

**OECD SCIENCE, TECHNOLOGY AND INDUSTRY OUTLOOK 2004  
COUNTRY RESPONSE TO POLICY QUESTIONNAIRE**

**NETHERLANDS**

**1. General framework and trends in science, technology, and innovation policy**

*Main directions, objectives and elements of the country's policies for science, technology, and innovation.*

*Introduction*

The partners in the new government, which took office in June 2003, acknowledged the status and problems of the economy of the Netherlands, and addressed them in the coalition agreement. Education, research and innovation have been identified as important pillars for policy aimed at stimulating the Dutch economy. This has resulted in the allocation of extra funds in a period of retrenchments in public spending, the drafting of a policy paper on innovation (Innovation Letter) and the establishment of an 'Innovation Platform' with representatives from all the actors of the Dutch National System of Innovation.

*Science Policy*

In December 2003 the Netherlands government published the new white paper on science policy, titled "Science Budget 2004 Focus on excellence and greater value". The Science Budget sets out policy initiatives for the coming four years.

The main themes are: focus and concentration, knowledge that promotes economic activity, human resources and quality. Focus and concentration concerns choices of scientific themes to be given priority and within those themes targeting promising lines of research. "Promising" are lines of research that generate advancements in knowledge and also research that is profitable for industry and/or society. Genomics, nanotechnology and ICT are priority themes. To bring about such focus and concentration the Science Budget 2004 introduces a "Smart mix" of extra funds and matching of those funds from the lump sum the universities are given for scientific research. More precisely: an amount which increases to €50 million per year by 2007 plus the same amount from matching is to be directed towards excellent research groups at universities. The research council NWO is to select those excellent groups. An equal amount, plus matching from the university lump sum for research, is to be directed towards research cooperation programs between universities, industry and technology institutes. In this way a better "valorization" of research results by industry is to be achieved.

This policy theme is connected to that of stimulating quality and competition. The Science Budget proposes to work towards a model of financing of scientific research in which a direct link

between funding and quality is made. The model for this is planned to be ready in 2006. Eventually this could result in reallocations of the lump sum which universities receive for scientific research.

The policy theme “human resources” concerns the need to educate a sufficient number of highly skilled manpower for research within universities and in industry and to keep them in research jobs. Human resource development is the responsibility of universities and research institutes. They are asked to develop and apply a tenure track, or up-or-out principle more often. The Science Budget describes special programs geared towards bringing or keeping more talented people among women and minorities in research careers. Those programs, "Aspasia" and "Mosaic" are run by NWO. The prognosis of increasing shortages of highly skilled with a scientific or engineering background has led to a cooperative effort of the ministries of Education, Culture and Science, of Economic Affairs, and of Social Affairs and Employment. Together they have published the so-called "Delta Plan for Science and Technology", which entails a large number of measures. These also regard making it more easy for researchers from abroad to work in the Netherlands, and encouraging activities in the area of public understanding of science and technology, for instance through science centers.

The Science Budget 2004 together with the Innovation Letter point out in which direction the Netherlands government wants to further the strength of the Netherlands as an innovative economy.

To underpin the wish to make the Netherlands more innovative, a national “Innovation Platform” has been created, chaired by the Prime Minister and encompassing leading figures from research and industry as well as the Ministers for Education, Culture and Science and for Economics Affairs

The Netherlands government has also decided to invest 800 million euro (for a period of 8 years) in so-called “knowledge infrastructure” projects, often of a public-private character. One of these is the so-called LOFAR project (radioastronomical facility).

### *Innovation Policy*

The ‘Innovation Letter’ (the new innovation policy) resulted from a thorough analysis of Dutch National System of Innovation based on different (inter)national and internal studies and benchmarks. This assessment has resulted in the following conclusions:

The innovative performance of the Netherlands has always been regarded as high on several rankings (EIS of the Trend Chart, World Economic Forum) based on different indicators (input, throughput as well as output). These rankings confirm that the basis for the required change is available within the Dutch National System of Innovation: 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 NIS however is also characterised by specific features and problems that weaken the strong innovative performance of the Netherlands, while countries with a less favourable innovation performance seem to be catching up (the Netherlands is 'Losing Momentum' according to the European Innovation Scoreboard):

- Total financial efforts in R&D expenditure is stagnating; business expenditure on R&D lags behind compared to main competitors.
- Increasing shortage of skilled personnel, especially in science and technology; inadequate match between outflow from education and demand by Industry.

