

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:

The cabinet's vision on science, technology and innovation policy is described in the Science Budget 2004 (issued november 2003) of the Ministry for Education, Culture & Science and the Innovation letter 2003 of the Ministry of Economic Affairs.

The launch of the Innovation Platform in 2003 was the most substantial change in the innovation governance system. In the midterm review of 2005 it was concluded that the Innovation Platform has successfully brought innovation on the political and societal agenda. In the past two years the Innovation Platform has advised on issues like 'renewal of vocational education' and 'vitalising the knowledge economy'. At this moment the Innovation Platform is working on a long term strategic knowledge investment agenda, in order to arrange extra finances and continuity in knowledge investments.

One relevant event for innovation, science and education policy was the so-called "Easter Agreement" (April 2005). In this

Agreement additional funds were made available for knowledge, innovation and education:

€250 million were allocated to education.

€500 million from the national gas revenues (FES = Economic Structure Enhancing Fund) were allocated for investments in knowledge, innovation and education.

The additional investments are used for primary vocational education, for top-research (on nanotechnology, biotechnology and innovative ICT-applications), for a specific innovation-impulse aimed at vocational education (€40 million), large-scale research infrastructure (€40 million) and the key areas which have been selected by the Innovation Platform (€70 million).

Recent developments in innovation policy include an emphasis on choosing "excellence" and the creation of focus and mass in the research and innovation system. The reason for this is that the Netherlands are a small country and cannot excel in every field. Clear choices have to be made, together with public and private stakeholders, in order to create critical mass in targeted "key areas".

In regional innovation policy this emphasis on key areas is exemplified by a shift away from helping deprived regions to catch-up, towards “backing winners”, *i.e.* regions with a capacity to develop into internationally competitive innovation “hot spots”.

In industry policy this new emphasis is exemplified by the special attention for key innovation areas, to be selected through a bottom up process. In the key areas (see section B.1), knowledge institutes, businesses and government will jointly develop action plans and develop programmes to stimulate research and innovation. The process is characterised by an open, bottom-up approach, in which each of the public or private stakeholders will have to take its own responsibility.

- 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):

In order to facilitate the realization of focus and mass in the Dutch innovation system, the ministry of Economic Affairs carried out a thorough reassessment of its policy mix in 2005. In an effort to become more effective and efficient, with less policy schemes, less overhead, less rules and regulations, and a stronger and more flexible organisation of policy implementation.

Main elements in this renewal are a substantial reduction of the number of instruments in the innovation policy mix and a reorganisation of the instruments in two main packages: (i) a basic and (ii) a programmatic package. An accessible and transparent basic package provides entrepreneurs with information and capital. In addition a programme-based package offers the possibility to focus innovation resources on a limited number of fields in which the Netherlands can excel (more info in section C-1).

The balance between generic and specific instruments is shifted towards more targeted innovation schemes, aiming to create excellence in key areas of strategic importance. Instruments will become more custom-made and bottom-up in order to increase flexibility and to prevent the risk of government failure. The new approach will be implemented gradually, within the existing budgetary frameworks. In 2008 it should be fully implemented.

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

Until now there is no specific innovation policy for the service sector, because innovation instruments are accessible for all sectors. The service sector however is an important sector in the Netherlands as it employs approximately two thirds of the total active labour force. Its expenditure on innovation is considerably lower than the industry sector (18% of BERD) with €2424 million⁵¹ (0.2% of GDP, which is average in the EU). Recent policy initiatives in other countries and the OECD study on the Knowledge Intensive Research sector are followed with interest to see if there are chances for raising productivity growth in the service sector.

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

i) strengthening the science system

As of the year 2007 €100 million per year is allocated to enhance focus and mass in excellent research and enhance social and economic valorisation through multi-actor multi-year programmes (the so-called Smart Mix). A group of experts will advise the cabinet on bringing more dynamics into research funding based on content.

For future policy development it is of great importance that reliable information on the science system is available. That's why much effort is put into an integral and accessible overview. This goes as well for a recurrent overview of inquiries into favourable and desirable scientific developments, including white spots. Furthermore, the parliament should be able to dispose of accessible information on new scientific and technological developments en on the functioning of complex technological systems. For that purpose, the duties of the Rathenau Institute, mainly dedicated to technology assessment, has been expanded with duties in the field of science system assessment.

iii) Linking science to innovation

The Casimir programme was set up for stimulating mobility of researchers between companies and public knowledge institutions.

So called "knowledge vouchers" should lead to more intense relationships between companies, especially small and medium sizes companies, and publicly financed institutions.

The Dutch Organisation for applied scientific research TNO should base their activities more on demands of society and develop a model of financing based on demand steering. The departments have mapped out their future demands for knowledge and have pointed out coordinating departments for each theme. This marks the first steps in a clear movement towards a more content based science policy.

For a number of socially relevant topics (big cities' issues, internationalisation of the law, retirement and ageing) societal top institutes are being established that bring together the best of knowledge and the demands for knowledge of departments and society, the so-called MTI's (centres of excellence on societal issues). These are:

1. HIIL: The Hague Institute for the Internationalisation of the Law. (Start in the summer of 2005 with cooperation of the ministry of Justice),
2. Netspar: Network for Studies on Pensions, Aging and Retirement (Start in the spring of 2005 with cooperation of the ministry of Social Affairs) and
3. NICIS: Netherlands Institute for City Innovation Studies. (Start in the fall of 2005; ministry of Internal Affairs).

iv) developing human resources for S&T

Communication on S&T should focus more on youth and kindling enthusiasm for science. The national science centre Nemo receives a subsidy for continuing their activities, it also subsidises smaller regional science centres. The National Action Plan for Science and Technology was set up to stimulate young people to choose for beta and technique studies. There is a proper understanding that kindling enthusiasm for science should start early on. The number of primary schools with technique in their

package is expanding rapidly. As a result of the space trip of the Dutch astronaut André Kuipers, the Delta Research Schools programme was set up together with ESA and NASA. This programme also focuses on primary schools. The admittance of foreign knowledge workers was eased in order to facilitate brain gain, picking up the best researchers from abroad.

Young scientific talent should be cherished. By the end of 2006 a White Paper has been issued to improve the chances and position of young researchers. It should become more attractive to take one's PhD and there should be better career opportunities for researchers. The talent of female and immigrant researchers should also be put to better use. The so called "Vernieuwingsimpuls" (impulse for renewal) is a substantial programme for the stimulation of young research talent in three categories: those who recently took their PhD, those who work in science for longer time, and those who have the capacities to become professor. For females there is a separate component in the "Vernieuwingsimpuls" as well as the Aspasia programme that was set up to make women move up to higher scientific positions. For immigrant scientific talent a separate programme has been set up: Mozaïek.

