

STI OUTLOOK 2006 – POLICY QUESTIONNAIRE

Purpose

1. DSTI is preparing the 2006 edition of its biennial publication, *Science, Technology and Industry Outlook*, which will be issued in the Autumn of 2006. The document will contain a chapter reviewing national science, technology, and industry policies in OECD countries. The enclosed questionnaire is intended to compile information on science, technology and innovation policies that are being developed, were recently implemented, or were recently evaluated by Member countries. It also gathers information about anticipated trends and policy challenges. The topics addressed in the questionnaire relate to areas of ongoing or future interest to the CSTP and its working parties, including policy mixes, globalisation of innovation and human resources for S&T, and will contribute to monitoring the implementation of previous recommendations and development of further policy recommendations.

2. The OECD Secretariat intends to synthesise the information provided by Member countries in a summary document for comment and/or discussion by the Committee for Scientific and Technological Policy (CSTP) at its first regular session in 2006. The revised document will form the basis of a chapter of the 2006 *Outlook* that reviews main trends and expectations in science, technology and innovation policy. Some of the information gathered through the questionnaire will be incorporated into other chapters of the *Outlook* that focus on specific policy issues. The individual country responses will also be made available on the OECD's public Web site, www.oecd.org/sti/sti-outlook.

3. The success of this exercise is directly dependent on the quality of information provided by Member countries, and the Secretariat appreciates the comprehensive responses provided by many countries for previous *Outlooks*. In addition to providing information for the *Outlook*, this exercise provides Delegations with a framework to compare their experiences, exchange views on the effectiveness of different policies and discuss the international implications of recent trends in science, technology and industry policies. It also helps the CSTP identify future projects and issues for investigation.

Guidelines

4. In completing this questionnaire, countries are requested to provide a general overview of the science, technology, and innovation policies implemented in their countries and to provide information on major changes that took place in 2004 and 2005 or are anticipated in the future in specific policy areas listed below. Delegates will have an opportunity to update this information prior to publication in order to incorporate information on policies introduced in early 2006. Countries need not provide information on all the topics indicated below, but should concentrate on those areas in which the most significant policy developments have occurred. They may draw upon existing policy documents where possible and are encouraged to submit additional supporting materials and links to relevant Web sites along with their written responses.

5. The responses to this survey need not be excessively long, but because they will provide the primary material for the Secretariat's report, they should at minimum: *i*) highlight significant policy changes in the areas listed and outline the background and rationale of these policy changes (such as assessments of previous policy initiatives), *ii*) indicate and describe the new programmes and measures that

reflect these policy changes and how they differ from past policies, *iii*) briefly recall ongoing programmes or measures that remain in place (indicating changes in implementation conditions that may have occurred)¹, and *iv*) include supporting quantitative data where possible. For reference, the previous country responses for the 2004 edition of the Outlook may be consulted on the OECD Web site. (www.oecd.org/sti/sti-outlook)

6. In terms of its content, this questionnaire differs from previous Outlook questionnaires in two important ways:

- It includes more questions regarding perceived changes in policies and priorities and the balance among them, as well as expectations regarding future priorities. These are intended to help identify important trends in policy development and implementation.
- It also requests more quantitative information about programmes and policy instruments (such as levels of financing, numbers of participants) to enable more direct comparison among national policies.

7. In addition, Delegates will this year have two options for completing the questionnaire. As in the past, they may insert responses into the electronic version (MS Word version) of the questionnaire and send it to the Secretariat via email. In addition, the Secretariat is developing a dedicated Web site that will permit Delegates to insert responses directly into a Web-based form. Further information on the Web site will be made available in a separate Room Document and on the Outlook Web page [www.oecd.org/sti/sti-outlook]. Delegates wishing to use the Web-base system may also contact the Secretariat directly for information [Mr. Byung-Seon Jeong].

8. It is requested that countries' responses be submitted to the Secretariat **no later than 15 January 2006** to allow the Secretariat sufficient time to clarify information and draft a summary document for the CSTP meeting in March. Additional background material such as white papers (in English or French) may be sent by regular mail if they are not readily available in electronic format. Email responses should be sent to:

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9. In completing the Questionnaire, CSTP delegates are encouraged to consult with delegates to CSTP working parties (TIP, WPB, NESTI) as appropriate. Nevertheless, country delegations are requested to designate a **primary contact person** with whom Secretariat staff can communicate regarding the survey responses.

¹. References could be made to country responses to the 2004 *STI Outlook* questionnaire.

REQUEST FOR INFORMATION

10. Please provide a written response for Section A below, which addresses general science, technology and innovation policies, and for those topics identified in Sections B through G in which significant shifts in policy have been made or new initiatives launched in 2004 or 2005. Information on anticipated changes in 2006 (or beyond) should also be included, where possible.

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:

Response:

The strategic planning for the formulation and implementation of scientific, technology and innovation policy in Poland is the responsibility of the Ministry of Education and Science along with the Ministry of Economy. As regards the development of science and technology policy, the currently binding document covering policy strategy in the above areas is *Assumptions of the state's scientific, science and technology and innovation policy till 2020* adopted by the Polish government in December 2004. The document sets a goal of increasing utility of the Polish science and directing it towards supporting the state's economic growth and society well-being.

With a view to meeting this goals the document allows for the following activities:

- Increase of the effectiveness of budgetary expenses on R&D.
- Selection of science and technology development priorities.
- Systemic, organizational and legal changes that will foster increased R&D expenditure of private sector.
- Participation in the European Research Area building and development of international cooperation.

In order to give systemic basis for achieving the Lisbon goals, in March 2004 the government adopted *Strategy of increase of the outlays on R&D activities in order to achieve the Lisbon Strategy's goals*. It sets new solutions that aim at strengthening the cooperation between R&D and economy, as well as stimulating entrepreneurs to invest in R&D. The document also sets an ambitious goal of increasing substantially both public and private expenditure on R&D in perspective of 2010 – that is 3,0% of GDP in 2010 (development variant I) and 2,2% of GDP in 2010 (development variant II). Along with entering in the EU, a need for stronger cohesion with European financial perspective period so as to achieve a synergy effect in conducting the national innovation policy with European framework was realised. As a result, in June 2005 *The strategy for the development of science in Poland along with a perspective forecast up to 2020* came

into force. The Strategy presents main science and technology development priorities as well as instruments of achieving them. Among these instruments, European structural funds can be found.

The directions of innovation related policy priorities have not radically changed since publishing the strategic document "Increasing the innovativeness of the Polish Economy until the year 2006". Some of the goals of this strategy are being implemented within the frames of Sectoral Operational Program Increasing Competitiveness of Enterprises 2005-2006.

The Polish government is also to approve soon the new document *Directions for increasing the innovativeness of the economy for the years 2007-2013*. It includes the evaluation of innovativeness of Polish economy and recommends the actions, which should be undertaken to build knowledge-based economy in Poland in which the major strength of enterprises is their high innovativeness. The strategic aim of the document is to increase the innovativeness of the economy to sustain the economy on the track of fast growth and increase the standard of living of Polish citizens. The motto of the *Directions for increasing the innovativeness of the economy for the years 2007-2013* is defined as: *Innovation creates new jobs*. The proposed actions are aimed at creating proper conditions to achieve the strategic goal. The actions include supporting:

- Human Resources for the modern economy.
- Research for economy.
- Intellectual property for innovation.
- Capital for innovation.
- Infrastructure for innovation.