- Limited interaction between the actors of the NIS; inadequate exploitation of research results.
- Limited innovative entrepreneurial activity.
- Problems concerning financing of (early stages of) innovation.

On the basis of the analysis, the ‘Innovation Letter’ identifies a series of bottlenecks which hinder the innovative potential of the Netherlands: the climate for innovation is not attractive enough; too few companies are involved in innovation; and research efforts lack focus and mass. Addressing these problems requires strategic focussing on potential strengths of the Dutch economy, institutional changes to direct research towards needs of Industry / society, combined with commitment of all the actors of the NIS as well as additional financial efforts. The ‘Innovation Letter’ clusters a series of actions around ‘areas of focus’ which refer to the issues mentioned above and taking into consideration the international dimension of R&D and Innovation, and the wish for sustainable economic development:

#### 1. Strengthening the innovation climate.

The Netherlands should become a country with an attractive ‘innovation climate’ (favourable to innovation). The government should therefore create the right conditions for companies to innovate such as, besides for example a good economic policy and less obstacles enshrined in laws and regulations, a favourable investment climate. The ‘Innovation Letter’ refers to the following specific actions:

- An extra 100 million EUROS will be allocated/reserved for companies that employ or want to employ researchers (the budget for the WBSO scheme will be increased with around 30%).
- Starting form 1 January 2004, 90 million EUROS will be available through a special scheme for companies that carry out joint research projects with other partners (projectmatig samenwerkingsinstrument).

The Ministry of Education, Culture and Science, the Ministry of Social Affairs and Employment and the Ministry of Economic Affairs will together implement a series of actions to address the shortage of technical and research personnel along four main action lines.

- Attractive science & technology education;
- Attractive choices (directing choices students towards beta/technology)
- Attractive research jobs and top research courses;
- Attracting more foreign researchers to the Netherlands.

#### 2. Creating the right dynamics: stimulating (more) companies to be innovative.

Dutch companies should produce (more) new products and provide innovative services. The government should therefore stimulate new innovative entrepreneurship climate, for example through its competition policy. The ‘Innovation Letter’ refers to the following specific actions:

- All existing initiatives for new technological companies will be combined in TechnoPartner.
- Syntens will support the exploiting of the innovative potential of SMEs, the establishment of networks and strengthening of co-operation between SMEs and the (public) research infrastructure.
- Introduction of targeted activities by CBIN (= Netherlands Foreign Investment Agency) to encourage foreign companies to position their knowledge-intensive activities in the Netherlands.

### 3. Taking advantage of innovation opportunities by opting for strategic innovative areas.

With limited resources and increasing competition, it is essential to invest in those areas of innovation that provide the best opportunities for strengthening the country's competitive position and generating the greatest social benefits. The government should therefore stimulate Dutch research institutes and companies to carry out more joint research projects in specific areas to create focus and critical mass. The 'Innovation Letter' refers to the following specific actions:

- Universities that help to set up companies will be rewarded. Furthermore, universities will be urged to make better use of patents in order to improve opportunities for the exchange of knowledge between universities and the business sector.
- Funding has been made available (200 million EUROS) for companies and research institutes that work on joint research projects for longer periods.
- Establishing contact with international knowledge clusters.
- Plans of action will be launched in areas with great potential, such as ICT and the life sciences ('key-technologies').
- Technological foresight; a professional process to identify future policy issues

A new monitoring system for important technological developments was committed in the autumn of 2003. The system (called DYNAMO, dynamic monitoring system) is now operational and is a cooperation of the the government and several agencies ( TNO, NWO, Senter). The aim is to organise the process by which new key points and new innovation areas need to be discovered and then selected. Input from both the commercial sector and the knowledge in institutes is used to get an insight in technology areas which are promising for a more innovation driven growth of the Dutch economy. This monitoring is followed by studies of the most interesting areas, in close contact with the industry.

