D investments
- Tax allowance for corporate donations to organisations of public benefit supporting R&D activities
- Tax credit for individual donors supporting R&D activities.
- Tax credit off personal income tax after the creation of intellectual property.
- In addition, the Research and Technological Innovation Fund with fiscal incentives like credits toward the innovation contribution to be paid by companies.

4. Looking to the future, what are the main issues that policy makers will need to address regarding support to the business innovation system? Please describe any efforts that have been taken to identify or address them.

At the beginning of 2006 the Council of the European Union asked the Member States to the set attainable objectives regarding the R&D contribution by 2010 in a Key Issue Paper. Most of the Member States have given percentages below the 3% set in the Lisbon Strategy, accordingly Hungary's commitment is 1,8% in the ratio of the GDP.

In the future, the intended direction for Hungary is the improvement and fine-tuning of fiscal measures to create innovation-conductive conditions for the economy and the society. It means the amendment of public procurement procedure and the introduction of seed capital funds. The advantage of fiscal measures is that they ensure equal opportunities with a wider circle of beneficiaries than grant schemes. On the other hand, they are not as much concentrated, cannot serve a specific, targeted and well-defined goal.

Aid for the costs associated with obtaining and validating patents and other industrial property rights shall also be introduced for supporting research activities that first led to the industrial property rights concerned.

Section D: Enhancing collaboration and networking among innovating and research organisations

1. Please describe major initiatives to promote collaboration and networking among innovating firms, e.g. via joint R&D programmes, regional innovative clusters, international co-operation (attracting research labs of foreign firms or supporting access of domestic firms to foreign programmes).

The deepening of integration and co-operation between enterprises through the creation of clusters is privileged. Network building is promoted by granting network infrastructure costs of establishment of new networks, development of existing networks, establishment of joint logistics system. Supplier activities are promoted by support for costs of establishment and extension of supplier activity, in particular: productive investment, purchase of technical instruments and machines, building and enlargement of real estates, purchase of know-how or licence, information technology development.

2. Please describe major policy initiatives to promote stronger industry-science relationships, such as efforts to:

Enhance collaborative research (e.g., through changes in regulations governing the types of agreements negotiated between public research organisations and businesses and their implications for access to and exploitation of research results);

Development of infrastructure of public and non-profit research facilities in order to improve their capability for co-operation with the private sector (esp. technology-based firms). This means the support of purchase of new instruments, renewal and modernisation of existing R&D instruments, rental of R&D instruments, use of measurement services, accreditation of measurement activity.

Support of partnerships and building of networks promoting technology transfer and co-operation between companies and publicly financed research facilities by developing and realisation of research and training co-operations as presented in the applicant's strategy.

Increase the mobility of human resources between public and private sectors (e.g. by revising employment and financial rules governing public-sector researchers to allow them to more easily collaborate with industry, move between the public and private sectors, participate in the creation of spin-offs, take equity positions in technology-based firms emerging out of public research, etc.);

New grants by NORT help to bridge public and private sector R & D mobility. Recently a conceptually new grant was introduced the so-called Kozma László program, that makes possible the flow/exchange of research capacities between academia and SMEs. The program favours the move of young PhD-s to the industry to use their academic knowledge to solve industrial research-development and innovation problems

Set up new modes of public/private partnerships for research and innovation:

There is no recent change regarding the modes of PPP.

3. How has policy shifted in recent years in its support for different channels of industry-science linkages (e.g., collaboration, licensing, spin-outs, public/private partnerships). Please describe any anticipated shifts or changes in policy for strengthening industry-science linkages.

The main initiative to support industry-science linkages is the Regional University Knowledge Centres (RET) programme. It helps the cooperation of professionals in R&D and the actors of the economic sphere. The industrial background is expected to strengthen and this would also influence the

development of the given region. The importance of the financial support given to the knowledge centres is the employment of young pre and post doctors and successful senior researchers

Section E: Globalisation

Many of these questions on globalisation were asked in a questionnaire circulated in November 2004 in the context of the CSTP/TIP project on globalisation of R&D. 13 countries (Australia, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherlands, New Zealand, Norway, and Poland) replied. These countries are invited report only significant changes since November 2004.

1. Please describe the most important policy issues and objectives with respect to the process of internationalisation of R&D:

The overall policy objective in this regard is to encourage those research collaboration programmes that can be beneficial for the Hungarian research and development climate in general, and for the Hungarian research community in particular. The two main policy initiatives for internationalisation of R&D are the bilateral S&T international co-operation and the initiative to attract the R&D centres of multinational corporations.

The former bilateral agreements with 36 countries (21 from Europe and 15 from outside Europe) have been made to guarantee the support of joint international research projects. These agreements contribute significantly to the internationalisation of R&D activity by defining the financial and the institutional background of projects conducted by a domestic and a foreign actor.

The latter means that the government attempts to create a favourable context for R&D activities in order to create a major research region in Central-Eastern Europe. One of the main objectives is to encourage multinational corporations relocate their research centres to Hungary.