The scientific and innovation policy is also present in the strategy of national development. In order to achieve goal of the *National Development Plan 2004-2006 (NDP 2004-2006)* that is development of competitive knowledge and entrepreneurship based economy, it was pointed that increase of outlays on R&D², especially in fields of direct use in economy, is essential. As implementation of the goal, a the sectoral operational programmes called *Increase of enterprises competitiveness* including measure *Strengthening cooperation between R&D sphere and economy*, aimed at enhancing economy competitiveness through innovativeness growth, was established. Among measures of the above Program there are two aimed at supporting R&D funding in SMEs. The first one - 1.4 *Strengthening of co-operation between the R&D sphere and the economy* is concentrated inter alia on research projects and development activities: industrial research and pre-competitive research conducted by enterprises or groups of enterprises and/or in co-operation with scientific-research institutions. Structuring the R&D sphere by development of consortia (consisting of institutions creating scientific-industrial centres of advanced technologies or centres of excellence) should lead to increasing the entrepreneurs' interest in the R&D investments. The second measure 2.3 *Improvement of competitiveness of SMEs through investments by enterprises* is aimed at improvement of competitiveness of Polish SMEs through modernisation of their product and technological offer through inter alia help in purchasing of the R&D results and industrial property rights.

² The National Development Plan 2004-2006 stipulated for the increase of expenditures on R&D to the level of 1.5 percent of GDP by 2008 (of which the public contribution should represent 0.6% of GDP). However, it is worth stressing that the new strategic document - *The State Reform Programme (Krajowy Program Reform - KPR)* formulating the main actions the Polish government aims to undertake in 2005-2008 with the view to realising the revised Lisbon Strategy goals – stipulates for the increase of GERD up to 1,65% of GDP.

In the draft of the *National Development Plan 2007-2013* the role of science in accomplishing strategic goals is even more emphasised. It is described as a basis for innovativeness and then, consecutively, a source of economic growth. Execution of the strategic goals will call for: increasing the R&D expenditures, changing their structure and strengthening the role of business R&D. These objectives should be achieved through sectoral operational programme providing for science and modern technologies priorities. Their execution should increase the role of knowledge and innovativeness in the process of long-term and sustainable social and economic development. In particular this aim will be fulfilled through:

- Integration and consolidation of the scientific teams around programmes and projects in key scientific domains that potentially stimulate an effective economic and social growth;
- Increasing competitiveness of Polish scientific research and experimental development;
- Strengthening and intensifying cooperation of science with society and economy.

In order to develop the innovativeness of the whole country in a sustainable way the Minister of Science has launched and is currently coordinating the nationwide programme supporting creation of the Regional Innovation Strategies (RIS). RIS are aimed at:

- Fostering regional path of building the knowledge based economy,
- Assistance for the regional authorities in implementation of efficient system of fostering innovation in the region,
- Building a partnership and a cooperation between scientific units and industry,
- Enhancing and exploiting the regional potential of the academic and R&D sector for the benefit of entrepreneurship development as well as strengthening the competition,
- Initiating of enhancing the cross-regional competition programmes.

The National Innovation Strategy, whose aim will be to assure coordination between governmental and local administration for the benefit of the innovativeness growth, should be built on the basis of the RIS integration.

On the 27th of December 2005 the Council of Ministers adopted *National Reform Programme* for 2005-2008 to implement the Lisbon Strategy. The document acknowledges the key challenges faced by the Polish economy; namely: increasing its competitiveness and productivity, eliminating the barriers hampering the development of entrepreneurship, improving the basic infrastructure, improving the quality of public institutions, and lessening the fiscal burden levied on those pursuing business activities. One of the priorities under the Polish National Reform Programme is “Increased innovation of companies” assuming that the ratio of R&D expenditures in the national economy against GDP should reach 1.65% by the year 2008. The priority “Increased innovation of companies” includes 4 measures: development of the innovation market and of the institutional environment facilitating the cooperation between R&D area and the economy; supporting the research and development area; development of information and communication technologies in economy and administration; facilitating the use of eco-technologies, supporting energy efficiency and cogeneration.

- 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):

Response:

New governance and institutional structures

As mentioned in section A (1) the strategic planning for the formulation and implementation of scientific, technology and innovation policy in Poland is the responsibility of the Ministry of Education and Science (up to 24 November 2005 – the Ministry of Science and Information Society Technologies Society) along with the Ministry of Economy (previous Ministry of Economy and Labour). These constitute the new administrative and governmental structures for the development of science, technology and innovation policy in Poland.

As regards legislative and organisational frameworks having predominant impact on shape and performance of S&T as well as innovation policy the two new acts have to be mentioned:

- The Act of 8 October 2004 on the Principles of Financing Science (Journal of Laws of 2001 No. 238, item 2390, No. 273, item 2703, and of 2005 No. 85, item 727); (to be implemented by means of the Regulation of the Minister of Science and Information Society Technologies of August 4, 2005 on the criteria and the procedure of allocating and accounting for the science funds).
- The Act of 29 July 2005 on some forms of supporting the innovation activity (Journal of Laws of 2005, No. 179, item 1484).

The Act of 8 October 2004 on Principles of Financing Science strengthens the role of minister of science in coordination and implementation of science policy; entrusts him with the legal, decision-making power in the area of distribution and allocation of the science budget³. Among his substantial capabilities is the competence to establish the so-called national framework programmes – an important instrument of scientific and technology policy implementation – regarded as a compromise between the autonomy of research and the country's economic and societal needs. Another important feature of the new system of science financing under the above-mentioned Act is formation of **the Council for Science** - the formal representation of the research community playing an important advisory role. The Council for Science is independent from the Minister in issuing its opinions. Its tasks are distributed among organs of the Council. The Council for Science consists of maximum 70 members. The scientific community elects 33 of them and the Minister appoints others on the basis of his or her own decision or from among candidates designated by other ministers and organisations of research institutions. The Council is divided in 4 collegial bodies:

- The Committee on Scientific and Technology Policy (max. 11 members)
- The Committee on Research for the Development of Science (28 members)
- The Committee on Research for the Development of the Economy (max. 26 members)
- The Committee of Appeal (5 members).

The Council for Science and Technology Development – plays an advisory role to the Council of Ministers and to the Prime Minister in the field of science development and new technologies strategy. The Council was established in January 2005 and it consists of:

- The Prime Minister as a chairman,
- The minister responsible for science as a vice-chairman,
- Ministers of: economy, public finances, labour and higher education,

³ Till 5 February 2005 it was the State Committee for Scientific Research (KBN), which had such a competence.

- Secretary of the Council
- Other members invited to the works of the Council by the Chairman: President of the Polish Academy of Sciences, president of the Council for Science and presidents of other Polish associations, foundations that deal with science and technology.

The Prime Minister appoints the Council's members. The Council for Science and Technology Development holds its meetings at least twice a year. In order to execute a specific task, the Chairman has a competence to set up problem teams, consisting of members of the Council.

The Act on Principles of Financing Science brings about the new system of R&D financing. In particular, it stipulates for the new tools, aimed at consolidation of R&D sector in Poland, the scientific excellence of R&D potential complying with country's economic needs, as well as European and world's standards. It introduces new legal and organisational instruments, putting greater stress on conducting scientific research that could be utilised in the economy, also increasing their importance for societal well-being.

Among the most important legal instruments under that act, aimed at the development of scientific research and experimental development having the greatest potential to the economy are:

- The National Framework Programme - NFP - (established by the Minister of Science in September 2005), which:
 - constitutes the basis for financing integrated, multidisciplinary ordered projects announced by the Minister of Science;
 - indicates ten research and development areas of utmost importance to the social and economy development in Poland, each specifying priority R&D directions, essential in view of enhancing the country's development processes;
 - apart from any multiannual programme, is the instrument facilitating the pursuance of the country's modern scientific, technological and innovative policy, adjusted to European and global standards.
- Financing the so-called development projects – aimed at carrying out a research task earmarked for practical application, especially in SMEs sector;
- Financing of goal-oriented projects – technical, technological or organisational undertaking to be carried out within an appointed period of time and on particular terms constituting the basis for practical applications in the economy, in particular SMEs sector, including applied research, experimental development, industrial research or pre-competitive research;
- Financing programmes or undertakings specified by the Minister of Science including, for example, regarding:
 - Supporting the restructuring of scientific entities carried out by their supervising organs of government administration, or by the President of the Polish Academy of Sciences;
 - Developing organisational entities supporting cooperation between science and the economy;

- New principles of scientific entities' evaluation (parametric assessment) – allowing to the greater extent the results of R&D activity, and their practical value.