Recently a number of studies ( starting with so called quick scans) has been carried out for several promising areas: functional food, white biotechnology, visual communication, domotica and human language technology. These studies are reviewed by an expert panel with representatives of the research institutes, the commercial sector and the government.

For other topics which have been selected in an earlier stage, like separation technology, a technology roadmap is planned, in a co-operation between the government and the industry.

The government is preparing a new scheme for the support of R&D-programmes for selected promising innovation areas; these programmes will be cooperations between the industry and the knowledge infrastructure.

An international conference on foresight is planned for the end of 2004, during the EU-presidency of the Netherlands.

## **2. Public sector research and public research organisations**

### ***Major policy changes related to R&D performed by public sector organisations (mainly universities and government laboratories)***

See section 1

### ***Major initiatives to reform the organisation and governance of universities and public research organisations.***

Besides that an evaluation exercise is being held of all organizations for applied research which, as so-called intermediate organizations, create a link between universities and industry/SME's/societal organizations. For example: TNO and the Large Technological Institutes. The evaluation exercise is being undertaken by a heavyweight committee chaired by Dr. Wijffels, president of the Socio-Economic Council. The report is due May 2004.

To improve accountability and quality control the Minister has agreed with the research council NWO, the Royal Academy for Arts and Science and the Association of Universities in the Netherlands to set out a "meta evaluation" committee who will monitor the quality analyses of research and the way in which the conclusions are implemented.

To create a solid foundation for science policy a science system assessment bureau will be set up within the Rathenau Institute (which until now focused on technology assessment and public debate on ethical aspects of science).

The role of the national research council NOW has been extended in the sense that this organization, which funds fundamental research on an individual or programmatic base, also has entered into cooperation agreements with organizations for applied research (in health care, in technology) and with the Sector Councils Consultative Committee (sector councils are made up of representatives from government, research and users in a certain sector; their task is to describe the direction research in this sector should move according to the demand and give recommendations on the programming and implementation of research). Also NWO now houses the management body for the Genomics programme, which covers genomics from basic research to practical applications. A similar role in the area of ICT research is being contemplated.

To build a basis for a national strategy for socially relevant research the Advisory Council for Science and Technology Policy has been asked to draw up an joint strategic agenda for long term policy-related research on the basis of surveys and foresight studies carried out by the sector councils and other bodies. This agenda is to be brought into discussion with other members of the cabinet responsible for sectors which (can) use scientific research.

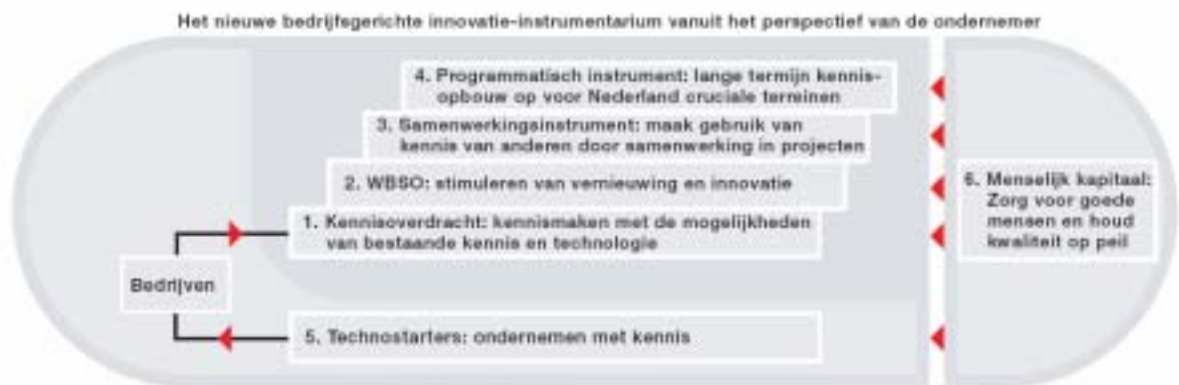
### ***Major policies and government-sponsored programmes to foster international collaboration among researchers in universities and public research organisations.***

Please read the Science Budget, chapter 3, concerning European cooperation

### 3. Government support for private-sector R&D and innovation

After several critical evaluations (the Industry letter in 1999, Interdepartmental evaluation of innovation instruments “IBO” in 2002) the Ministry of Economic Affairs started an operation at the end of 2002 to restructure the firm-oriented innovation policy instruments in order to minimise overlap, increase their transparency and accessibility and make them more compliant to a changing market environment. The outcome of this ‘streamlining operation’ is a significant decrease in the number of instruments. Furthermore the instruments provide a better coordination between the relevant ministries, generic instead of specific programmes and an aim at more R&D cooperation between companies and public knowledge institutes.