2. Please identify and describe changes in policies to attract R&D through foreign direct investment.

Hungary joined the EU in May 2004. This means customs-free market access for foreign direct investors and a low-cost workforce. Furthermore, the government continues to foster infrastructure improvements, including transportation upgrades, technology, financial and supportive business services and education.

For the simplification of bureaucracy the so-called 'one-window-system' is being build up. It will serve the foreign investors with the possibility to arrange everything at one single window to get the necessary permissions for economic activity.

3. Please describe any changes in the principles concerning the treatment of foreign firms (both non-domiciled firms and foreign-owned subsidiaries) or foreign research institutions in national R&D programmes (e.g, access to national R&D funding programmes, rules for co-operation with domestic public research institutions, rules for co-operation in public private partnerships, public procurement, etc.)

There were no changes concerning the treatment of foreign firms. However, if these firms are from the European Union they are entitled to the same advantages that arise of the EU membership.

4. Please describe specific measures to support the internationalisation of domestic public research institutions (e.g., such as additional funding for projects with international partners, co-funding for project partners not located in-country, support for setting-up affiliates abroad).

There is a so called 'large international projects programme' which took the initiative to create large R&D centres in collaboration with other countries interested in a given technological area. This particular programme aims those specific technological areas, which have significant economic and social potentials. Moreover it also underlines the importance of strengthening the relationships between academic and market-oriented R&D activities. For the time being, there are two running projects on biotechnology and nanotechnology in association with France and Russia.

5. Please describe measures to link domestic firms, in particular SMEs, to foreign sources of research and innovation, including international co-operation in R&D (e.g., additional/preferential funding for projects with international partners; co-funding for project partners not located in the country; and support to find international partners, etc.).

Hungary is participating in different international initiatives like the EUREKA providing assistance for companies with networking and access to financial resources. In this network one of the main objectives is to help the SMEs to get them engaged in R&D activities in conjunction with other foreign and domestic, academic and private sector actors.

There is a national programme called Déri Miksa with the objectives to connect the Hungarian SMEs to the EUREKA network and to encourage the Hungarian R&D performance to be market oriented.

In the 6th Framework Programme of the EU there were also various initiatives to foster innovation. SMEs are encouraged to get involved in all areas of FP6, particularly the research activities.

Section F: Human resources

These questions are broader than those included in the OECD Questionnaire on the Working Conditions and Attractiveness of Research Careers in the Higher Education and Public Research Sectors (April 2005). Delegates may wish to consult their SFRI delegates in responding to these questions.

Section F: Human resources

1. Please identify and describe recent efforts to improve supplies of university graduates with science and engineering degrees (both quantity and quality), in particular as relate to the following areas:

Raising interest in and awareness of science among youth: There is annually a conference where the best students can demonstrate the results of their scientific work. All students get support from their universities (professional and infrastructure) but they can also get additional grants to their professional activity.

Revising academic curricula to make science and technology more attractive to students, such as by expanding interdisciplinary training in S&E education:

Improving teaching in mathematics and science, including through the use of ICT in teaching content and delivery:

Reducing gender and ethnic minority gaps in science and technology education: There is a governmental proposal on the participation of women in scientific activities. It includes different recommendations to ease the participation of women researcher in scientific activities. Regarding the

minorities the Hungarian Academy for Science (HAS) has a special annual grant for the successful roma researchers.

Enhancing financing opportunities for PhD study and post-doctorate training (such as through fellowships, funded research opportunities, etc.):

The National Office for Research and Technology (NORT) announce call for applications for young researchers. In cases of *establishment of Cooperative Research Centres* and *establishment of Regional University-based Knowledge Centres* it is also taken into account as an advantage if young researchers participate in the research activity.

Improving the quality of secondary university research laboratories/infrastructure: In the Regional University Knowledge Centres (RET) programme NORT supports infrastructure development.

Demand-side policies to increase the attractiveness of employment in public research organisations, make public sector employment more flexible, or improve provision of information to students regarding job opportunities in the public and private sector:

2. Please describe recent policy changes to enhance the international mobility of scientific and high-skilled personnel, including programmes to attract foreign (and expatriate) talent and encourage students/workers to gain international experience. Consider such policies as:

Changes in immigration legislation: There is no change in the immigration legislation.

Funding of scholarships, grants for international mobility of students/scholars: The NORT and the Hungarian Scholarship Board have different scholarships and grants to support the international mobility of students and researchers. There is also an initiative for the introduction of a special researcher visa.

Creation of special positions at universities or public research centres: The Regional University Knowledge Centres (RET) programme supports the creation of special position at universities.

Fiscal incentives (e.g., income tax breaks) for foreign workers: There are no special fiscal incentives for foreign workers.