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).

The Innovation Letter (2003) was based on a thorough analysis of the Dutch NIS, which identified a series of weak points of the innovation system. In spite of an overall strong innovation system with a number of good indicators well above EU25 average (high quality of output of scientific research; high level of patenting, high share of financing of public research by industry and high use of ICT and access to its applications), the trends in a number of factors are negative. The conclusions from this analysis are still valid and so are the challenges.

Innovation challenges and policy responses

Identified challenge	Measures for meeting the challenge and impact
Corporate R&D intensity of Dutch companies lagging behind	(Intensifying) WBSO (reduction of wage tax and social security contributions for companies with R&D personnel) – Evaluation in 2007 Impact not seen in figures on investments in RTDI by the public sector, due to delaying effect.
A growing shortage of knowledge workers, particularly scientists, technologists and R&D workers	Delta Plan Science and Technology ("Δ-plan β/techniek", see description in section B) Policy presented in 2003. Impact not seen in figures yet.
Too little innovative entrepreneurship	The TechnoPartner programme was introduced recently (see description in section C). Impact not seen in figures yet.
Insufficient use of results of scientific research	IOP - Evaluation is running LTI (NL_19) – Will be evaluated in 2005 NGI – Will be evaluated in 2007 IS (NL_45) – Will be evaluated in 2008 Technology Foundation STW – Will be evaluated in 2006 Bsic (ICES/KIS 3) (NL_29) – Will be evaluated in 2009
The financing of innovation is problematical	Seed facility part of TechnoPartner Action Programme (see description in section C) The programme was introduced just a few months ago and will be evaluated in 2009

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: No major changes have taken place in the overall level of R&D funding, and no major changes have taken place in the R&D funding of the public research organisations.

If funding data is available, please provide it below:

Year	2003	2004	2005	2006(forecast)	2007(forecast)
R&D funding (Unit: million €)	3,524.0	3,594.6	3,597.7	3,609.1	3,660.9

Note: total GBAORD data, including funds for R&D abroad.

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

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

Response: No major changes.

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

Response: there are some shifts at the level of the socio-economic objectives

	2003	2004	2005	2006	2007
Infrastructure	207.0	189.5	145.1	153.8	150.3
Environment	98.6	67.0	57.8	52.1	52.1
Energy	111.5	109.9	137.7	67.3	68.2
Agriculture	149.3	208.5	213.2	200.4	200.1
Space	144.1	144.9	116.9	87.5	95.5
Other civil research	140.8	150.4	170.2	215.1	214.2

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

The Innovation Platform has identified four key technology areas in the Netherlands:

Flowers & Food.

High-tech systems and materials.

Water.

Creative industries.

- 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?

More emphasis on the use of temporary budgets versus structural budgets and changes in the direction of more competitive funding mechanisms (*e.g.* Smart Mix funding of university research).

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).

In 2005 a major initiative has been implemented to enhance the accountability of universities. €100 million of the so-called first flow of funds (Government funding) to universities has been redistributed to universities on the basis of how many funds they have been able to attract from the research council (NWO) and from other parties, such as industry. Also per 2007 the so-called Smart Mix will be implemented. This is a government subsidy of €100 million for multi-year multi-actor programmes directed to strengthening focus and mass in excellent scientific research and generating social and economic valorisation of knowledge. All programmes will have to serve both goals. This will help universities to focus their research activities more towards economic as well as social objectives.

A high-level Committee has been asked to present possible measures to increase the measure in which university research responds to new developments and needs, with emphasis on possibilities for cooperation between universities and research centres of industries and societal organisations, and on areas of research which will lead to top performance of Dutch science in the European arena.

The Committee has also been asked to evaluate the efficiency and effectiveness of the way that universities evaluate their performance and how they respond to the outcomes of such evaluations.

It is expected that the Committee will report in April 2006.

- 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):

The Dutch Government has initiated a major effort to increase the contribution of the large public research organisations (ie TNO and 5 large technological institutes) to innovations in the public as well in

the private sector. To this end a high level commission of experts has been commissioned to prepare a report about the necessary measures to be taken. Based on this report the Government decided in 2004 to change the way of defining and financing the research programmes of the forementioned institutes. This change is characterized by a switch from input programming towards demand led programming and a corresponding change from institutional funding towards programme funding. In 2005 the ideas for implementation of these new concepts have been materialized in more detail. An important element is the formulation of networks around the major questions. These networks include the important stakeholders taking into account the mechanisms of "open innovation". In this way the research agenda for several important themes will be developed in close cooperation with the relevant stakeholders from government, private sector and research community. A new scheme for funding is presently under investigation. Starting 2007 the new programming and financing procedures will be implemented.

- 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:

In 2004, TNO has introduced new rules regarding the ownership and licensing of IPR's. The new IPR-policy makes it easier for companies who work with TNO in joined research projects, to obtain ownership of patents, or an exclusive license. It is expected that these new rules with more possibilities for companies to own IPR's, will lead to a better commercial use of the results of research.

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.²

Response:

By the end of 2005 The Royal Netherlands Academy of Arts and Sciences (KNAW), the National Organisation for Scientific Research (NWO), the national funding agency, as well as the leading universities in The Netherlands had signed the *Berlin Declaration* that promotes Open Access to research results and data. Transparent ways of making data available is a condition for research grants from NWO. In 2005 KNAW and NWO jointly established the Data Archiving and Networked Services (DANS) to disseminate and archive data for the social sciences and humanities. DANS makes data accessible at no additional cost. Meanwhile, the Association of Universities in The Netherlands (VSNU) has established a code of conduct for research dealing with privacy sensitive data. At the moment (2006) the minister of Education, Culture and Science is preparing a governmental white paper that will address future policies on access to and use of scientific information.

² Delegates may wish to consult with experts participating in the electronic discussion group to develop OECD guidelines for access to 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?

The main challenges remain:

The growing shortage of knowledge workers, particularly scientists, technologists and R&D workers (see section F.1 on Human Resources).

Insufficient use of scientific research (see section D.1 on Joint R&D programmes).

Furthermore, the emphasis on focus & mass creates a challenge to focus on:

strengthening sciences areas of great promise and quality in the Netherlands, and creating focus and mass in those, where desirable also in a European context;

strengthening those research areas that are essential for societal challenges and for industry (innovation).

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:

A major change was the thorough reassessment of the policy mix mentioned in section A.1:

Entrepreneurs only do well in a healthy and challenging business climate, with a stable macro-economic environment, properly functioning (international) markets, clear legislation and regulations and an attractive tax climate. In addition, a mix of financial and non-financial government instruments could contribute to creating a climate that encourages entrepreneurs to deliver top performance. These instruments must satisfy today's requirements in the best possible way, and that is why the Ministry of Economic Affairs has reviewed and radically revised these instruments.