In the Innovation Letter the new innovation policy instruments are constructed in six building blocks, which are visually displayed in the following ‘innovation staircase’.



- Transfer of knowledge: companies that want to innovate by means of new knowledge are supported in this knowledge-transfer (a.o. by Syntens);
- For companies that want to carry out R&D themselves, the threshold for doing R&D is lowered through fiscal measures (WBSO).

Complex innovations demand the combination of knowledge that a single enterprise alone does not have at its disposal. The next step is R&D collaboration, whether or not internationally or together with the knowledge infrastructure:

- The collaboration can be project-based (concrete collaboration projects that are often limited in time) or
- With a long-term programme-based character (in the form of long term research programmes).
- In addition special attention is given to start-ups that want to do business with knowledge. They are supported by information, referrals to and for technostarters but also by making seed capital available (Technopartner).
- Human capital; for each company it is important to ensure good personnel and maintain quality.

The major policy change is the focus on six building blocks, with which the number of instruments has been significantly reduced. This reduction of instruments led to a shift towards more collaboration.

### ***Instruments for knowledge transfer***

The main 'instrument' aimed at fostering innovative organisational and management practices in SME's is called "Syntens". Syntens provides advice and support to national SME's on technological and non-technological innovation issues. The support activities are performed in the fields of Information & Communication Technology, Personnel and Organization, Product & Process Development, New Entrepreneurship, Co-operation and Marketing & Strategy. Evaluation in 2002 showed positive impact of Syntens on the innovative capacity of its customers. Participating SMEs reported improved co-operation with other companies and increased business results. Evaluation of co-operation indicated room for improvement.

Furthermore, 'Subsidieregeling Kennisoverdracht Ondernemers (SKO)' is a subsidy scheme that stimulates SME's to absorb existing knowledge. 'Subsidieregeling kennisoverdracht Brancheorganisaties (SKB)' is a subsidyscheme that stimulates sector-organisations to diffuse existing knowledge to SME's. Right now, we are planning to reshape our policy for knowledge transfer. Our main point is to challenge potential innovators of the SME's to start networking with research infrastructure and other companies. Existing knowledge, that can be used to make new applications will be the central subject in these networks.

### ***Instrument for knowledge development (WBSO)***

As business expenditure on R&D is lagging behind compared to the OECD average, stimulating research carried out by companies continued to be an important pillar to strengthen the innovation climate.

The WBSO is a tax scheme through which the government encourages investment in research and development work in the private sector. The WBSO reduces wage tax and social security contributions for companies with employees and deducts a fixed amount from the profit for self employed persons. The WBSO budget will be intensified by €100 million (an increase of 30%), focusing in particular on small and medium-sized enterprises. The extra €100 mln will be implemented in phases (€50 mln in 2004, €75 mln in 2005 en €100 mln from 2006 onwards). The total budget of WBSO will amount to €450 mln in 2007.

### ***Collaboration instruments on knowledge development***

The building blocks refer to instruments of R&D collaboration will be discussed in section 4 of this questionnaire, under the subject of 'collaboration among innovating organisations'.

### ***Knowledge intensive Entrepreneurship (TechnoPartner)***

Under the name "Action Programme TechnoPartner: from knowledge to prosperity" the climate for technology based start-ups will be improved. All current initiatives for the creation of technology-based start-ups will be streamlined into one initiative: TechnoPartner. TechnoPartner's overall goal is the promotion of more higher-quality new businesses based on technology.