Programmes to promote return migration of expatriate students, scientists and engineers: The NORT has announced the so-called Polányi Mihály programme to support the return of expatriate scientists. Different civil organisations support the return of expatriate students and scientists like the Association of Hungarian Researchers in Germany, the Association of Pelegrins – Sweden, the Hungarian American Foundation. Furthermore a conference was held on the return migration of young scientists in the summer of 2005 in Veszprém. The Hungarian Academy for Science (HAS) has announced the Programme for Western Hungarian. Its objective is the contact and co-ordination of Hungarian researchers working outside of Hungary. Finally here is an incomplete list of the different programmes:

- Deák Ferenc Fellowship (Ministry of Education): to support young researchers in the field of political sciences and Hungarian legislation
- Szent-Györgyi Fellowship (Ministry of Education): to enable outstanding researchers living abroad to contribute to scientific work carried out in Hungary
- Magyar Zoltán Fellowship (Ministry of Education): to attract post-doctoral researchers back to Hungary

- Domus Hungarica Fellowship (Ministry of Education and Hungarian Academy of Science): to enable researchers representing Hungarian science abroad to participate in Hungarian scientific life
- Bolyai János Fellowship (Hungarian Academy of Science): to help candidates prepare a scientific work or acquire a higher academic degree
- EURYI Award (Hungarian Scientific Research Fund and Hungarian Academy of Science): to enable outstanding young researchers from all over the world to work in Europe for the benefit of European science
- Junior Researcher Fellowship (Hungarian Scientific Research Fund): to enable young researchers to carry out their own research project
- Post-doctoral Fellowship (Hungarian Scientific Research Fund): to help young outstanding researchers to conduct research
- Marie Curie Reintegration Grant (European Union): to cover the cost of undertaking a reintegration projects of former Marie Curie fellows

3. Please describe recent policy efforts to foster development of specific skills other than S&T skills needed to foster innovation in a knowledge-based economy (e.g., management, communication, legal), notably as relates to the service sector.

There are different courses at the universities on innovation management (homepages of these universities: www.u-szeged.hu, www.bme.hu, www.sze.hu, www.szie.hu). And there are some non-profit organisations that keep courses on innovation management (www.innovacio.hu, www.innostart.hu).

4. Please describe any major shifts or changes in the priorities and mix of instruments used for developing human resources for innovation, e. g. between development of domestic talent versus attraction of foreign talent; between development of S&T skills and non-S&T skills; between stimulation of demand and development of supplies; between support for teaching and support for research; etc.

There are no recent changes in this aspect.

5. Looking to the future, what are the main changes anticipated in the supply and demand for human resources, and what are the main policy challenges that policy makers will need to address? Please describe any efforts being made to identify future challenges or develop future policy directions.

There are no recent changes in this aspect.

Section G: Policy evaluation

1. Please describe recent changes in policies regarding ex-ante or ex-post evaluation of innovation policies and programmes, including new legislation or regulations, methodologies employed, criteria considered and the organisations/institutions that perform the evaluations.

In 2005 a new government decree (No. 198/2005 (IX.22.)) came into force defining the range of the public R&D programs to be evaluated ex-post. The large number of public financed RTD programs indicated the necessity of this regulation. The decree obligates the responsible bodies to make ex-post evaluation on the public financed RTD innovation programs exceeding the threshold of one billion HUF and/or announced repeatedly. The evaluation has to be carried out by from the program management independent national or international evaluation body. There's no bond for making ex-ante evaluations, but there is a suggestion in the decree to anticipate a new program implementation with an ex-ante evaluation.

The impact of these evaluations is the continuous improvement of the Hungarian RTD program planning and management. All the results give feedback to policy decision makers and to the main stakeholders of the programs by drawing conclusions for their further activities to achieve efficiency and effectiveness.

2. Please describe recent changes in policies regarding the evaluation of public research organisations, including legislation or regulations requiring evaluation, methodologies employed, criteria considered and the organisations/institutions that perform the evaluations.

The organizational evaluations or assessments aren't significant in Hungary. The Hungarian Academy of Sciences proposes these types of evaluations but the impact is negligible since there is no regulation in force on this issue.

3. Please outline any significant changes in the priority given to evaluation in innovation policy, including the motivations for such changes and anticipated effects. Please include information about additional resources being invested in evaluation and approaches used to ensure that results of evaluation feed-back into policy making

According Gov. Decree No. 198/2005 (IX.22.) several evaluations will be carried out in the near future. Among the planned evaluations the ex-post evaluation of the National Development Programs and of Hungary's participation in the FP6 and in its supporting actions are the most remarkable.

Major ongoing evaluations are:

- Mid-term evaluation of the Economic Competitiveness Operational Program (which is one of the operational programs in Hungary financed by Structural Funds) – Ministry of Economy and Transport
- Ex-post evaluation of the Instrument tenders announced between the years 2000-2004 – National Development Office in cooperation with the National Office for Research and Technology. This evaluation composes a part of a series preparing the ex-ante evaluation of the implementation of the second National Development Plan.

4. Please provide information or web-links, if available, about the outcomes of recent major evaluations of R&D or innovation policies.

<http://www.nkth.gov.hu/main.php?folderID=1305&articleID=4276&ctag=articlelist&iid=1>

(outcome of the evaluation of the Hungarian Cooperative Research Centers Program – only Hungarian)

<http://www.nkth.gov.hu/main.php?folderID=161>

you can download some information in english about the Hungarian ex-ante "policy evaluation in the course of preparing the Innovation Act; ex-post evaluation concerning supporting of the Hungarian participation in the different foreign exhibitions, evaluation of COST actions implemented Hungarian participation (1991-1998)