With respect to framework conditions that are conducive to innovation from the Polish perspective it is worth to mention the Law on some forms of supporting the innovation activity (adopted on the 29th of July 2005 by the Polish Parliament). Aims of the law are as follow:

- To make the economy more innovative by increasing expenditures on R&D,
- Creating organisational, legal and economic conditions in favour of increasing effectiveness of innovative activities,
- Enhancing higher share of non-budgetary means in financing R&D and other innovative activities,
- Increasing the number of enterprises offering products based on technological solutions (new to the country or internationally),
- Strengthening entities addressed to by the law and stronger involvement of their capacities to develop a knowledge-based economy in Poland.

One of the instruments of the mentioned above law is especially devoted to linking science to innovation. These are mainly changes in PIT, CIT and VAT law

Coordination - On the part of the science sector it is the Department of Strategy and Development of Science (DSN) in the Ministry of Education and Science that coordinates the innovation policy. The main tasks of DSN within this scope are following:

- Preparation of the state's scientific, science and technology and innovation policy projects as well as of documents concerning this policy;
- Preparation of projects of systemic, organizational, legal and economic solutions concerning science and scientific and technological progress;
- Preparation of the research priorities of the Polish scientific research and experimental development;
- Preparation of the science share proposal in the state budget;
- Co-operation with other organs of the governmental administration (in particular with Ministry of Economy) that execute scientific, science and technology and innovation policy.

Moreover, especially when it comes to execution of the innovation policy, there are also the following units, that should be mentioned: the Department for Innovation, Department of Research for Economy (DBG) and the Department of Structural Funds in the Ministry of Education and Science, as well as the Polish Federation of Engineering Associations – NOT, the Foundation for Polish Science and the National Contact Point.

The Department of Research for Economy:

- Initiates activities connected with the development of economy innovativeness; in particular it initiates subjects of the applied research, experimental development, industrial and pre-competitive research that are of practical significance in economy;
- Conducts all of the matters connected with applications for financing under the goal-oriented projects and the development projects;

- Co-operates in assessment of applied research and experimental development effects;
- Co-operates in preparation of analysis of innovation activity results in economy;
- Co-operates in execution of the assumptions of regional innovation policy;
- Plays a role of implementing authority for structural funds in research and development in 2004-2006.

In its works connected with implementing the goal-oriented projects, the **Polish Federation of Engineering Associations supports DBG – NOT**. NOT is a public organization affiliating 37 branch Engineering Associations representing all fields of technology. The co-operation of the Ministry of Science with NOT is a part of a larger tendency in Polish administration directed at decentralisation and outsourcing of public tasks.

Also the Foundation for Polish Science a non-Governmental science-funding organization plays a role in executing the innovation policy, as it supports scientists and scientific teams as well as investments that serve the Polish science. One of its financial aid streams is directed toward the science results transfer to the economy practice.

Within the scope of international cooperation between Polish and European units, the National Contact Point plays the main coordinating role for Research Programmes of the EU (KPK). Its main task is dissemination of information about call for proposals and possibilities of participating in the EU research projects as well as assistance to Polish scientists and scientific teams in acquiring European grants. Moreover, it helps Polish participants of research programmes in searching foreign partners, promotes the idea of international cooperation and encourages enterprises to creating international consortia.

Advisory bodies

- **The Council for Science and Technology Development.** Its task is elaboration and presenting to the Council of Ministers and to the Prime Minister evaluations and opinions on the draft government documents (including programmes and legal acts) concerning field of science development and new technologies strategy, in particular: development of knowledge based economy, financial and organizational instruments concerning science and technology, allocating budget to science, the EU structural funds on research, supporting use of research and experimental development in innovative economy development and quality of life, etc.
- **The Council for Science** – whose tasks are accomplished by its organs, not by the Council as such.
 - The Committee on Scientific and Technology Policy is the only organ of the Council that plays a role of a policy advisor. It gives opinions on draft documents concerning the state's science and technology policy and its innovation policy as well as bills and economic and financial arrangements concerning the development of science and technology.
 - The Committee on Research for the Development of Science and the Committee on Research for the Development of the Economy participate in the process of peer review evaluation of applications for funding scientific activities from the state budget. Hence, their functions concentrate rather on distributing money for science than on advising.
 - The Committee of Appeal should give opinion on appeals to Minister's decisions concerning financing science.

For the time being, discussions are still going on regarding the future shape of the Polish National Innovation System (NIS). For instance, within the framework of the project “Strengthening government policy and institutional cohesion to enhance innovativeness of the Polish economy” a number of research studies were made and workshops were held with participation of Dutch experts (from Ecorys consulting company) and representatives of Polish governmental institutions, regional self-governments, business and professional organizations, scientific and academic circles. One of the outcomes of the project was the suggestion that Poland should improve the governance of innovation policy, especially in terms of its structure. More specifically, it was proposed to establish a special Council of Innovation. In this context, it was pointed out that similar Councils exist already in some EU countries, including Finland, the Netherlands and Portugal. It was also suggested that the competences of such a body should not be limited to raising innovation awareness: it should also play a coordination role with the capacity to formulate strategic goals. With regard to the membership in the Council, it has been recommended that the Prime Minister should chair its activities, whilst its members should include the representatives of the Council of Ministers responsible for the development of economy, research and education as well as managers of innovative companies and successful scientists. The Action Plan of the Prime Minister Kazimierz Marcinkiewicz’s Government entitled „Solidarity State”, includes an action for Minister of Economy – to create a feasibility study for the agency aimed at innovation policy implementation. Establishing the Agency is the key aspect of improving the effectiveness of innovation policy implementation on the state and regional level. The aim of the Agency should be creating the better conditions for innovation policy implementation and especially increasing the interest in innovation activity and increase of enterprise R&D spending. National Agency of Innovativeness will also have coordination, information and training issues to cover.

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

Response:

In the Polish economy the following services sectors are the most important allowing for their share in generating GDP: trade and repair (17.1% of GDP), banking and insurance (15.0% of GDP), transportation and communications (6.7% of GDP). In general, there is no need to introduce special incentives for the sectors of trading, banking and insurance. The major part of companies of retail trade are controlled by foreign and Polish networks of supermarkets and smaller shops which dispose of sufficient resources to finance innovative methods of servicing customers with the use of information technologies. It also relates to banking and insurance sectors. A considerable problem is a transportation sector. The Polish railways are undergoing the process of restructuring which includes also a technological improvement of the whole railway infrastructure. As Polish Railways are weak financially, for the time being they use extensively public aid. About 50% of the Polish public aid is consumed by the transportation sector (mainly railways and inland water transportation). Introducing of special measures and instruments for this sector will have a sense after ending the restructuring process.

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).