In order to deliver good performance, all entrepreneurs must have ready access to information and capital, and so the Ministry of Economic Affairs is introducing the *basic package* for entrepreneurs:

A package for information and advice.

A package for capital.

A. Information and advice: streamlining of helpdesks and schemes

A range of organisations provide the entrepreneur with information and advice: SenterNovem, Syntens, The Netherlands Patents Centre, the EVD and the Chambers of Commerce.

They all work in the field of stimulating and enhancing the innovative character of enterprises over a broad range (technology, hrm, finance, organisation, international relations and export) including sme's.

The coming years we will be working on reducing the number of helpdesks, as well as improving accessibility and referrals between the various services.

The Ministry of Economic Affairs is also developing instruments at present, with which the entrepreneur can buy information from parties other than the above-mentioned organisations. These include:

The *Subsidieregeling kennisoverdracht ondernemers MKB* [Knowledge Transfer Subsidy Scheme for Small and Medium-Sized Enterprises] (SKO), the *Subsidieregeling kennisoverdracht brancheorganisaties MKB* [Knowledge Transfer Subsidy Scheme for SME Sector Organisations] (SKB) and the pilots with innovation vouchers. These schemes focus on the transfer of knowledge to SMEs.

Pilot with *Innovation vouchers*; entrepreneurs can exchange vouchers at public knowledge institutions and companies whose annual R&D expenditure exceeds €60 million. Autumn 2005 there will be conclusions about the effectiveness of the vouchers.

In order to increase enthusiasm among SMEs for innovation, the Ministry of Economic Affairs will also be launching a pilot with '*Innovation Performance Contracts*' (IPCs). These are agreements between the Ministry and groups of SME entrepreneurs on innovation objectives and joint action plans to achieve these objectives. The Ministry's contribution is an obligation of effort, building on experiences with the SKB. Eventually we want the IPCs to link up to the basic package, and possibly also the programme-based package and we will be developing this over the coming period.

B. Capital market: a single package

The capital market must work in such a way that businesses can have ready access to finance. The financial sector is cautious about providing finance for innovative activities, starters and SMEs, for example, because of the relatively high risks, the lack of track records among starters or high administration costs with small credit loans. Another factor is that as far as the financiers are concerned, only smaller markets are involved. The incentive for them to build up and maintain expertise is therefore usually not very great.

At present there are various capital market schemes to improve access to capital for these activities and groups of entrepreneurs:

- SMEs Credit Guarantee Decree (*Besluit Borgstellingskrediet MKB= BBMKB*) A general SME guarantee scheme. The Dutch Ministry of Economic Affairs provides the guarantees to back loans. The risk premium amounts to one off 3 percent of the principal amount. There are three guarantee sub-schemes in place: a) A 50% guarantee for bank financing of SMEs (with a cap of the guarantee of EUR 1 million). b) A 80% guarantee for start-ups (less than EUR 100.000) which requires adjustment given decreasing demand due to the Basel II. c) A 2/3 guarantee for innovative companies that is not used very much yet, however.
- The new *TechnoPartner Seed Facility* – introduced in 2005 as part of the overall *TechnoPartner* programme aimed at raising the number and quality of high-technology start-ups by improving access to capital and providing specific information and coaching – is aimed at eliminating the “equity gap” frequently faced by Dutch high-tech start-ups. Drawing on experiences made with related schemes in The US and the UK, this facility aims to stimulate Small Business Investment Companies (SBICs) established by private parties. The own capital brought into the SBICs is matched by government loans.
- In addition there is a fiscal facility providing incentives for individuals to invest in risk capital.

In order to meet the need for capital in the market better, the Ministry of Economic Affairs will introduce a single capital market package, in which the existing schemes will be incorporated. The modifications should lead to greater transparency, greater awareness of the scheme among entrepreneurs, lower acquisition and implementation costs and shorter and simpler procedures.

The ultimate package will consist of finance for starters, growing enterprises, innovative companies, company transfers and capital-intensive sectors (such as shipbuilding and aircraft construction) and

investment in emerging markets. The package contains various financing options. Which option is the most suitable will depend on the risk profile of the entrepreneur. The starting point is that the capital package will be cost-neutral for the government as far as possible.

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

The new initiatives are as follows:

A **guarantee facility for venture capital** for SMEs. This ‘growth facility’ consists in general terms of a 50% guarantee on venture capital in the form of shares and/or subordinate loans, up to a maximum amount of € 5 million. This will be allocated to SMEs through banks and participation companies. The aim is to start up this growth facility at the beginning of 2006. As far as its structure is concerned, the facility will be similar to the BBMKB, although there are a few important differences:

1. more focus on venture capital instead of loan capital;
2. the use of participation companies;
3. a stronger focus on growth enterprises and company transfers;
4. and a higher upper limit (€ 2.5 million guarantee compared to € 1 million in the BBMKB).
5. For this new initiative we still need to obtain approval in view of the EU rules for state aid.

Review of the **BBMKB in the area of small credit loans** (up to about € 0.5 million). With this review we are responding to the increasingly standardised and automated credit loan processes among the banks. The aim of this review is to reduce the administration costs and encourage greater use of the scheme. The introduction of the renewed BBMKB is anticipated for the start of 2006.

The pilot scheme Innovation Vouchers aims to increase the innovativeness of SMEs and to increase interactions of SMEs and knowledge institutes. The idea is that SMEs can use “innovation vouchers” (worth €7500 each) to buy knowledge from knowledge institutes (or large R&D-intensive companies). The knowledge supplier can then hand the voucher in to the Dutch innovation agency SenterNovem to receive payment. After the first round held in September 2004 with 100 vouchers was considered a success, a second round was started in March 2005 with 400 innovation vouchers – which, again, were “sold out” on the first day. This new initiative was recommended by the Innovation Platform and will be implemented for the period 2006-2007.

- 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):

There’s been an overall decrease of the corporation tax rate. A more targeted approach was the intensification of the WBSO tax scheme (reduction of wage tax and social security contributions for companies with R&D personnel): intensification of this tax scheme with €100 million from 2004 to 2006.

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

Launching Customership by the government can be used as an instrument to stimulate innovation in the private sector. The Action Plan Launching Customership will be released in May 2006.

The “SBIR” pilot scheme was implemented to address the limited involvement of SMEs in R&D and innovation.. It is modelled on the American Small Business Innovation Research (SBIR) Programme. With

the help of this pilot programme, the Ministry of Economic Affairs wants to learn how an SBIR-like programme can best be implemented in the Netherlands.