The programme consists of several action lines:

1. **TechnoPartner Seed Facility:** stimulate and mobilise the lower edge of the Dutch risk capital market by stimulating Small Business investment Companies (SBIC's). A SBIC is a private company which finances starters and small companies. Private parties can establish a SBIC and get their capital matched by government loans. The SBIC takes the investment decision, not the government/Ministry of Economic Affairs.
2. **TechnoPartner Subsidy Scheme for Knowledge Exploitation (SKE):** aims at stimulating the use of scientific knowledge by high tech start-ups from outside and within universities and research institutions. These institutions can, when operating in a public-private consortium, request a subsidy for stimulating high tech start-ups. The SKE consists off a:
  - pre-seed facility: soft loans for high tech start-ups for the working out of a business plan;
  - patent facility: subsidy for part of the cost for attaining a patent to achieve a better use of university patents by industry and professionalise the patent policy within universities
  - Support high tech start-ups: subsidy for coaching, facility sharing and networking;
  - Screening and Scouting: subsidy for activities aimed at tracking and tracing of commerciable ideas from research results.
3. **TechnoPartner-platform :** which has the task to stimulate awareness and high tech entrepreneurship in the Netherlands and take stock of the problems and bottlenecks concerning high tech start-ups.

### ***Public Procurement Policies***

In order to increase efficiency and cut costs for government bodies, an interdepartmental project group 'Professional Purchasing and Public Procurement' (PIA) was established in 2001. The project group tries to achieve its objective by taking stock of what is procured by the central government, by creating a buyers' network (putting purchasers and tendering companies in touch with one another), encouraging joint purchasing, providing assistance for this group and starting up discussions on public procurement. Progress is made on procurement of public infrastructure, and attempts are being made to extent this practice to other fields. Interesting side effect of this mechanism is that the government influences innovation directly as a consumer by means of public procurement.

Further efforts to encourage European tendering are needed, given that the value of European public procurement (as a percentage of GDP) in the Netherlands is below the EU average (see also figure 3). Within this context, the Ministry of Economic Affairs has, among other things, commissioned a stocktaking survey on the various enforcement instruments being deployed in other EU countries. The aim of this exercise is to explore the possibilities for introducing some of the instruments used abroad into the Netherlands, in order to increase European tendering.

## **4. Enhancing collaboration and networking among innovating organisations**

### ***Initiatives to promote collaboration and networking among private firms***

#### ***Project-based collaboration instruments on knowledge development***

In order to stimulate R&D collaboration further, a single new project-based collaboration tool has been introduced on 1 January 2004 (Projectmatig Samenwerkingsinstrument). Right now, we are

planning to reshape our policy for knowledge transfer. Our main point is to challenge the innovators of the SME's to start networking with the research infrastructure and other companies. Existing knowledge, which can be used to make new applications, must be the central subjects in these networks.

This collaboration tool will be clearly visible and broadly accessible to a range of collaboration projects in various (part) target groups. Assessment criteria are quality, innovativeness, sustainability and economic potential. Three major subsidy schemes for the promotion of business R&D (TOP) and R&D cooperation (EET, TS) have been integrated into one subsidy scheme for the promotion of R&D cooperation (IS) in January 2004.

The tool devotes particular attention to the small and medium-sized enterprises and collaboration with knowledge institutions. Projects submitted will be tested, amongst other things, on aspects of sustainability (economic, ecological, social). The scheme comes into effect in January 2004 and will replace four existing schemes at the same time.<sup>1</sup> This should lead to a sizeable number of new, high-quality R&D projects in the Netherlands. The Innovation Platform is asked for advice on how to create greater coherence in the programme-based R&D collaboration.

It is aimed at pre-commercial R&D co-operation *between companies* and *between companies and the research infrastructure* (since it includes private-private as well as private-public collaborations it will also be mentioned under section 4.2), includes an additional subsidy for SME's.

In our view this will increase their hiring of knowledge workers and absorptive capacity. SME is a heterogeneous group. For the most innovative companies pre-commercial R&D co-operation is the most important item. For other SME's, who are less innovative, the transfer of existing knowledge is the main item.