Response:

As regards the major shifts and changes in the priorities’ establishment and the instruments of their realisation to strengthen science system and support business innovation, the majority of them have been

presented above. However the special stress should be given to the role of the new instrument of the Minister of Science that is the National Framework Programme (established on the basis of the Act of 8 October 2004 on Principles of Financing Science). It specifies those scientific fields and disciplines, which can have the greatest impact on the country's social and economic development, along with the instruments of financing scientific research and experimental development that are focused on them⁴. The National Framework Programme (NFP) which constitutes the basis for financing ordered projects, apart from any multiannual programme, is the instrument facilitating the pursuance of the country's modern scientific, technological and innovative policy, adjusted to European and global standards. The main objective of the NFP is to focus scientific research and experimental development on bolstering sustainable economic development to provide an improved quality of life for Polish society. The effect of the research priorities defined in the NFP, will be to direct budgetary financing to the scientific research fields, which are instrumental in achieving the objective. The NFP development procedure, which in the first stage calls for proposals for priority research fields from scientific, governmental, self-governmental and economic institutions, makes it possible to achieve the long-awaited compromise between the necessary autonomy of research and the development needs of the country and society. The careful selection of projects, especially of an interdisciplinary and multi-field nature, will play a major role in integrating the dispersed scientific community in Poland and will achieve a new quality of scientific research and experimental development, which will be competitive on the European scale.

The National Foresight Programme will be used to adapt the NFP to the country's changing social, economic and scientific conditions. As regards the structure of the NFP, it is made up of three hierarchical stages consisting of the strategic research areas, priority directions of scientific research and ordered projects. The strategic research areas include projects covering a wide range of issues, corresponding to selected fields and aspects of public life and the economy. These areas correspond to the country's long-term scientific and technological policy. The priority directions of scientific research narrow down the thematic scopes within the strategic research areas. They are interdisciplinary yet selective, and are characterized by a medium-term period for realization. If necessary, they can be supplemented and modified annually, based on the requests made by authorized entities. Detailed priorities can be established under the priority directions in extraordinary cases as needed. The ordered projects are defined by the priority directions of scientific research, or detailed priorities, of the NFP, taking into account the criteria laid out therein. Establishment of multi-discipline ordered projects guaranteeing scientific and technical progress is particularly desirable. Each ordered project will specify the preferences concerning the four types of activity fostering the development of new scientific ideas, technologies, research staff and the research base. Such segmentation facilitates linkage with other instruments for financing science. The NFP is of a continuous nature. The structure of the strategic research areas is determined for a period of ten years. The priority directions of scientific research defined in the NFP, as well as the ordered projects under way, will be subject to regular analysis, which will make it possible to verify and confirm the soundness of the selection of projects. An overall assessment of the NFP will take place no more than once every 5 years. It is assumed that the Committee on Scientific and Technology Policy of the Council for Science will actively participate in this process. Furthermore, the update of the NFP will take into account the directions specified in the guidelines of the country's scientific, technological and innovative policy and the forecasts of the National Foresight Programme regarding the development of science. Concerning the budget of the NFP, the spending on the NFP should include a major portion of the funds allocated to the Science section in 2006 and in the following years. The value is dictated by the fact that ordered

⁴ Procedure for establishing and updating the National Framework Programme - the first stage of establishing the NFP is specified in article 10 par. 2 of the Act on the principles of financing science. Acting on this delegation, in December 2004, the Minister asked the entities referred to in the act (ministers, voivodes, voivodship governments, the President of the Polish Academy of Sciences, higher education institutions, scientific entities or economic self-governing bodies with a nationwide reach) to submit proposals for priority directions of scientific research or experimental development to the NFP.

projects established under the NFP should be large, interdisciplinary and area-related undertakings which will include basic research, applied research and experimental development. The basic element of the NFP are nine the strategic research areas. Their selection is based on the country's long-term (a period of 10 years) social and economic priorities for which the research sector is expected to make a significant contribution. The strategic research areas have been divided into two groups. The first includes those areas, which have a direct impact on people and the quality of their lives as well as their role in society (health, environment, agriculture and food, the state and society, security). The second includes technological and technical priorities (new materials and technologies, information technologies, energy and its sources, transportation infrastructure), which are of key importance to the development of the national economy and to support its innovativeness. These comply, between others, with the document "Proposed directions of science and technology development in Poland by 2020" adopted by the Minister of Science in 2004. The document defined strategic areas of science and technology for Poland for forthcoming ten years, that is as follows:

- Software, knowledge and decision support engineering
- Intelligent, telecommunication and teleinformation new generation networks
- Optoelectronics
- New materials and technologies
- Nanotechnology
- Design of specialised systems
- Biotechnology and bio-engineering
- New products and medical techniques
- Numeric science and building scientific information resources
- Solid body physics
- Chemistry, technology and chemical engineering

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).

Response:

Regarding the foresight exercise – it was first initiated as a Pilot Foresight Project in the research field "Health and Life" by the former Ministry of Science and Information Society Technologies in 2003. The choice of the "Health and Life" research area was dictated by a large public support to this subject field, by a change in demographic structure of Polish society, the Polish traditions of producing clean food, and by attempts to find niches on the Polish pharmaceutical and medical markets. The Pilot Foresight Project in the research field "Health and Life" was accomplished in September 2005 and resulted in the determination of 11 topic areas in the following research areas and selection of 26 priority research and development areas. It was also subject to social consultations with the aim of optimizing the choice of priorities and ensuing social support. Following it the Minister of Education and Science initiated in January 2006 the National Foresight Programme that will be implemented into following areas: "Sustainable Development", "Information and Telecommunication Technologies" and "Security".

Section B: Public sector research and public research organisations

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

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

Response:

Over 2004-2005, the science and technology sector in Poland was still significantly adversely affected by the slowdown in economic activity. Polish economy – generally speaking – did not manage to restore positive trends in R&D and innovation activities observed in the period 1995-1999. For the past few years under financing of research and development in Poland has still been a problem. The present situation is confirmed by the fact, that in course of the past decade budgetary means assigned for scientific research have been systematically reduced and in effect in the present year Poland notes almost 50% decrease as compared with the beginning of 1990's.

If funding data is available, please provide it below:

Year	2003	2004	2005	2006(forecast)	2007(forecast)
R&D funding (Unit: R&D funding Unit: PLN)	2729,2	2891,8			

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

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

Response:

Organisation and financing of research by type of research organisation

There are mainly following public sector institutions conducting scientific research and development works in Poland: scientific units of the Polish Academy of Sciences (PAS), academic research institutions and central laboratories in specific sectors of the economy supervised by ministers (State R&D units; RDUs), as well as State-owned and private companies performing the so-called in-house research activities. Higher education institutions (TEI) and PAS scientific entities conduct R&D projects funded mainly by the State Budget, with the ratio of State-budget funding to other funding remaining unchanged; the State-budget funding accounted for 83.6% of the total R&D funding in TEIs in 1998, and for 83.3% in 2003. In the last decade, the provisions of the above-mentioned Act of 12 January 1991 on the State Committee for Scientific Research (SRC) have determined the situation of public research entities in the area of research. The Act introduced a number of important policy principles concerning research and its funding. Most of these principles are still in effect today under the new Act of 8 October 2004 on the Principles of Financing Science:

- All public institutions involved in R&D (PAS scientific units, TEIs and RDUs) receive funds for research from the science budget which is administered by one institution (formerly the State Committee for Scientific Research, currently the Minister of Education and Science);

- Nearly all funds are distributed on a competitive basis or as a result of indicator- or algorithm-based assessment of performance (scientific entities may apply for grants for their own research projects, and may also apply for funds for their statutory activities on a competitive basis, pursuant to the rules applicable to them);
- The same competition principles are applied to all institutions and individual researchers, irrespective of their sector; funding for the so-called "particular research" (the term explained below) is the only stream of funding available exclusively to TEIs;

The new Act of 8 October 2004 on the Principles of Financing Science (Journal of Laws of 2001 No. 238, item 2390, No. 273, item 2703, and of 2005 No. 85, item 727), which entered into force in 2005, introduced - in addition to important changes in the structure of bodies responsible for research policies and resource allocation - certain modifications in the streams of funding, methods for the allocation of funds and organization of research. The basic rules for the distribution of funds are **still based on competitive criteria**, management functions are centralized in the Ministry of Science, and funds for research constitute a separate part of the State budget.