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

In order to allow the system of intellectual property to function better, the following actions are being considered:

Lowering annual charges. Compared to the prices demanded in other countries, the annual extension of the validity of a Dutch and European patent is expensive. This is a major cost disadvantage to Dutch entrepreneurs compared to their foreign competitors. The Ministry of Economic Affairs is considering lowering the annual charges;

Investigating fees of patent attorney's;

Implementing a written opinion on patent search report provided by the Patent Office in order to increase transparency.

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

Information package: see 'recalibration' text under section A.

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:

In March 2005, the venture capital part part of the TechnoPartner programme was launched: the seed facility for high-tech start-ups. The TechnoPartner initiative was set up to stimulate high-tech start-ups. This seed facility aims to promote and mobilise the Dutch venture capital market to the benefit of high-tech start-ups by making available a loan to closed-end venture capital funds. This loan reduces the risks for these funds.

The Valorisation Grants enable researchers at universities to apply for a grant to create a spin-off from a public knowledge institute. In March 2005 a second round of the Valorisation Grants project was started as a joint pilot scheme of the Technology Foundation STW, the national research council NWO and the Dutch Organisation for Applied Scientific Research TNO, after the first round in 2004 had proven to be a success.

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

See section C.1 (Guarantee facility for SMEs, pilot scheme innovation vouchers, SBIR).

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

The Dutch Ministries of Economic Affairs and Education, Culture and Science took the initiative to form the Partnership Entrepreneurship and Education with all parties from the different educational levels (primary education up to university level) and other parties active in the field of entrepreneurship and education. The main task is to reach a more entrepreneurial attitude among students and make more young

people aware of the possibility to start an own business after their education. Activities that are used to reach this goal include more teaching entrepreneurs, entrepreneurial assignments for teachers and students and a price for the entrepreneurial activities in the school.

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: See previous answers section C.

Anticipated shifts:

The balance between generic and specific instruments is shifted towards more targeted innovation schemes, aiming to create excellence in key areas of strategic importance. Instruments will become more custom-made and bottom-up in order to increase flexibility and to prevent the risk of government failure.

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).

Networking and co-operation are key elements in Dutch innovation policy. Collaboration in networks and value chains is supported through various policies including financial support to R&D partnership projects. The ministries of Education, Culture and Science and of Economic Affairs have decided on the so-called Smart Mix programme. This is a fund of € 100 million annually, starting in 2007, for which consortia of research organisations, universities, corporations and other organisations can apply for cooperative research and valorisation programmes. Every programme should be directed to enhancing focus and mass in excellent research and enhance valorisation of research, be it in innovation/technology or in knowledge which is useful for solving societal issues. The programme is to be run jointly by NWO and SenterNovem

In addition, the Ministry of Economic Affairs plays an active, facilitating role in bringing together different parties to develop joint strategies and action plans for R&D co-operation (in fields such as catalysis, genomics etc.).

Besides the basic package, the Ministry of Economic Affairs is introducing a *programme-based package*, the aim of which is to achieve top performance in a number of **areas by enhancing strong collaboration between industry, knowledge institutes and government** in order to create strong clusters and networks. Through this programme-based package, businesses, knowledge institutions and other government bodies can pool their resources to develop further the potential strengths in the Dutch economy, the core concepts being choice, demand management and customisation. This can only be achieved with flexible instruments that allow scope in their implementation.

The Innovation Omnibus will replace existing policy instruments on research and innovation of the Ministry of Economic Affairs in due time (realisation date 2007/8). At the moment the different

instruments hamper the tailor-made financing of programmes and projects and limit the interaction between the different programmes and projects. One legal framework will create more flexibility and synergy between programmes and projects, there by raising the effectiveness of programmes. The Innovation-Omnibus will also entail specific programmes of knowledge institutes (target-financing). By doing so no longer a distinction will be made between programmes launched by knowledge institutes like TNO and programmes launched by other consortia.

Projects that do not fit in a specific programme, but do fit the conditions of the Innovation-Omnibus can be supported as well. Each year budget will be reserved for these projects of the so called *challengers*. How the budget will be divided between the programmes and the challengers is not decided upon yet and will be partly dependent on the pace of the implementation of the programme package.

Many of the current innovation instruments will be incorporated in the innovation omnibus. This 'omnibus' is a legal framework, on the basis of which a whole range of initiatives can receive financial support, such as top institutes, research programmes, development credit facilities and feasibility studies. The omnibus ensures that financial support for programmes and projects comes within European, legal and financial (supporting) frameworks.

In order to ensure continuity in the policy, a number of existing instruments will continue in their present form until such time that the renewed instruments have come into effect.

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

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

Since 2004 there have been no major changes in the instruments for stronger industry-science links.

- 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.*);

The "Casimir Experiments" aim to promote public-private mobility of researchers. It is the Dutch equivalent of the European Marie Curie scheme and is a joint initiative by the Ministry of Economic Affairs and the Ministry of Education, Culture and Science. It is a direct response to the challenge posed by the looming shortage of knowledge workers in science and technology. This new scheme was recommended by the Innovation Platform as a means to improve the availability and quality of knowledge workers.

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

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: Globalisation³ :

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

When dealing with internationalization of R&D, one has to consider two sides of one coin, being inward and outward investments. New insights proved that *outward R&D* of the main Dutch multinationals (MNOs) were not at the expense of existing R&D activities of these MNOs.⁴ At the other end of the spectrum, when adjusting for the openness of the economy, the Dutch inward R&D investments are far below the international average.⁵ Based on macro data, in 2001, approximately one quarter of total private R&D investments in the Netherlands were conducted by foreign affiliates. Given the open character of the Dutch economy, however, one would expect the foreign component in total private R&D in the Netherlands to amount up to 50% (instead of 25%). This observation is strengthened by looking at FDI in general. The Netherlands performs quite well in attracting FDI in general. The main problem, however, is the R&D component within total inward FDI, which is, as already concluded, too low. This suggests that private R&D could be increased by improving the R&D climate – especially for inward R&D.

The answer to internationalization of R&D policy is to improve the Dutch position on the most important location factors of R&D. These location factors are: the availability of highly-skilled (science and engineering) personnel, international accessibility, the quality of knowledge institutions, the value added of foreign firms, the stock of private R&D capital and the cooperation between firms and knowledge institutes. Three prominent tracks have been described in part A of this questionnaire (1. fostering human capital and research, 2. providing the right framework conditionals and 3. enabling strategic innovation areas).