#### *Co-operating with foreign partners*

Co-operating with foreign companies and immigration of personnel mean an extra incentive for innovation. Innovation is an international phenomenon which goes beyond the national frontiers. A lot of the international most innovative knowledge is not available in the Netherlands. So our instruments are opened up for international co-operation and the new policy instrument for R&D co-operation gives an additional subsidy for international co-operation to increase technology import.

#### *Tackling impending shortage of knowledge workers*

End of 2003: joint memorandum Ministries of Education, Culture & Science; Social Affairs and Employment; and Economic Affairs on knowledge workers/delta plan science/technology.

At the end of 2003 the Ministries of Education, Culture & Science, Social Affairs & Employment and Economic Affairs presented in a joint memorandum on knowledge workers/delta plan science/technology an analysis of the shortages and the approach in concrete measures divided across 4 main themes relating to education, the labour market and migration: i) Attractive education, ii) Attractive choices – directing choices of students towards beta/technology, iii). Attractive jobs; and iv) Attractive working places for knowledge workers):

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<sup>1</sup> Technological Collaboration, Economy, Ecology & Technology programme, a part of the Energy programme subsidies decree (including Energy saving through innovation) and the scheme for Technical Development projects. The scheme is a result of the government's reaction to the IBO technology policy (2002).

- Fewer obstacles and financial risks for science and technology courses, for example through a science foundation year for students without a science profile;
- Attractive science and technology education, particularly by increasing the involvement of the business sector in this type of education;
- A good image for R&D workers and technologists, by creating heroes of technologists and researchers;
- Attractive research jobs and top research courses;
- Attractive technical careers through good employment conditions for technologists;
- More mobility between public knowledge institutions and companies, e.g. in the form of dual promotion placements and maintenance contracts through the exchange of researchers;

More knowledge workers from abroad; whereby the position of the Netherlands in the ‘battle for brains’ can be strengthened, for instance through a more attractive knowledge infrastructure.

***Policy initiatives to promote stronger industry/science relations:***

Collaboration instruments on knowledge development. An important weakness of the NIS in the Netherlands is the inadequate interactions between public and private actors. The quality of Dutch science & Higher Education is regarded as excellent, but it seems the actors of the Dutch NIS are not able to commercialise the results of these efforts ("European Paradox"). The shift from a factor driven economic growth to an innovation driven economic growth requires optimal co-operation, and analysis indicates a lot of opportunities for improvement.

The NIS in the Netherlands does not have a tradition of intense interaction between its actors. Research efforts by universities could take more account of the knowledge needs of industry / society and vice versa. The government of the Netherlands has acknowledged the problems concerning inadequate interaction.

Actions for medium to long-term concerning improvement of interaction between the actors of the NIS (as mentioned in the ‘Innovation Letter’) concern:

Implementation of a programme on project-based co-operation (Projectmatig Samenwerkingsinstrument) between public research infrastructure and Industry with more focus than before on fundamental research (‘away from the market’), but addressing the needs of the users of the scientific research. See section 4.1.

Implementation of a new policy on programmatic co-operation on R&D (Programmatisch Samenwerkingsinstrument); a set of ‘third generation’ instruments referring to Public Private Partnership on breakthrough-technologies like Genomics, which will play an important role in the financing of the public research infrastructure. The instruments in this area aim for (financial) involvement of companies with (basic) strategic research. Strengthening long-term collaboration and knowledge diffusion play an important role in the instruments for long-term programmed R&D-collaboration.

This instrument aims to strengthen coherence in the use of resources for stimulating programme-based collaboration in R&D. The aim is to use resources more strategically on key points.

The following starting points are important:

- Added value through coherence; flexibility, transparency and maintaining the quality of the tools are paramount for creating coherence;
- Powerful organisation; through a controlling function, first and foremost a link is made between the facilitating character of the exploratory process and the programme-based set of tools. The controlling function is then introduced across the entire set of tools;
- Added value through collaboration; in designing this process, expertise will be used that has been built up with the existing set of tools;
- Extra attention will be given in this process to the formation of a public/private research network, the formation of key points and the division of tasks in the knowledge infrastructure, knowledge transfer through the distribution and mobility of researchers, and the embedding of research networks.
- A new aspect of this tool is that it stimulates an integral approach: from knowledge application to fundamental research and vice-versa.