Financing of scientific research, experimental development and other tasks serving science can be effected under the several legal streams stipulated in the new Act of 8 October 2004 on the Principles of Financing. The following streams of funding are distinguished:

- **Financing of statutory activities** of scientific entities includes: funding of primary statutory activities of scientific entities, comprising scientific research or experimental development included in their tasks schedules and the implementation of tasks, as specified in the Statutes of a given research unit, which are related to academic research or R&D work continuously conducted by the unit in accordance with an activity plan; purchase or creation of scientific research equipment necessary to conduct such research; academic research cooperation at national and international level; research-supporting services such as: expert analyses, opinions and scientific evaluations, academic opinions and assessments, as well as maintenance of the scientific entity); TEI particular research (scientific research or experimental development and related tasks serving the development of scientific personnel and scientific specialties in a TEI); maintenance of special research device in scientific entity; joint research pursued by academic networks (network financing is a new form of funding statutory activities);
- **Funding of investments** serving the purposes of scientific research or experimental development, including building investments, purchase of buildings; purchase or constructing of scientific research equipment classified as fixed assets and intangible assets; development of information technology IT infrastructure for science; participation in investment venture under an international agreement. (the last two being new forms of funding);
- **Funding of research projects**, including the so-called *particular projects*, covering subject matter specified by an applicant (grants); ordered projects, covering subject matter defined in a the national framework programme or multi-annual programme which specifies priority directions of scientific research or experimental development, drawn up by the Minister; development projects aimed at carrying out a research task intended for practical applications (new form of projects); supervised projects undertaken to prepare doctoral dissertation; special projects pursued under international programmes, but not being subject to co-financing with foreign funds(new form).
- **Funding of goal-oriented projects**, including: goal-oriented projects related to the implementation of sectoral operational programmes or regional development programmes, submitted by competent ministers or bodies of voivodships' self-governments; (new form of funding), and goal-oriented projects of subject matter defined by the applicant, submitted by

entities capable of applying results of the projects directly in practice. Funding of goal-oriented projects includes the portion of expenditure specified by the Minister on applied research, experimental development, industrial research or pre-competition research.

- Funding of international scientific cooperation (arrangements modified) which includes: R&D conducted under EU programmes or other international programmes co-financed with non-refundable foreign funds, and activities supporting participation in these programmes; fees paid to international institutions or organizations under international agreements, excluding fees paid by natural persons.
- **Funding of research supporting activities**, including: preparing expert analyses, opinions and scientific evaluations; producing, processing, revealing and disseminating scientific or scientific and technological information; promoting, popularizing and disseminating information on scientific and technological achievements; promoting innovative undertakings applying the R&D results. Funds for research supporting activities can be assigned to ministers responsible for government administration sections, heads of central government offices, and the President of the Polish Academy of Science for their own purposes related to above-mentioned tasks, as well as for the purposes of institutions under their supervision. It can also be assigned to the so-called: entities performing for science.
- **Funding of programmes and undertakings specified by the Minister** (all programmes mentioned below are a new legal instrument); those important for TEIs include programmes supporting: the adapting scientific personnel to the requirements of international scientific and technological cooperation; creation conditions for the employment of outstanding young scientist to train personnel in particular science areas; creation of conditions for the development of outstanding young researchers, including the awarding of scientific scholarships; development of information society technologies infrastructure and information technology infrastructure of science as well as their digital resources.
- **Funding of consortia and networks** under the new Act. A scientific consortium is defined as a group of organizational entities, including at least one scientific entity engaged, on the basis of an agreement, a joint undertaking involving scientific research, experimental development or investments made for the purposes of scientific research or experimental development. A scientific network is defined as a group of research entities with legal personality, engaged, on the basis of an agreement, in organized cooperation which is related to continuously pursued joint scientific research or experimental development serving the development of the network's scientific areas. In contrary to the previous funding system, under which funds were granted to individual institutions, arrangements for the financing of networks and consortia facilitate interdisciplinary research and inter-institutional cooperation.

It is expected that ordered projects and goal-oriented projects co-financed from the science will encourage the development of university-industry linkages and tailor R&D projects to the needs of industry. Although both streams of funding were available for a number of years, selection rules often changed and were not linked to priorities, and the involvement of TEIs in such projects was very limited. Likewise, development projects provide an opportunity to target TEI's research activities to the needs of the economy, also at local level, and stimulate research in those TEIs, which are situated outside large academic centres. It is difficult to assess the extent to which the new, legal instruments of R&D financing presented above will contribute to better quality of scientific research, closer links with the needs of the economy, more efficient use of science budget funds or increased research productivity because these arrangements have been only recently introduced. However, the question arise to what extent, public R&D institutions will participate in new types of projects, or whether their researchers will continue to rely in their research work mainly on funds for statutory research. The success in efforts to improve the R&D system also hinges largely on the level of funding for research.

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

Response:

The role of science and research policy in supporting the development of research has been one of the most controversial issues for the entire academic community since 1990. Successively designed research policies focused practically on one main priority of **ensuring high quality of research**, whereas thematic, i.e. area-related, priorities linked to the socio-economic development were not implemented. It resulted in **dispersion of R&D** due to too many priorities defined by the academic community in a **bottom up approach**. Moreover, no attempts were made to steer research towards the needs of regional development. The above-mentioned goal-oriented projects and ordered projects were the only incentive encouraging cooperation between research and business. However, these projects were not an instrument of government policy as they were developed as a bottom-up initiative rather than a part of any national strategy or development programme. **Thematic priorities could hardly be implemented because of structural constraints and the lack of financing instruments**. Primarily, science budget funds were divided first between various streams of funding (statutory activities, grants, goal-oriented projects etc.), and only then between individual RDUs or academic disciplines. Secondly, the State Committee for Scientific Research, responsible for science and technology policy, was divided into teams representing groups of academic areas and composed of researchers "guarding" the interests of their respective areas, which made it difficult to re-allocate funds between these teams. Thirdly, funding of statutory activities and funding of the so-called particular research, as two major streams of funding (next to funding for goal-oriented and ordered projects), were also designed **primarily to stimulate research quality**. Funds for statutory activities were granted mainly on the basis of academic indicators such as the number of publications or the number of academic degrees and titles awarded, with less weight given to indicators concerning application of research results. Since 1990, no indicator to promote research in line with the government policy priorities has been introduced into legal funding instruments for statutory activities. Most funds available for research projects were also granted for the so-called particular projects reflecting interests of individual researchers rather than needs of the economy. Moreover, the rules for the distribution of grants in individual academic areas did not take into account the importance of a given area for the socio-economic development or other practical applications. As a result, this meant implementing informal priorities of the academic community, individual RDUs and researchers, with the main focus, in particular in PAS institutes and TEIs, on basic research. TEIs allocated 60.2% of their R&D funds for basic research, 25.7% for applied research and 14.1% for development work (see: Annex, Table 5.9). In this context, it is worth noting the position of TEI units vis-a-vis PAS institutes and RDUs in the classification based on performance indicator-based assessment designed to reflect research quality. Between 1991 and 1998 (in spite of changes in detailed rules of assessment of statutory research as well as in related indicators and weightings), PAS institutes were at the top in the classification, and TEI research institutions ranked second. In 1998, 89.2% of PAS institutes were given the highest statutory research ranks and therefore obtained relatively highest subsidies, as compared to only 39.6% of TEI units with the highest grade, and 35.5% of RDUs supervised by sector ministries.

The new rules of parametric assessment introduced under the New act are aimed at considerable change scientific units' appraisal taking into account to the greater extent socio-economic development or other practical applications of research in the distribution of grants and funding statutory activities.

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

Response:

- 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?

Response:

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:

- 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).

Response:

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

Response:

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

Response:

- 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:

Response:

- Other

Response:

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).