The above-mentioned Dutch approach to deal with the internationalisation of R&D primarily concerns generic policy measures. Of course, also more specific policy measures exist to improve the R&D investment climate. First of all, the Dutch Foreign Investment Agency is occupied with the task to attract foreign countries to the Netherlands. Secondly, the Netherlands Office for Science and Technology fulfils an important matchmaking function by providing Dutch innovative companies with information about knowledge networks which are relevant to them.

³ 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.

⁴ Erken, H.P.G., V.A. Gilsing and A. van Hoorn (forthcoming), Internationalization of R&D within small, open economies. The Dutch case. In: J. Prašnikar (editor), *Innovations, Competitiveness and Social Responsibility of Firms: A European Context*, Nova Publishers, pp. 51-77.

⁵ OECD (2005), OECD economic survey of the Netherlands 2005, Paris, http://www.oecd.org/document/43/0,2340,en_2649_34569_35817451_1_1_1_1,00.html.

These imminent problems with respect to HRST have been taken up by the Dutch government. A variety of initiatives involving various policy areas are required to address this issue effectively. Policy measures need to be aimed at increasing the attractiveness of S&T education and S&T professions (including financial support and employment conditions), improving mobility of employees between the different sectors and institutions of the Dutch NIS as well as attracting highly qualified workers in science and technology from outside the Netherlands by making it an attractive location of work for highly skilled employees from around the world.

In particular, the projected shortage of highly skilled with a scientific or engineering background has led to a joint effort of the Ministries of Education, Culture and Science, of Economic Affairs, and of Social Affairs and Employment ("Delta Plan for Science and Technology") proclaiming a variety of measures. These include measures intended to make it easier for researchers from abroad to work in the Netherlands, and to encouraging activities in the area of public understanding of science and technology, e.g. through science centres, and to increase the number of women and members of minorities choosing careers in science and technology (programmes *Aspasia* and *Mozaiek*). The Dutch government has decided to simplify procedures for immigrating science and technology workers and to lower the fees for entering the country. The only criteria for a high qualified foreign worker to start is a job and an annual income of € 45.000 (€ 32.600 > 30 years). There are no criteria related to the educational level and economic sector in which the knowledge worker will be active. The 'market price (annual income)' is the only indication for his/ her attribution to the economy.

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
 - Advertising
 - Other measures:

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

Administrative support/active recruitment of foreign firms:
 The Netherlands Foreign Investment Agency, part of the Dutch Ministry of Economic Affairs, (The) facilitates direct investments of foreign companies in the Netherlands. The NFIA introduces corporate investors to a variety of Dutch networks and service suppliers in business, to government authorities at national and regional levels, to academic and private sector consultants, and to others, of relevance to the investment process.
 Two R&D measures, yet not only for foreign firms but also for Dutch firms:
 - Incentive for Research and Development Costs in the Netherlands (WBSO)
 The purpose of the incentive is to promote corporate R&D work through a tax deduction for R&D wage costs.
 - Innovation Subsidy Partnership Projects (IS)

Grants scheme for Technological Co-operation. Technological Co-operation is a general grants scheme to stimulate R&D co-operation. This scheme consists of a generic part and specific elements for international co-operation, co-operation with emerging markets, co-operation in the maritime sector and co-operation in ICT breakthrough projects. The projects are appraised and prioritised based on the criteria of co-operation, technological innovation and economic perspective. The projects that best satisfy the criteria receive grants until the budget is exhausted.

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: Foreign-owned firms in the Netherlands are treated the same as 'domestic' firms in the Dutch R&D policies.

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).**

- Possibility to co-operate with international partners: the Bsik-scheme for large scale research programmes in public-private partnership (€ 800 mln 2003-2008) opens the possibility of international cooperation;

- PPP-R&D schemes of Innovation Oriented research Programmes (IOP) and Leading Technology Institutes (€ 15 and € 20 mln yearly) set goals of international networking.

- The 4 LTI 's are open to foreign partnerships, the IOP's are active in exchanging researchers with foreign countries, e.g.

- Next to that the new IOP-TTI Scheme of 2005 paves the way to support foreign research partners in addition to stimulation of international participation. (see also Q.3)

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.).**

- x Additional/preferential funding for projects with international partners
- x Co-funding for project partners not located in the country
- x Support to find international partners
- Other measures:

Description of the measure(s):

Innovation Subsidy Partnership Projects (IP) - Technological Co-operation is a general grants scheme to stimulate R&D co-operation. This scheme consists of a generic part and specific elements for international co-operation. (Senter)

The new IOP-TTI Subsidy Scheme of 2005 (for Innovation oriented Research programs and for Leading Technology Institute Research Programs) provides for the participation of foreign funded research organisations.

So will the Smart Mix Scheme of 2006, aiming at large scale R&D-programs of public-private consortia, aiming at scientific excellence together with societal relevance and innovation.

These programs clearly mark a decisive step towards the internationalisation of Dutch innovation policy.

Technology Matchmaking is a new service provided by the Netherlands Foreign Investment Agency (NFIA) to further assist foreign technology companies seeking European partners and a supportive business environment.

Section F: Human resources⁶

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:

- X Raising interest in and awareness of science among youth;
- X Revising academic curricula to make science and technology more attractive to students, such as by expanding interdisciplinary training in S&E education;
- X Improving teaching in mathematics and science, including through the use of ICT in teaching content and delivery;
- X Reducing gender and ethnic minority gaps in science and technology education
- X Enhancing financing opportunities for PhD study and post-doctorate training (such as through fellowships, funded research opportunities, *etc.*)
- X Improving the quality of secondary university research laboratories/infrastructure
- X 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:

The White paper on young talent in research, mentioned in the OESO Questionnaire on the working conditions and attractiveness of Research Careers has been published.

In the Netherlands universities and public research institutes are autonomous organisations. Therefore, the government has no direct influence on their Human Resources Management. However, there is a constant dialogue between the ministry of Education, Culture and Science and the (representatives of) these organisations to discuss the way universities implemented the policy on specific HRM-domains. . Sometimes the ministry introduces (financial) incentives to stimulate universities and research institutes to include to governmental policies into their policies. Moreover, the new Higher Education and Research Act will replace the old one.

The new act takes innovation as a starting point. It should enable higher education institutions to respond better to demand from students and business. The government and society also want more insight into institutions' performance.

⁶ 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.

In the Netherlands, government, industry and the education system have been collaborating since 1998 on bringing about a structural solution to the problems surrounding science and technology. The Axis foundation was established in 1998 to use an integrated approach in raising the numbers of students taking science and technology courses and reducing dropout levels, so that more science and technology graduates would come onto the labour market.