At the moment we are improving the cohesion between instruments for long-term programmed R&D-collaboration. The new set of instruments should improve the connection between public knowledge creation and the knowledge demand of industry. The good experiences with existing instruments such as the LTI's (Leading Technology Institutes) will be used for the design of the new set of instruments. The results of foresight studies on key technologies can be useful for making the joint strategic choices. An example of using the potential of the knowledge infrastructure and industry to make strategic choices are the investments in genomics via the "Nationaal Regieorgaan Genomics" (National Direction-organ Genomics).

Examples of current instruments for long-term programmed R&D-collaboration are:

- "STW" (Dutch Foundation for Technical Sciences), established as an instrument of Dutch innovation policy in 1981. STW stimulates the development of demand-oriented excellent technical research at Dutch universities, via cooperation in innovation oriented research programs and public basic research in all technology areas with an extensive utilization interest by private enterprise (precompetitive research). Projects are selected in heavy competition, scored on scientific quality and industrial innovation perspective ("Utilization"-aspect). Grants amount to 50% of total research costs; universities match for supervision and overhead. Projects are accompanied by user-committees of industry.
- The LTI's (Leading Technology Institutes). In 1997 four LTI's were selected out of 19 proposals initiated by industry led consortia, on the basis of objectified scientific and industrial qualifications:
  1. Telematica Institute (situated at the Twente University campus): aims to become industry's long term research partner to foster business innovation in telematics within and across key industry sectors
  2. Wageningen Centre of Food Sciences (WCFS; situated near Wageningen agricultural university research centre): concentrates on precompetitive research, on topics key to future competitiveness of the Dutch Agro Food sector, linking food and biosciences/biomedical research

3. Netherlands Institute for Metals Research (NIMR; situated at Delft Technical University): aims to achieve leadership in research and education in areas critical for the international competitiveness of Dutch metals industry by means of cross disciplinary research and training programmes
4. Dutch Polymer Institute (DPI; situated at Eindhoven Technical University) has the mission to establish a leading technological institute in Europe in the area of Polymer Science & Engineering, involving establishment of a fundamental knowledge base for industry, development of new industrial concepts and training of scientists and engineers.

### *IPRs*

Study has shown that trade in intellectual property rights is increasing, indicating that Industry in the Netherlands handles knowledge and IPR much more strategic than before. The study argues that non SMEs (bigger companies) apply much more than SMEs, but the number is dominated by the large companies among this group (top in patent application is also top in R&D expenditure). SMEs experience more problems when applying for patents than big companies and are hindered more in their innovation process by patents than big companies. Starting SMEs experience problems with strategic patenting of others, but patents are useful for finding investors.

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 very 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;
- Billboards; electronic publication of the knowledge in the European database system of the Innovation Relay Centres (IRC) can be used to improve the exchange of knowledge.
- Possible implementation of a differentiated patent system for different sectors to address the specific issues of each sector.

### **5. Human resources for S&T**

The causes of the impending shortage of knowledge workers (and scientists, technicians and researchers in particular) lie in the bottlenecks in education and the labour market, as well as a lack of opportunities for foreign knowledge workers. These bottlenecks need to be tackled coherently. The ministries of Education, Culture & Science, Social Security & Employment and Economic Affairs have presented the analysis of the shortages and the concrete measures to tackle the problem (divided across seven main themes in education, the labour market and migration) at the end of the year in a joint memorandum on knowledge workers/delta plan science/technology.

The role of the Ministry of Economic Affairs will be above all to stimulate initiatives and experiments in the business sector in order to make 'science' careers more attractive. Public/private mobility will also be encouraged. In addition, a system of differentiation for administrative charges and faster procedures could help to attract knowledge workers from abroad.

## **6. Policies to boost innovation in the service sector**

There are no programmes specifically directed at the service sector. Service-sector firms can, like all firms, utilise the policy-instruments concerning technological innovation and/or R&D. But no efforts have been made specifically directed at service-sector firms and/or at non-technological (types of) innovation, because reasons for and possible form (instrumentation) of such a policy are not (yet) clear. With small-scaled 'policy-experiments' we try to get the answers.