Response:

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.⁵

Response:

The new regulations that were implemented in 2004 and 2005 assume some improvement for access to data resulting from publicly funded research:

- Act of 8 October 2004 on Principles of Financing Science – financing of research-supporting activities covers producing, processing, rendering available and distributing scientific and technological information and disseminating and promoting scientific or technological achievements
- Regulation of the Minister of Science and Information Society Technologies of August 4, 2005 on the criteria and the procedure of allocating and accounting for the science funds – implementing Act of 8 October 2004 on Principles of Financing Science with a consideration given to possibility of practical application of the research results and of their dissemination

Furthermore, there is implemented Program PIONIER “Polish Optical Internet - Advanced Applications, Services and Technologies for Information Society” – program for maintaining and developing of the information and IT infrastructure of science, and its digital resources; construction of broadband network infrastructure supporting the science, matching similar installations in other European countries.

The main reasons for adopting policy are:

- Improving the overall efficiency of scientific research, make data quickly and widely available to research community, provide greater returns from the public investment in research.
- Producing publicly-accessible knowledge, helps to maximize the research potential of new digital technologies and networks, reduce costs of transferring information.
- Increasing activity of data exchange, improve number of cooperating research entities, provides the scientists with access to international research data.

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):

Response:

⁵ Delegates may wish to consult with experts participating in the electronic discussion group to develop OECD guidelines for access to research data.

The business R&D and innovation related tax incentives are envisaged in the Law on some forms of supporting innovation activities adopted by the Polish Parliament on 29th of July 2005. The law introduced a number of the tax incentives relating to the CIT, PIT and VAT for Research and Development Centres (the status of Research and Development Centre will be have those entrepreneurships, which obtain at least 50% of their income from the sale of their R&D results). The new law enables entrepreneurs to deduct from tax base expenditures spent on a purchase of the new technologies from research unit. The deduction can be no greater than 50% for Small and Medium Sized companies and 30% for other than SMEs. Another instrument is the shortening the period of writing off the finished experimental developments from 36 months to 12 months. It's also worth mentioning about enabling to include the expenditures on R&D into operational costs, regardless from the results of R&D activities. A new instrument provided by the Law is also 22% VAT rate for scientific-research services. Under the previous law these services were exempted from VAT, which created a barrier for cooperation of research units with enterprises, as VAT could not be deducted.

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

Response:

The policy on supporting business R&D and innovation is first of all aimed at stimulating the entrepreneurs to increase their expenditure on R&D activity. In that area an important stimulus is envisaged in the law on some forms of supporting innovation activity. The act stipulates for the so –called mechanism of technological credit – a new instrument for entrepreneurs, which will be assigned for financing investment based on purchasing and implementing new or possessed new technology. However, it will not be granted for execution of a big investment as well as for an investment in one of the following sectors: iron and steel metallurgy, synthetic fibres, coal mining, fishery, production, processing and introducing agricultural produce on the market. It will be granted under a condition that own contribution of an entrepreneur in financing the investment will amount to at least 25% of its value. Technological credit cannot exceed 2 million euro. The granted credit can be subject to a partial write-off, which can amount to maximum 1 million euro and 50% of amount of the credit that was already used during the new investment. The sum of the write-off also depends on localisation of the investment and cannot exceed 30% and 40% (in agglomerations) or 50% (other localisations) of expenditures incurred (on tangible and intangible assets, pre-execution works). However, when the write-off is granted to a microentrepreneur or to a SME, the limits depending on localisation increase by 15 p.p. (gross). An aid in a form of the write-off is summed up with other forms of aid obtained for this investment or for job creation connected with this investment and can not exceed the above-mentioned limits.

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

Response:

- 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):

Response:

The present activities of the Polish Patent Office in the area of supporting R&D sector and innovation are directed at promoting events (conferences, seminars, stands at fairs, popularising patent information, publications). Patent Office cooperates closely with 27 patent information centres operating at: tertiary schools, regional technology and rationalization clubs, research and development centres through passing them literature on patent issues and computer equipment to make use of global information patent

databases. Personnel of mentioned centres are delegated to different kinds of trainings both in Poland and abroad just on Patent Office initiative. In the area of strengthening of industrial property rights execution there has been created in Poland court on Community trademarks and industrial designs. There is not in Poland a specialized court on patents as yet but the issue is still considered. One of the initiatives promoting protection of industrial property rights in Poland has been implementation (since 2005) of Ministry of Science recommendation for all tertiary schools (including private schools) to take into account the industrial property right issues in building teaching programmes on all faculties.

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

Response:

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:

Response:

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

Response:

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

Response:

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?

Response:

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.

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).

Response:

Over the last 3 years intensified activity in the development of innovation at the regional level is being observed in Poland. Throughout Poland the so-called Regional Innovation Strategies are being implemented. Some of them try to identify and develop cluster initiatives focusing on high-technology.

Till, however, Poland is dominated by traditional branches, which are also major exporters. Specificity for the Polish institutional landscape are special economic zones which to some extent have also clustering effects and may stimulate the creation of clusters.

Among the most important cluster initiatives in Poland are:

- Aviation Valley in South-East of Poland with the center in Rzeszow; this is a region with traditions in manufacturing aircrafts and aircraft equipment dating prior to World War 2nd
- Plastic Valley in Tarnow and neighbourhood (also South-East of Poland), this is a center of plastics manufacturing and processing companies
- Maritime Cluster on the Baltic Sea, where in Gdansk and Gdynia many shipyards and producers of naval equipment are located
- Construction Materials Cluster in Southern Poland with the center in Kielce; rich local deposits of gypsum, calcium are used for production of a wide assortment of construction materials; also the largest construction companies are located there.
- Cluster of food processing in Lubelskie region (Eastern Poland) – there are about 110 groups of rural producers organized as associations; their main goals is to help their members in processing of food products and their marketing in Poland and abroad.
- Automation equipment (especially for ships) in the Maritime Cluster (Gdynia – Gdansk).

Another high-technology clusters are expected to be form around the major metropolitan areas in Poland with a developed base of universities, R&D institutes. These are:

- Electronic industry in Warsaw area,
- Pharmaceuticals and cosmetics in Krakow and Lodz,
- Automotive industry in Lower and Upper Silesia (Southern Poland).

Until last years the issue of clusters was under-estimated in the Polish economic policy. Since 2004 there is a certain improvement. The Gdansk Institute for the Market Economy have jointly prepared the assumptions for “Strategy of developing clusters in Poland”. It is expected to put foundation for the formulation and implementation of the complex governmental strategy for cluster development.

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

A number of studies confirm that cooperation between universities, polytechnics, R&D institutes, the Polish Academy of Science and the Polish industry is low. The reform pace in the R&D sector is slow, mainly because the state research institutes (JBR) are supervised by different ministries and because of the size of the science sector. In 2003, there were 201 state research institutes employing 13.130 people. In general, there is an idea to create about 20 areas of excellence in cooperation of leading R&D organizations that are to be able to deliver valuable and innovative technological solutions needed by the Polish industry.

A certain improvement is also expected to take place after entering into force of the law on some forms of supporting innovation activities. Minister of Economic Affairs may grant an entrepreneur with a status of Research and Development Centre. The aim here is to develop the private research and development centres and an increase of demand on R&D services through tax incentives for R&D Centres. The R&D centre can set up an innovativeness fund, based on monthly deduction of 20% of revenues. These monthly payments will be included into the costs of running the R&D Centre. The innovativeness

fund resources will be earmarked for carrying out R&D activities. The R&D Centres will be exempted from tax on real estate, agriculture and forest tax when a tax subject is exploited while executing research and development works and from other payments.

- 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);

Response:

- 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.*);

Response:

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

Response:

- Others:

Response:

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.