At the same time agreements have been reached between universities and the ministry of Education, Culture & Science to tackle the problem of low entry numbers at the university level. One consequence of this is that science and technology courses are being made more attractive by broadening them with civil society and educationally oriented variants and by making them tie in more closely with secondary schooling. Those universities that have been most active in implementing these agreements have indeed reported rising numbers of students and improved results.

In 2004 the government launched its National Action Plan on Science and Technology (Nationaal Actieplan Bèta/Techniek), continuing the approach initiated by Axis. The plan expresses the ambition to achieve 15% more new science and technology graduates in 2010 relative to 2000, and to ensure that scientists and technologists are more effectively retained and used. For 2007 an interim goal has been formulated of 15% more students entering science and technology courses relative to 2000. The Science and Technology Platform (Platform Bèta Techniek) was established by the ministry of Economic Affairs, the ministry of Social Affairs and Employment and the ministry of Education, Culture & Science in 2004 to put this ambition into practice.

Approach

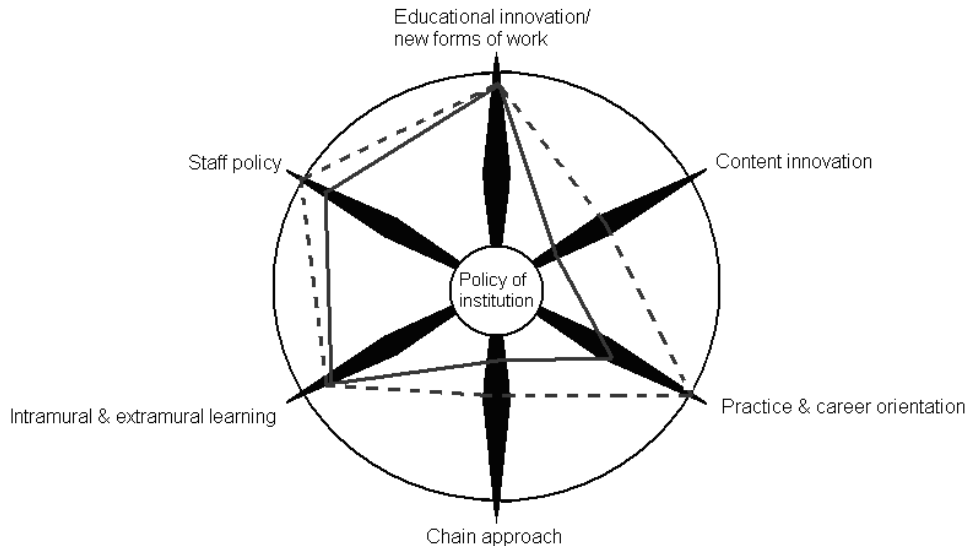
The Platform's approach is aimed at permanently anchoring science and technology policy into the entire chain from primary schooling to the labour market. The trio of education, government and industry must collaborate in order to achieve results.

The Platform starts from the institutional policy of the school or company and the requirements that stem from this. This increases the probability of sustainable anchoring. The Platform is also developing a range of solution directions and methods with which schools can start changing things according to their own choices and insights. Innovation and performance agreements are made with the school or company regarding the ultimate objectives. The core of this approach, then, is the autonomy of the school. Nothing is imposed. Progress is monitored, and the results of monitoring are discussed with the school at auditing meetings, when the school as it were has a mirror held up to it so that it can see its strengths and weaknesses.

In addition to its nationwide programme the Platform is also active in the regions, collaborating with the business community, schools and regional and local government to establish and carry out science and technology agendas.

The Platform's aim is to offer institutions as much support and expertise as possible. On the basis of the analyses of the problem and the experience collected by Axis, the Platform has developed an 'education and labour market compass'. This illustrates the various elements that contribute to a

successful approach. The more of these elements a school takes up, the greater the chance of success. The compass can be used to visualize both the initial situation of a school and the target situation. It looks like this:



The Platform works from primary school up to and including the labour market, making the entire educational career of a young person more attractive. In what follows we examine the most important initiatives of the Platform.

Primary education

The Science and Technology Platform has extended the successful VTB programme (Verbreding Techniek Basisonderwijs: broadening engineering and technology in basic education) introduced by Axis (see good practice). Under the programme, a third of all primary schools receive an incentive premium for permanently anchoring engineering and technology in their teaching programme. The object is to introduce children to engineering and technology not as an isolated subject but as an integral part of their education so that they both gain an awareness that engineering and technology are all around them and at the same time start collecting positive experiences of the subject at a young age. Each school in the programme is assisted by a support network consisting of other schools and a central support point. Schools taking part in the programme must undertake to involve and support other schools on the basis of their own experiences. At the same time the programme ensures that each school is given easily approachable access to information and material for introducing engineering and technology into its programme, policy and organization, e.g. through workshops, websites and regional support points. Where material is not readily available, it is developed. Likewise, engineering and technology are being incorporated into the curricula of all primary teacher training colleges so that teachers will come to the classroom better equipped. A postgraduate course leading to a qualification as technology coordinator is also under development.

All schools in the Netherlands are required to include engineering and technology in their curricula from 2006.

Secondary education

In secondary education the “Universum programme” has been developed to encourage schools to elect for a ‘science and technology profile’. School policy towards constructing such a science and technology profile is determined by the factors in the compass referred to earlier. Schools are assisted with workshops and seminars on e.g. specific problems relating to girls, training opportunities and teaching material. To aid the introduction of ‘learning by doing’ methods one approach has been the creation of a partnership of multinationals to help schools (Jet-Net, see good practice), which is supported by the

Science and Technology Platform.

Schools participating in this programme receive an incentive premium and become part of a network in which, after a certain time, they will be expected to assist new schools entering the scheme. The intention is that 20% of all schools will be profiled as science and technology schools by 2010.

Vocational and prevocational education

In 2004 seven regional redesign projects were allocated and started up. These projects involve institutions that were already engaged in educational innovation during the Axis period and are now continuing to build on that start. The object of these projects is to arrive at a redesign of vocational education in technical fields, both as regards teaching methods and in overall programme terms. It was in this context that the institutions were asked to set up the projects on a regional basis. Three of the projects are at the prevocational secondary and secondary vocational (VMBO-MBO) level and the remaining four are at the secondary and higher vocational (MBO-HBO) level.

Performance and innovation contracts have been entered into with these projects: the projects commit themselves to a growth target of 15% more volume in combination with innovation in technical vocational education. In an outline Plan of Effort the pilots have indicated what ambitions they hope to achieve in the coming years.