### *KISA*

No such programmes (to increase the uptake of knowledge-intensive service activities (KISA) by service-sector firms or to increase demand for such services in the manufacturing sector) directed at knowledge-intensive services exist, because it is a commercial knowledge-market. But not-for-profit intermediaries play an important role in transfer to and exchange with SME's - service-sector and manufacturing sector - of all sorts of knowledge (of the public knowledge infrastructure) which is essential for innovation. And indirectly these intermediaries stimulate the commercial knowledge-market.

### *IPR*

Dutch intellectual property policy is not specifically directed toward the protection of service sector inventions. Even more, the new software directive which is being discussed at the moment is bound to exclude pure business methods from patentability. In the field of copyright, the Ministry of Economic Affairs has done research regarding the economical aspects of copyright and its influence on innovation. The results of the research have shown that copyright itself does not have a negative influence on innovation. However, in practice the execution of copyright (by intermediaries etc.) can put a hold on innovation.

## **7. Policy evaluation**

### ***Recent changes in policies regarding the evaluation of innovation policy programmes or institutions***

Since the first of January 2002 policy-evaluation and policy preparation are subject to the ministerial decree on performance measurement and evaluation (Regeling Prestatiegegevens en Evaluatieonderzoek, RPE). The decree poses a number of requirements on policy preparation (ex-ante evaluation), monitoring and ex-post evaluation. The requirements concern:

- The use of evaluation instruments.
- 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)
- The frequency and extent of ex-post policy evaluations. Every instrument has to be evaluated every five years.
- The quality of the evaluation instruments.
- Informing the minister, head of the department, and parliament about the outcomes of an evaluation.

- The distribution of responsibilities within the department with regard to the implementation of this decree.

*The outcomes of recent major evaluations of R&D or innovation policies.*

Since every instrument is evaluated every five years, there have been at least 15 evaluations over the last two years. I will only mention the results of the largest and most influential evaluations. Both took place in 2002 but were very important to the policy changes that took place in 2003.

First, there has been the evaluation of the WBSO, a tax credit scheme that is by far the most important instrument in Dutch innovation policy. Due to the large amount of available data the Ministry of Economic Affairs was able to evaluate the instrument in a thorough and econometrically sound way. The main conclusions from this evaluation were:

- The main focus of the WBSO was on SME's.
- In general the users were positive about the WBSO.
- Continuous monitoring proved to be important.
- The WBSO was very likely to be effective in promoting innovation (second order effect).
- The effectiveness also depended on other instruments, so the policy mix is important.

Second, there has been an overall evaluation of the Dutch innovation policy. It was a system evaluation of technology policy in response to questions from parliament about the effectiveness of innovation policy. The main conclusions were:

- The number of instruments should be limited for sake of simplicity and transparency.
- There should be a shift from specific to generic instruments.
- There should be a shift from near market research towards fundamental research.
- The co-operation between firms and between firms and research institutes should be stimulated.
- Monitoring and evaluation had to be improved.

Both evaluations had a significant effect. First, it helped to create a sense of urgency with regard to innovation, making innovation one of the top priorities of the second cabinet Balkenende. There came additional funding for innovation and research, including a raise of the WBSO budget. New white papers were written on innovation and science policy, and stakeholders were unified in the Innovation Platform. The Innovation Platform is headed by the prime-minister. Other members are the ministers of Economic Affairs and Education and Science, high-ranking scientists and captains of industry.

Apart from these large influential evaluations there have been a number of smaller evaluations, e.g. an evaluation on the knowledge transfer instrument (SKO/SKB), an evaluation of the Netherlands Agency of Aerospace Programmes and an evaluation of Stichting Weten (an organisation to promote science). At the time of writing it is not yet known what the consequences of these evaluations will be.

In 2003 the start of a new instrument to promote collaborative research was prepared. Part of this preparation has been a study of the present situation. This will enable the Ministry of Economic Affairs to establish the probable additionality of this instrument over five years by comparing the 2003 situation with the 2008 situation. This type of 'zero-measurement' is relatively new to Dutch evaluation habits.