Section E: Globalisation⁶

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

Response:

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

- Direct financial support
- Fiscal incentives (tax breaks, R&D tax credits ...)
- Administrative support
- Provision of infrastructure
- Public procurement
- Active recruitment of foreign firms

⁶ 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.

- Advertising
- Other measures:

Please check the boxes above to indicate the types of policies used and provide more detail information here:

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.)

Response:

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).

Response:

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.).

Response:

Section F: Human resources⁷

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;
- 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

⁷ 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.

- Enhancing financing opportunities for PhD study and post-doctorate training (such as through fellowships, funded research opportunities, *etc.*)
- Improving the quality of secondary university research laboratories/infrastructure
- 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 sectors.
- Others:

Please check the boxes above to indicate the types of policies used and provide more detail information here:

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;
- Funding of scholarships, grants for international mobility of students/scholars;
- Creation of special positions at universities or public research centres;
- Fiscal incentives (*e.g.*, income tax breaks) for foreign workers
- Programmes to promote return migration of expatriate students, scientists and engineers
- Other measures:

Please check the boxes above to indicate the types of policies used and provide more detail information here:

One of the major challenges as regards the policy for human resources development is **optimising the structure of national human R&D potential**. To this aim, special effort has to be put on increasing the number of researchers employed in the private sector in Poland. Nowadays in Poland almost 66% of researchers employed in the R&D sector works in higher education institutions, more than 19% in public R&D units (JBR), 8% is employed in the institutes of the Polish Academy of Sciences, and scarcely 6% in private enterprises.

Moreover, legal frames in Poland are considered to pose direct obstacles to one of the aspects of intersectoral mobility – transferring scientists from science sector to the industry sector. Also differences in the levels of employees’ powers in the private and science sector serve as an antimotivator for this kind of mobility. Low level of intersectoral mobility in Poland stems first and foremost from the lack of proper mechanisms aimed at stimulating researchers from public sector to work on a temporary basis in the industry sector. Simultaneously, there are no parallel stimulators for researchers employed in the private sector to join the public one. Under presently binding regulations researchers from the industry sector cannot be employed in public one, if they don’t have a degree or a title on a scientific post in the public sector, regardless of their outstanding achievements in their research work.

Rules of employing on scientific posts, as well as rules governing the conditions for resolving employment, have a great impact on the mobility of researchers, both, between disciplines, as well as between science and industry sector. A higher certitude of employment (based on appointment) compared to the number of posts in R&D sector, together with radically lower certitude of employment in the private

sector results in the lack of motivation for the appointed researchers from the public sector to seek employment in the private sector. Remaining in the R&D sector is more advantageous for them than being employed by a private company.

Within the framework of Prime Minister's Kazimierz Marcinkiewicz government work programme, dated 9 November 2005, there are programmes due to be developed and implemented in 2006 by the Minister of Education and Science (based on article 14 item 1 of the Act of 8 October 2004 on the Principles of Financing Science), regarding human R&D resources. Those programmes would focus on:

- supporting international mobility of researchers,
- supporting the mobility of researchers between science and economy sectors,
- supporting the development of young doctors - financial support for young researchers' investigations.
- Ad. a) The programme supporting international mobility of researchers

The programme would be implemented through financial support for the participation of young scientists in research projects carried out in research units abroad. The researcher who would want to get support within the project will have to find a partner from abroad – a research institution that would allow Polish researcher to take part in the project carried out at its premises. The programme is to be aimed at increasing the mobility of Polish scientists. The financial support within the framework of the programme would be allocated on a competitive basis, which means that the support would be mainly granted to the participation in the projects presenting the highest scientific level and to the performance of the projects in research institutions presenting the highest world standards.

- Ad. b) The programme supporting the intersectoral mobility of researchers

The programme would be carried out by means of allocating support to the entrepreneurs in the form of covering a part of their cost of employing a researcher. Eligible costs would have to relate to the performance of a project in the field of R&D on the entrepreneur's premises. It will be one of the instruments of the national policy that will stimulate a higher level of mobility of research staff between science sectors (in Poland: higher education institutions, institutes of the Polish Academy of Sciences, public R&D units - JBR) and enterprises. The program is also expected to generate a positive indirect impact, namely by contributing to the increase of the level of cooperation between scientific environments and enterprises and economic growth. Financial support of the programme would be allocated on a competitive basis, meaning that of all submitted projects support will be granted to those, which represent the highest scientific level and would comply with the priorities of Polish scientific and technology policy.

- Ad. c) Programme supporting the development of young doctors - financial support for young researchers' investigations

The programme would be carried out by means of financing or co-financing research projects performed by young doctors in an entity other than the one where they obtained doctor's degree. The objective of the programme realization is to support the development of young researchers who have recently obtained doctor's degree. The implementation of the programme should help young scientists in acquiring the competences of independent researchers, by means of providing them with the possibility of performing their own research project, according to their own ideas and in the area of their interest. The financing or co-financing of the costs (other entities may participate in the project's costs, enterprises most of all) will be allocated on a competitive basis.

As regards the support of women and young scientists in scientific careers - within the scope of the Ministry of Education and Science's activities in this field there is the above-mentioned programme

due to be developed and implemented in 2006 by the Minister of Education and Science concerning the support for the development of young doctors, aiming at the financial support for young researchers' investigations.

It is also worth mentioning that there are scholarships offered by the Foundation for Polish Science, among them:

DOMESTIC GRANTS FOR YOUNG SCIENTISTS – the Foundation every year awards about 100 grants for young scientists of age of 30 (32 for candidates who were on maternal/paternal leave), whose achievements have been already documented. Researchers who are employees or PhD students in higher education institutions, PAS institutes or in other entities whose statutory activities include conducting research may apply for the grant.

DOMESTIC VISITING GRANTS – were founded as a mean to support the development of R&D staff by awarding young scientists with research visits of several months duration to leading research centres throughout Poland. The programme aims at increasing mobility of R&D staff, the exchange of views and ideas between various research centers, it should also facilitate the performance of interdisciplinary research and facilitate a better use of research equipment.

FOREIGN POSTDOC FELLOWSHIPS – awarded to young Polish researchers who, after obtaining a doctor's degree have not yet been on a long-term foreign fellowship, in order to give them the possibility to visit (for the period of 6-12 months) the worlds' best research institutions. These fellowships are available to young (up to 35 years of age, 37 for candidates who were on maternal/paternal leave) Polish researchers who have a PhD degree and are employed in higher education institutions, PAS institutes or in other entities whose statutory activities include conducting research. The candidates are evaluated on the basis of their research achievements and on the basis of presented work plan that will be realized during the fellowship. One of the most important criteria will be the rank of the chosen institution⁸.

In December 2005 the Foundation introduced two new programmes for young scientists:

HOMING PROGRAMME – subsidies for returning researchers – is addressed to young researchers returning from a longer (over 9 months) scientific visit. The programme aims at encouraging young researchers to return to Poland and to speed-up their careers by improving the conditions of work as well as supporting the international cooperation they have started during their visit. The Foundations plans to award a minimum of 6 subsidies in 2006. They will be awarded for 2 years with a possibility of extending the duration of the subsidy agreement by one year. Both, the subsidy and the extension will be awarded on a competitive basis. The candidates will be evaluated on the basis of their research achievements, research project the candidate wants to perform during the subsidy and a financial plan of how the money he gets will be spent. The Foundation expects the laureates an active research work, as well as actions towards social understanding and promotion of science.

FOCUS Programme – subsidies for forming research teams (the 2006 editions concerns the field of mathematical modeling of biological processes). The programme aims at granting support for young scientists, who already have research achievements in a field chosen each year by the Foundation, having a

⁸ From the year 2004 onwards, under an agreement between FNP and the Polish-U.S. Joint Science and Technology Commission, one of the grants under this scheme is to be financed from unallocated resources of the Maria Skłodowska-Curie Joint Fund II. It is awarded to a beneficiary representing exact, technical or natural sciences, for his or her stay at one of the leading research centres in the USA.

great meaning for civilization development of Poland. The support granted by the Foundation is meant to enable young scientists to pursue research in new and promising fields of science, as well as assist in the first stage of building a research team. The programme is addressed to those researchers whose achievements in previous years have proven him to be independent and give a guarantee of correct use of funds.