Alongside the redesign projects the Platform is also hoping to broach new initiatives. In the Prevocational Education Ambition Programme for Science and Technology (VMBO Ambitieprogramma Bèta/Techniek) 2005-2008 ambitious prevocational schools are given an extra incentive to offer innovative and attractive education in science, engineering and technology. Two routes are offered: further development or total innovation. In the case of further development the school embarks on innovation on the basis of the possibilities that are already available. In the case of total innovation the school focuses on a new educational philosophy and structure and the entire organization is involved in the process. Both routes are designed to strengthen the position of science and technology; the tempo and intensity of the innovation can vary considerably from school to school.

Higher vocational education

Innovation and performance agreements have been entered into with all eighteen higher vocational education establishments (also known as universities of professional education) in the Netherlands. Under the terms of these agreements all the establishments commit themselves to the aims of the government, undertaking to make education more attractive, to reduce dropout rates and to create hybrid courses. The Platform supports them in these innovations in various ways, including regular audits giving them an objective view of how each establishment's approach is faring.

Universities

Debates with each individual university are being entered into regarding the possibilities that these institutions already have for making themselves more attractive to pupils with qualifications in science and technology. The programme is based on three themes:

- the development on a regional or national basis of networks between universities and secondary schools;
- broadening first degree courses;
- encouraging applied science master's courses.

Together with relevant industry bodies and employers, a '2010 exploration' (a tool developed by the Science and Technology Platform) is used to set the agenda by which work is to proceed in both

the labour market and the education system. The object is to strengthen the attraction to job-seekers of technically skilled jobs and companies and at the same time to promote the retention of available potential within companies.

In 2004 the Casimir programme was launched to reinforce research and development. The programme aims to boost R&D careers by enhanced public-private mobility, i.e. making it easier for researchers to be exchanged between universities and companies. In the autumn of 2005 grants will be awarded to some twenty new projects. At the same time a study is being carried out to determine what further bottlenecks exist in this area.

Science and Technology Communication

In the area of communication on science and technology, too, the Science and Technology Platform is developing activities. Key to these is the premise that the activities must both fit in with other projects and be subservient to them. The focus will be on putting the spotlight on the many interesting areas in which technology plays a part, e.g. technology and sport, technology and nutrition, or technology and lifestyle.

Financial incentives

To determine whether financial incentives might be able to encourage students to take science and technology courses a number of pilot projects have been established. At the time of writing these have yet to yield results.

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:

**1. The government adopted a set of measures last year to simplify the immigration procedures for knowledge workers and their partners from outside the EU/EEA. The new fast-track procedure was introduced on 1 October 2004. Knowledge migrants now deal with only one government authority, go through a uniform procedure and are issued the same type of permit. The European Union also wants to relax entry restrictions for researchers from non-EU countries. The European Commission adopted a Directive and two Recommendations in September 2005. The purpose of the Directive is to relax and harmonize the procedures for admitting third-country nationals for purposes of scientific research. The two Recommendations are intended to facilitate their admission by fast-tracking residence permit and visa procedures. Member States must transpose the Directive in their national policies before the end of September 2007. Most of the demands in the Directive can be integrated in the Dutch immigration procedures for knowledge migrants. Currently, the negotiation process with all the stakeholders is taking place and we expect the Directive can be implemented in the Summer of 2006.

**2. To give those who have just received their doctorate a chance to gain experience before applying for a grant under the Innovational Research Incentives Scheme, NWO has set up the Rubicon Programme. A total of € 4m per year has been set aside up to 2010. The purpose of introducing the bachelor-master system and accreditation is to create a more open system of higher education in the Netherlands, in which it is the quality of individual courses that counts rather than the quality of the institution providing the course. University students are entitled to complete their studies under the old system. Each university may set a reasonable period within which they may do so.

**3. An updated Aspasia Programme has been introduced, and performance agreements will be concluded with the organisations concerned in which they commit themselves to appointing more women to senior academic and executive positions.

**4. no policy changes, but still in force

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:

Doctoral programmes can be made more appealing to more students by introducing more diversity in the types of programme. In addition to those focusing mainly on a career in academia, programmes can also be envisaged that concentrate on non-academic careers.

Concern for training in interdisciplinary and transferable skills¹ (this can go beyond traditional teaching methods to include, for example, peer-sharing groups)

Career development / labour market

The Netherlands are in favour of having a greater variety of different PhD programmes on the condition that these programmes are developed in an organisational context that is assessed by the Royal Academy.

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.

By means of bilateral research programmes, exchange of researchers of both countries are stimulated, for example in long term Centres of Excellence programmes. Joining bilateral programmes could be a European endeavour in the future.

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.

Improve statistical and qualitative information at national level. Such information should at the very least cover the number of PhD candidates in each type of PhD programme (dual, external doctoral student) and aspects such as performance, duration and career.

In order to monitor the quality of the PhD programmes, the universities will have to submit a periodic assessment of the organisational context of such programmes and the related research environment. This will be set down in the new Higher Education and Research Act. The Royal Netherlands Academy of Arts and Sciences will be assigned the task of conducting the periodic assessments on the quality of the doctoral programmes.

Attempting to offer Dutch scientists who went abroad for scientific research an attractive research climate to return back to the Netherlands.

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.

The rules on evaluation of policy instruments (not only innovation policy) established in 2002 are still unchanged. The ministerial decree of 2002 on performance measurement and evaluation (Regeling Prestatiegegevens en Evaluatieonderzoek, RPE) poses a number of requirements on policy preparation (ex-ante evaluation), monitoring and ex-post evaluation. The requirements concern:

- 1) The use of evaluation instruments.

- 2) The obligation to consider an ex-ante evaluation when starting to think about a new instrument. Policy-makers have to consider different policy alternatives unless there are good arguments not to do so (urgency, limited financial and societal risks, sufficient information from ex-post evaluations, dictated by international agreements)
- 3) The frequency and extent of ex-post policy evaluations. Every instrument has to be evaluated every five years.
- 4) The quality of the evaluation instruments.
- 5) Informing the minister, head of the department, and parliament about the outcomes of an evaluation.
- 6) The distribution of responsibilities within the department with regard to the implementation of this decree.

Generally ex-post evaluations are commissioned to independent research organisations or consultants. The quality and independence of evaluation process is guarded by a commission of experts. The experts can be recruited from inside the department or outside. This mostly depends on the size and impact of the programme to be evaluated.

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.

Since 2003 a new protocol for assessing university research has replaced the old one. The protocol is a common protocol of the universities, NWO (for the evaluation of their institutes) and the KNAW (for the evaluation of their institutes). It is not an instrument of government. Compared to the old protocol the responsibility for the evaluations of university research has been moved from the Association of the Dutch Universities (VSNU) to the boards of the universities. Compared to the old protocol the new protocol contains some modifications:

- The evaluation is more strongly related to the mission of the institute; the management and organisation of the institute are also part of the evaluation;
- The national comparability of disciplines is abandoned, because the universities themselves can define the unit of evaluation;
- The evaluation takes place once every six years (was 5 years), with a self-evaluation in between;
- The criteria are a bit broadened and the assessment scale has been changed.

The Royal Netherlands Academy of Arts and Science and the Dutch Research Council NWO are to be evaluated in 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.

There have been no recent changes.

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

There have been a number of evaluations, but we mention only the two most important ones:

TNO and the Large Technological Institutes (GTIs)

Objective of TNO and GTI's

TNO (Netherlands Organisation for Applied Scientific Research) and the Marin, Waterloopkundig Laboratorium [Hydrodynamics Laboratory] (WL), Nationaal Lucht- en ruimtevaart Laboratorium [National Aerospace Laboratory] (NLR), GeoDelft (GD) en Energie Centrum Nederland [Energy Research Centre of the Netherlands] (ECN) GTIs are establishments that in their own fields transform scientific knowledge into applied knowledge. TNO receives earmarked funds from the Ministry of Economic Affairs so as to involve the business world at an early stage in the development of knowledge. The Ministry of Economic Affairs mission financing (consisting of basic and/or earmarked financing) at Marin, WL and NLR is intended for the upkeep of the knowledge base and the development of new knowledge together with the business world.

Results of the evaluation

The task of TNO and the GTIs to create a bridge between science and the private sector was evaluated by the Wijffels Committee in 2004. The Committee concluded that TNO and the GTIs are important organisations in the knowledge infrastructure and have a good starting position in various fields to enable them to play a leading role in the area of European research. There are some important bottlenecks as well:

- The knowledge available is fragmented and non-transparent. The overlap of technological competences between the institutes and the universities has increased over time.
- TNO and the GTIs are aware of the necessity to determine their position anew under pressure from national and international competition and changes in the set-up of the knowledge transfer process. They are hindered in this, however, by their own history and their sometimes supply driven character.
- The GTIs' financial base is weak because, inter alia, they have great difficulty in running the large research facilities and there is no level playing field at national or international level. Fellow establishments in other countries often receive much more government funding. There is talk at national level of unfair competition from universities that can provide their services at marginal cost, in contrast to the establishments.
- Government financing of TNO and the GTIs is still supply-driven to a large extent. As a result, there is insufficient response to the diversity of requests from the public and private markets.

The Committee drew the following conclusions about TNO and the GTIs:

- TNO and the GTIs fulfil an important role for large firms that have their own research opportunities and facilities, for leading firms in SME, and for firms that use the facilities and test facilities and/or buy off-the-peg services. The nature of their activities and the size of TNO and the GTIs do not fit in with the needs of the SMEs, however, for whom innovation is certainly important but not a day-to-day item.
- The business world says that TNO and the GTIs respond insufficiently to the issues that arise from the changing requirements of the market.

- The business world has, in general, a limited interest in committing itself to long-term research programmes.

Actions

The Cabinet has the following intentions:

- Introducing demand-driven programming and financing at TNO and the GTIs;
- Carrying out organisational changes between TNO and some GTIs;
- Strengthening the knowledge and research policy in the departments involved;
- Encouraging greater participation by the business world at TNO and the GTIs, in management and organisationally, as well as financially.

The concrete application of these main topics will be accomplished in close collaboration with the establishments and all the other parties involved (the business world and other organisations). The first steps towards change will be done in the middle of 2005, while changes will be introduced on a test basis in 2006. If these are successful, full implementation will begin in 2007.

Leading Technological Institutes (TTIs)

General

The purpose of the TTIs is to increase the innovative power and competitive strength of Dutch firms in the fields of telematics (TI), food (WCFS), polymers (TI) and metals (NIMR). A TTI is a virtual establishment, with limited central direction, in which multidisciplinary teams from the business world and knowledge institutions work on the commercial and social application of basic research. In this way, TTIs foster the interaction between public and private bodies.

Results of the evaluation

TTI's were evaluated in 2005 by Technopolis. The LTI programme has enabled the launch and development of four successful LTI institutes, providing industry with relevant research. Each has performed well in terms of its own goals and business plans⁷. However, none of the four LTI institutes has yet fully developed into 'international centres of excellence', which conduct fundamental-strategic research and harbour researchers and equipment of international excellence. It has been the assumption of the LTI programme that this type of research activity of international excellence is required to have a significant and lasting impact on the innovative capacity and competitiveness of participating sectors. After eight years the LTI instrument has not (yet) fully reached its goal, although some of the LTI institutes have shown potential in this direction.

All four LTI-institutes needed time to find the appropriate balance between 'research excellence' and pure applied research. An important reason for this was a lack of guidance from the industrial partners, concerning their strategic research needs, in the early LTI years. In the latter years of the LTI institutes the balance shifted towards more industry oriented research but in some cases this has shifted the balance towards more short term applied research. Complementary to other existing policy instruments such as the direct funding of industrial research, or applied research through the TNO and GTI institutes, the LTI instrument aims at more medium to long term fundamental-strategic research which is able to open new technological opportunities and breakthroughs.

⁷ A short summary of the performance of each LTI is given in Appendix F

In order for a research institute to perform research of excellent quality, which is at the same time relevant for industry, the LTI needs to programme, jointly with the active involvement of industry. It is necessary to establish the medium to long-term technological opportunities and challenges, which can provide the industry with strategic knowledge, altering their competitive position ('need to know knowledge'). This requires both a strategic R&D vision (to anticipate market/technology options and needs) and an absorptive capacity (to translate LTI knowledge into innovations within the firm) on the side of the participating firms. It also requires a research staff and LTI management, who understand this process from two sides: (public) research and industry.

It appeared that:

- In some of the sectors in which the LTIs operate this strategic vision was hardly present (e.g. telematics users) or it took member firms quite some time to be able and willing to articulate these visions and needs. As many LTIs operated in times where industrial R&D staff and activity decreased and shifted towards more applied research, their industrial counterparts were less able to formulate how LTI research could contribute to their capabilities and challenges.
- The 'absorptive capacity' (e.g. the ability to understand and apply research results and translate this into marketable innovations) on the industry side was either limited to a small number of industrial partners (e.g. food, metals, telecoms) or hardly present (e.g. software houses, ICT users);
- The evaluation showed that LTIs have interpreted their positioning in terms of short - long term and strategic - applied research in very different ways. This was partly determined by the type of industrial partners they involved (with varying R&D capabilities and time horizons) but also due to the programming modalities they chose to implement for their research activities;
- Across all LTIs the ability to attract top level international researchers have been limited;
- International experience shows that developing 'centres of excellence' needs time. The time frame of eight years is not sufficient.

¹ Not related to the researcher's discipline