Actions aimed at increasing the financial support for S&THR development

The increase in financial support for the development of R&D staff by means of supporting the mobility of the researchers will depend on whether the programmes of the Minister of Education and Science, planned for 2006 will be implemented, and what amount of money will be allocated to those programmes.

Reforms of education programmes and stimulating demand

It is worth mentioning that the instruments foreseen by the Act of 29 July 2005 on some forms of supporting innovation activities contribute to stimulating the employment of researchers in enterprises. It may become an important issue at the moment of presuming an attempt to award the entrepreneur with the status of Research and Development Centre, taking into account that the main criterion of awarding a status of Research and Development Centre is that 50% of the enterprise's income comes from selling its research and development activities. Knowledge and abilities of researchers in the field of how to make use of research results for creating new technologies becomes valuable from the entrepreneur's point of view who is given support for innovation in the forms provided by the act.

Attracting talents from abroad - inviting young researchers-migrants to return to their home institutions

Starting with the 2001 edition of the competition of the Foundation for Polish Science for foreign postdoc fellowships, the programme has been extended by the possibility of applying for a supporting grant given to the researchers after their comeback to the country. This grant is meant to support the young researcher in order for him to make full use of the knowledge and capacities gained during the fellowship in his further work in the domestic research institution. The grants are awarded to the researchers after their comeback from the fellowship, and the manner they can be used (costs of buying the needed equipment, costs of facilitating research work, costs of buying books or participating in scientific conferences) will depend on the fellow's judgement.

The supporting grant in Maria Skłodowska-Curie fellowship should be used, at least partially, for continuing the cooperation with the host institution.

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.

Response:

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.

Response:

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.

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.

Response:

Evaluation refers to a process that seeks to determine as systematically and objectively as possible the relevance, efficiency and effect of an activity in terms of its objectives, including the analysis of the implementation and administrative management of such activities. Taking into account this definition, it has to be admitted that in Poland there is no fully-fledged overall system of innovation policy evaluation. Although there are some attempts to create it (for example *Assumptions of the state's scientific, science and technology and innovation policy till 2020* should be revised and updated every three years), nevertheless future efforts are needed to implement the government policy evaluation in a systematic way.

However, it should be stressed that the national innovation policy is usually carried out through a set of S&T and innovation programmes or projects and they are evaluated, as well as scientific entities that conduct those projects.

Evaluation of programmes and strategies Every **National Development Plan** and **sectoral operational programme** should undergo an evaluation: ex-ante, on-going, mid-term and ex-post. Evaluation ex-ante covers in particular assessment of the socio-economic environment for the assistance in terms of competitiveness and innovativeness of the economy, the labour market, including job opportunities for both sexes, the condition of the natural environment and an macroeconomic impact of the NDP implementation. The on-going, mid-term and ex-post evaluation cover: efficiency of financial resources spending, effectiveness in reaching the assumed objectives, impact on socio-economic situation, including employment, functioning of implementation system. The *National Development Plan 2004-2006* and the Sectoral Operational Programme *Increasing of enterprises competitiveness* ex-ante evaluations were conducted by a team of Polish and foreign experts. Their results were then taken into account while preparing the final versions of the documents. The remaining types of evaluation are being conducted by the National Evaluation Unit, situated in the structures of ministry responsible for the regional development. Until October 2005 it was the Ministry of Economy, and since then – the Ministry of Regional Development. The same unit will be responsible for evaluating NPD 2007-2013. The *Act on Principles of Financing Science* gives a possibility of creating **programmes and undertakings of the Minister**, aimed at supporting linking science with economy. At present, these programmes are under construction. Their drafts provide for evaluation to be conducted at various periods of a programme existence. In this scope, also **the National Framework Programme** should be quoted. The Programme, which determines R&D priority areas, was established in September 2005 and it will be reviewed and updated annually, according to opinions and proposals of the scientific and business communities. The important element of evaluation is also the case of monitoring Regional Innovation Strategies (RIS), usually comprising three stages. At the first stage, monitoring takes place at project level and begins with launching of the first actions, which are then systematically examined. At the second stage, the monitoring moves onto the level of strategic goal achievement. The main purpose of this stage is

to verify the extent to which strategic targets are met and to measure the impact of projects on the region's economy. At the third stage, the preparations for the establishment of the regional observatory can begin in order to present information concerning innovative trends to decision-makers and to adjust the region's innovation policy. At the regional level, it is the National Contact Point for FP6 in Poland that effects the implementation and monitoring of innovation policies, which acts as a coordinator of the Polish network of Regional Innovation Strategies.

Evaluation of projects. *The Act on Principles of Financing Science and Regulation on criteria and procedure of granting and settling funds for science* have established a comprehensive evaluation system for the public sector projects.

- **Evaluations of applications** are prepared by committees of the Council for Science: the Committee on Research for the Development of Science or by the Committee on Research for the Development of the Economy on the basis of appraisal accomplished by a working, specialised or interdisciplinary group (consisting of members of the Committees as well as of competent external experts). Before the Committees examine applications for financing of research projects and goal-oriented projects, reviewers appointed by members of the Committees review those applications. The outcome of evaluation prepared by the Committees should contain a proposition of the amount of financial means assigned for a particular project or a proposition of rejecting an application for funding. The outcome of the evaluation should have the form of a ranking of applications.
- **Mid-term and ex-post evaluation** is conducted on the basis of annual and final reports submitted by a scientific entity which conducts a project. It is the Minister of Science that is responsible for this evaluation and control of the legality, purposefulness and reliability of spending science funds. This control is exercised on the basis of reports, accounts and other documents, or directly at the seat of the scientific entity by an audit team appointed by the Minister.

Evaluation of scientific entities. The most important role in the evaluation of scientific entities plays the so-called *parametric assessment* of public research institutions, which is conducted every four years. Under new *Act on Principles of Financing Science*, those entities will be appraised in three fields:

- General activity of the institution (training of researchers, rights to awarding scientific degrees, research laboratories possessed, research projects performed),
- Results of the scientific activity (scientific papers published, academic manuals written by scientists of the institution),
- Practical application of R&D results (new technologies, materials, products, systems, services and methods devised, applications, patents).

Evaluation will be conducted by the Committee on Research for the Development of Science and the Committee on Research for the Development of the Economy. The final outcome of such appraisal exercise is attributing to each public research institution one of the categories ranging from "1" to "5". Such number of category is taken into account while granting financial resources to an entity.

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.

Response:

The above-mentioned *parametric assessment* of the public research institutions carried out since 1998 under the Act on State Committee for Scientific Research was significantly modified under the *Act on Principles of Financing Science*. The most important changes provides for:

- The parametric assessment results taking the form of public research institutions' categorisation (as described above) will not only determine the level of block grant/subsidy for the statutory activity of scientific units, but also will be taken into account while appraising their research applications;
- Allowing to the greater extent than before in the parametric assessment the scientific excellence, practical applications of R&D results as well as actions taken towards their dissemination and promotion.
- Increased role of parametric assessment as the instrument of science and technology policy, enhancing the scientific units to increase the quality of its research activity and channelling it towards meeting social and economy needs.
- The parametric assessment is also planned to constitute essential element of the modification of system of institutional financing (concentrated only on the units that obtained categories 1 and 2) and creation of National Research Centre (comprising the best public R&D institutions). That new parametric assessment is to be carried out in the first quarter of 2006.

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.

Response:

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

Response: