

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

SWEDEN

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

1.1. Overview of the main directions, objectives and elements of the country's policies for science, technology, and innovation.

Main features of recent science, technology, and innovation policy developments and the rationale behind them, including new innovation strategies.

In the Swedish research system, public R&D is mainly performed by universities and university colleges. To support the interaction between academia and the surrounding society, including industry, a so-called third task has been assigned by the government to all universities and university colleges. The third task complements the traditional fields of action regarding education and research. Another national measure has been to make it possible for universities to establish holding companies to support the commercialisation of R&D. Another example of national innovation support mechanisms for publicly funded research is the establishment of the Technology Bridge Foundations. This initiative enables seven regionally distributed independent foundations to promote university based innovation. The future activities of these foundations are now subject to further study, connected to a comprehensive overview of the Swedish system for public seed-financing. Based on the assumption that the critical competence for development of innovation system and clusters lies within the locally based actors, an increased focus has been put on the universities own involvement in the creation of effective innovation systems.

A new organisation for R&D funding has been in place since 2001. With a smaller number of funding agencies, it has been made possible to allocate the competitive R&D-resources with stronger focus and better impact. VINNOVA, the Agency for Innovation System has a key role as one of the major R&D-funding agencies in this system to promote strong national, sectoral and regional innovation systems.

Innovation policies have for some years been an important part of the policy debate. A part of the debate has focused on the so-called Swedish "paradox" of quite slow long-term economic growth compared to very high RTD-spending, primarily by industry. As a consequence the efficiency of the national innovation system in terms of producing innovations and economic growth has been questioned. In 2002 the Government initiated a process to set up a new policy field for innovation policy. A new strategy for innovation policy is foreseen during 2004. The framework for the strategy is developed by the Ministry of Education and the Ministry of Industry, Employment and Communication in close cooperation. This calls for integration of parts of industrial policy and of research policy. It also demands an integration of departments within the ministries of Education and the one of Industry, Employment and Communication as well as integration between the two ministries. The prime minister and the minister of

education and science and the minister of industry, employment and communications argued for improved innovation systems as one way of increasing economic growth. One aspect of the debate concerns the commercialisation of university research and how to increase it. There is a discussion about changing the rules for intellectual property rights. Today, researchers on Swedish universities have exclusive ownership of intellectual property rights deriving from their research.

Also in 2002 the so-called Bennet & Jonsson Group presented the report “The future of Swedish Industry”¹. The group consisted of representatives from industry (primarily large multinational enterprises) and labour unions and proposed measures in 15 fields that would support the competitiveness of Swedish industry and economic growth. One field concerned the issue of how to improve the Swedish innovation system and others concerned the need for collaborative research between universities and industry in different technologies. The Minister of industry, employment and communication commented on the report in a press release. He agreed with the many of the proposed measures and said that it was his ambition to improve the conditions of innovativeness.

Since 1948 the Swedish government has carried out long-term evaluations. The aim of evaluations is to form the basis of economic policy. One important objective is to analyse challenges and opportunities for the Swedish economic policy. In an enclosure to the long-term evaluation for 2003 the Swedish “paradox” is scanned. According to the evaluation one explanation to why Sweden has high R&D-spending but during some periods has lagged behind comparable countries concerning economic growth is that multinational companies conduct their R&D in Sweden but place part of their production in other countries. Therefore, it is important that Sweden provide favourable environment for production. The enclosure compares Sweden and Finland and states that Sweden need to adopt a systemic view for innovation policy.

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

The Swedish Government initiated a process for regional growth agreements in 1997.² The government stated that agreements on regional growth were intended to become the principal instrument for co-ordinating and adjusting the policies of the various sectors, and also for exploring new approaches to the promotion of regional and local industrial development.³ Thus, these agreements were to be the principal tool for the implementation of the new regional industrial policy. The first regional growth agreements were launched on 15 March 2000, when the first generation of such agreements were signed between 21 counties and the Swedish Government.

Measures pertaining to innovation policy are major components in the regions’ growth strategies. To a substantial degree they focus on RTD activities, technology diffusion institutions and venture capital markets. These regional growth strategies are generally geared towards the specific industrial specialisations in the regions. The ambition has been to use innovation systems or cluster approaches in the analysis backing up the proposals. However, these resulting analyses may in a large number of cases be better described as traditional sector analyses.

The regional policy bill “A Policy for Growth and viability throughout Sweden” 2001/02:4 focuses on the establishment of a new policy area - regional development policy. The purpose is to establish a well-co-ordinated policy for all parts of the country, i.e. to create regions with well-functioning and sustainable

¹ C. Bennet, G. Johnsson et al, 2002, *Framtid för Svensk Industri*, ISBN 91-974-066-7-8

² Government Bill 1997/1998:62 (Regional Growth for Employment and Welfare)

³ <http://www.naring.regeringen.se/tillvaxt/avtal/inenglish.htm>

local labour markets and with good services. The Government argues that proactive strategies are needed to reach this objective including (a) efforts within areas where investments are of great importance to regional development, and (b) a clear division of responsibility between the Government and municipalities. The latter means that municipal co-operation bodies could be established in all counties from year 2003. These bodies will have the authority to make decisions about county plans for regional infrastructure and the authority to take decisions on certain governmental funds for regional development. One task is to create programmes for the development of the county including, for example, regional growth programmes. The regional growth agreements will develop into such regional growth programmes in 2004. These programmes will consist of analysis, goal and regional priorities and plans for financing, implementation and evaluation. This transfer of authority to regions is a major change in Swedish regional policy.

In the Bill the Government also proposed a national programme for development of innovation systems and clusters. The programme will carry on from 2002 to 2004 with a budget of €8 million with the aim to strengthen and complement already ongoing activities at regional level. The responsibility for implementing the programme will be shared by VINNOVA, NUTEK and the Invest in Sweden Agency, ISA.

Major shifts or changes in the balance of the use of different types of policy instruments, and/or attention or support given to particular science, technology, and innovation policy areas.

Technology areas receiving explicit attention in the Government bill on research of 1996-1997 are information technology and biotechnology. This is further emphasised in the government bill on research of autumn 2000. The common vision for a number of innovation-related measures is that Sweden should develop its strength within knowledge-intensive fields. This is reflected in the research programmes given priority by VINNOVA and by the Swedish Foundation for Strategic Research.

One important focus for the government has been the promotion of collaboration, between university and industry. Not only ongoing programmes but also new programmes have been launched in this area.

A number of industrial research institutes in Sweden are being restructured to ensure critical mass and visibility. A strong presence in international research collaboration is one of the main goals for this process.

Future project or policy issues identified by technology foresight, forecasting or technology road mapping.

The results of the Technology Foresight exercise had considerable influence on the debate on future priorities concerning investments in higher education and research. The impact on priorities presented in the research bill is clear, particularly in the major efforts directed to research in biotechnology and information technology. Other areas receiving important reinforcement in research funding are humanities and social sciences as well as education and learning. The concept of "Technology foresight" is becoming a strong "brand" manifested by the 2nd round of the national foresight "Teknisk Framsyn 2003-2004"⁴. It has been organised and sponsored by eight influential organisations⁵ that ensures broad support but makes the foresight different from countries where the process is being done directly by and for the government.

⁴ <http://www.tekniskframsyn.nu>

⁵ VINNOVA, The Swedish Research Council, The Confederation of Swedish Enterprise, The Swedish Trade Union Confederation, The Swedish Industrial Development Fund, NUTEK, The Royal Swedish Academy of Engineering Sciences, The Knowledge Foundation

2. Public sector research and public research organisations

Please refer to document “GBAORD_Swe2003 (statistikunderlag)”.

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

Shifts in the allocation of funding across: 1) different kinds of institutions (e.g. universities vs. public research organisations), 2) different kinds of R&D (e.g. basic vs. applied research), 3) different socio-economic objectives (e.g. general advancement of knowledge, health, national security, environment, energy), or 4) different fields of science and technology (e.g. information and communications technology (ICT), biotechnology, and nanotechnology.)

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).

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

Initiatives to increase the flexibility and/or accountability of universities and public research organisations in responding to changing scientific opportunities or socio-economic needs (e.g. by granting more autonomy, adopting new funding instruments, relying more on contract-based funding).

In what has become known as the ‘Swedish model,’ it is expected that the university and college sector will meet social and economic needs. This principle was made more explicit in 1996, when the universities and colleges were assigned a ‘third task’ of supporting socio-economic development, in addition to their two traditional tasks of teaching and research. Throughout the 1990s, there has been a wider series of initiatives to link industry more tightly with the university and college sector. The role of the applied industrial research institutes in Sweden are currently being developed i.a. through a process of restructuring.

However, Swedish institutional structures might not fully be adapted to the “third task”. The universities are independent and have long traditions in academic teaching and research. Largely lacking a cadre of post-doctoral researchers, there are some concerns that the universities are more tuned to education and research training than to deliver the type of customer-directed and professionalised research services associated with applied research institutes.

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

3.1. Major policy changes in the individual instruments or in the mix of instruments used to provide public support for private sector R&D and innovation.

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

Public funding of research carried out in companies is organised through special programmes in areas such as aerospace and vehicles. However, Swedish research and technology programmes are mainly aimed at increasing the competence level of research within the universities in areas of future interest to companies. Increased efforts are made to get increased involvement from industry in the form of co-funding or actual work in co-operation with universities and institutes. The VINNExcellence and the VINNVÄXT Programmes are such efforts. See also 4.2

Support for venture capital or other sources of private sector financing (e.g. foundations).

For a long time there has been a debate in Sweden on the shortage of capital for young innovative firms. Over the past few years there has been an influx of private capital not only to established venture capital firms, but also from private placements made by wealthy individuals. But the crises in the IT-sector caused a decrease in the venture capital.

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).

The government is preparing a commission to the Swedish Patent and Registration Office to investigate the economic aspects of IPR for business development.

Other forms of public support for innovation

There are many female inventors in Sweden – women developing new products or business-ideas. But still women are strongly underrepresented as inventors. In order to stimulate women to become inventors the Swedish Business Development Agency conduct a special programme, Women and innovations.

3.2. Major changes in the balance and/or priority of public support of business R&D and innovation.

The interest in furthering the creation of new technology-based firms has resulted in actions taken in most university regions. New instruments have been created not only to stimulate the creation of NTBFs but also to provide management support activities. Good examples are the Business Development Programmes for Technology-based Growth Firms organised by the Centre for Innovation and Entrepreneurship in Linköping and the Centre for Entrepreneurship in Uppsala.

Around the universities and Science Parks in Sweden different initiatives have been taken to give technology start-ups access to resources at incubator units. Good examples are found in Gothenburg, Linköping, Lund and Uppsala. The last year's 'greenhouses' for student start-ups have been created in many of the new universities and university colleges. Örebro, Jönköping, Halmstad, Växjö and Gävle provide examples.

The public programmes and the seed finance scheme, carried out by NUTEK, has been in existence since the mid 1970s and represented a budget of about €7 million per year. NUTEK implemented the Programme in co-operation with regional organisations, primarily ALMI Business Partners and Technopole organisations. Since 2002, NUTEK and The Swedish Industrial Fund in collaboration offer advice and financing to technology-based firms in early stages of development. This collaboration started when the seed financing of NUTEK ended. The objective is to renew Swedish industry through financing development of technological product ideas with large commercial potential. Applications are sent to NUTEK who evaluates them. Once approved, the application is forwarded to the Swedish industrial fund, which decides whether or not to give a go-ahead. The financing (in the form of loans or owner capital) is given by the industrial fund. Those who can get financing are newly established enterprises that demonstrate a will to grow through innovations (products, processes or markets). The enterprise must have a unique business idea (and technology) in a growing market.

In the 1990s several new actors were created in order to help bring independent inventors and resources together for market exploitation. One example is SIC, Stiftelsen InnovationsCentrum, a foundation created in 1994 that started its operations in 1995. Innovation Centre Foundation (SIC) is a public foundation with the objective to foster innovation through grants, loans and advice. Its capital

amounts to €55 million (SEK 500 million) and focuses on inventions/inventors in their very early stage of development - pre-seed or seed stage. Financing is also given to projects that aim to develop product prototypes. Project loans are offered by SIC for a maximum of SEK 400 000. These loans can be written off if the project turns out to be commercially unsuccessful. During 2003 The activities of SIC will be concluded

Apart from NUTEK and SIC there is a third public institution, the Swedish Industrial Development Fund, that provides loans with conditional repayment for development projects in industry as well as new equity through its venture capital branch. A relatively new pension fund controlled by the government - The sixth AP Fund (Sjätte APfonden) - has been formed with the mission to engage in venture capital via organisations established in the field.

Recent research into conditions for survival of NTBFs shows that the business founders consider business angels to be the most valuable partners in the early stages. It emphasises their role not only as financial supporters but also – and more so – in terms of their assistance with market positioning and the establishment of early market relations.

One initiative of interest here for the NTBF population is the new NUTEK CapTec programme, that provides a yearly meeting-place for young innovative firms and investors. It has been running for five years and is planned to continue. At the same time, new Financing Forums are being set up with the same purpose but with other organisers, one of which is CONNECT Sweden, whose activities were initiated in 1998 by the Royal Swedish Academy of Engineering Sciences, IVA.

To improve access and transparency of the venture capital market, NUTEK has launched an internet-based service. The Venture Capital Database is a database on the Internet, by which start-ups and SMEs looking for venture capital can access information on the most suitable risk capital companies to contact.

Support structures have been built up around most universities containing, for example, Patent & Licensing Offices, University Holding Companies, Foundation for Technology Transfer and other actors providing advisory services to NTBFs and to company starters. Seed and start-up capital are provided by regional actors as well as by national actors.

A relatively new programme, VINST allocates grants for research projects conducted in collaboration between researchers at Swedish universities and/or research institutes, and companies which have self-developed products on the market and want to set a higher goal for their activities. The new knowledge generated should benefit the individual company and the group of researchers, and in the long run also the research community, industry, and society at large. The programme is a joint venture between VINNOVA and SSF. A short-term goal is to initiate a small number of collaboration projects while also disseminating knowledge of the programme in order to attract qualified proposals from a broad spectrum of Swedish industry and research. In the longer term, the ambition of VINNOVA and SSF is to have started up some 15-20 projects, enabling some 20 patents as a direct result of the programme. The programme is meant to be a 'window of opportunity' for companies that have already started selling self-developed products. Such companies are given an opportunity to aim higher, towards the next generation of products and systems, and to build platforms for renewal and expansion that will strengthen prospects for growth under their own management. Since the projects involve research in natural science, technology, and medicine, the programme is part of a sectoral innovation system of considerable breadth.

4. Enhancing collaboration and networking among innovating organisations

4.2. Major policy initiatives to promote stronger industry/science relations (i.e. linkages between industry and public research organisations)

Reform the rules governing ownership and licensing of publicly-funded research results, support for technology licensing.

The Swedish Patent and Registration Office, PRV, grants patents and registers trademarks, industrial designs and names. It also registers limited companies and other forms of companies that need to be registered. This office issues authorisations to publish periodicals, and offers a number of commission services and training courses. The more comprehensive activities performed by PRV have to be fully financed by the users/clients.

In addition to the PRV authorities, very few public schemes exist that are exclusively aimed at stimulating the use of the IPR instruments. However, as part of general services in connection with seed financing, support for joint university-industry RTD programmes (VINNOVA, NUTEK, SIC etc) and financing in general (i.e. ALMI), advice is given on the strategic and tactical use of IPR and on utilisation of information contained in patents. Some other agencies and research councils (e.g. the EU RTD Council) include training and advice activities on IPR matters in their general programme. They also offer partial funding of IPR costs, whenever necessary, after an overall consideration of the total project concept.

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

The Competence Centres Programme is a long-term effort to strengthen the very important link in the Swedish innovation system between academic research groups and industrial R&D. The programme will be extended with new Competence Centres during 2004. The new centres will be specialised in areas of working-life or transport.

Enterprises and research organisations from both sides of Öresund work together in an R&D-project, Öresundskontrakt. The intention is that the collaboration between expertise and R&D-resources should strengthen the industrial competitiveness of the region. The bridge between Malmö and Copenhagen generated governmental activities to identify obstacles and problems for mobility and integration in the Öresund region. In 1999 it was proposed that a connected knowledge system should be strengthened in which enterprises, research institutes and universities operating in the region may all participate in a project. Currently, six projects are running and new knowledge is being developed and applied in these projects, primarily for the participating enterprises. However, participating research organisations are supposed to transfer the knowledge to other enterprises.

VINNOVA launched a new programme, "VINNVÄXT" in spring 2002. Its aim is to stimulate strong innovation systems with high quality environments for research and development as well as regional competitive and dynamic networks in order to achieve more innovation and a lasting growth. The concept behind the programme is the promotion of effective co-operation between companies, research and development organisations and the political system (the triple helix) within each region, with the aim of developing dynamic regional innovation systems allowing the region to be competitive at international level within specific areas of growth. The programme has now been extended and there will be a new call for proposal in 2004 and an increased budget.

5. Human resources for S&T

A special time limited tax reduction for visiting scientific experts was introduced in January 2001.

6. Policies to boost innovation in the service sector

Services is a broad field in the Swedish economy, around 75 % of GNP. They consist of the government and local government sector, trade of input products, trade of consumer products, industrial services, personal services, health services, transport and logistics etc.

6.1 Policies to foster increased innovation and productivity growth in the service sector.

VINNOVA has different sectoral innovation programs. Some examples:

- *Mobile services*; new business models for building and managing service systems. Models for designing customer high value service systems.
- *Goods logistics*; business models for haulage contractors, IT-technical platforms and models for technical support systems for haulage contractors. New specialised service contractors for third part logistics. Services for multi modal logistics among others.
- *Wood manufactured products*; Development of systems for industrialised multistock buildings and interiors.
- *Industrial products design and production with service qualities*; functional procurement, service oriented product development, IT-support.

In short service design and service growth is integrated in different sectoral innovation systems like them above. The strategy is that different knowledge areas cooperate in forming innovation actions and methodology. A special IT-use knowledge platform is now starting which will support sectorial systems with high level research on trust and security, user interfaces and design, open production value chain and knowledge based information use.

Efforts to encourage service-sector firms to undertake more innovation and/or R&D

VINNOVA's 18 growth areas, which VINNOVA has prioritised, there are two areas that focus on the service sector, i.e. **IT in home health care** and **E-services in public administration**. Within VINNOVA policy there are also a commitment on knowledge platforms. The purpose of those is to generate knowledge, which will support the growth areas. The knowledge platform at VINNOVA to support innovations in the service sector is **ICT implementation**.

IT in home health care

The healthcare sector is undergoing a number of changes, which are closely linked to developments in IT, the need to reduce care costs and the aging population. At the same time healthcare is subject to a structural transformation as a result of the increased need for help in the home, and remote medical care. The sectors, which are growing most quickly, include new medical technologies for self-treatment, home care and decentralised care, which are expected to show an annual growth of around ten percent. An increased use of mobile IT services, together with medical technology products can provide safe home care for patients and at the same time generate growth. One decisive factor is that the technology must give healthcare professionals the opportunity to utilise the existing potential for quality and effectiveness.

VINNOVA supports

- innovative and experimental environments where IT-based services, the application of medical technology, and issues of work organisation and the science of healthcare will have strategic significance. Research, firms and public administration at different levels has to work together in these projects and environments to develop knowledge and innovations which, in the long term, will give Sweden a leading role in the field of IT-based home healthcare.
- programs to encourage start-up and small firms to develop more service innovations in close collaboration with the users. This is to increase the demand for e-services in home health care.
- demonstrators and testbeds to promote the diffusion of e-services. The plan is to demand innovative e-services that build on open-source.

There should be an emphasis on networking organisations and also studies what kind of economic incentives are of importance for cooperation to develop public e-services. According to both public authorities and private companies unsatisfactory standards play a significant role in hampering development. Different types of standards are involved. The technical and other systems are incompatible and there is a need for more standards both for public bodies on the national level and, even more, for public organisations on the local and regional level. There is a need for research into common methods and techniques for organising, finding, understanding and exchanging information in an agreed standard way. The problems involve such research areas as semantics and ontologies, protocols, access and intelligent surfaces etc. as well as legal and technical standards for public e-services, particularly in the area of security, relating to identification, signatures and authorisations.

E-services in public administration

Public authorities can provide their services more effectively and at a lower cost in online interactive form. Cross-disciplinary research and technical development will allow new functions to be created and cases to be handled more quickly. Effective work processes, simpler organisations and IT support will help to develop a networked administration system which will make contacts with authorities easier. Important opportunities are emerging on both national and international markets for companies, which can develop and supply new types of services, products and technical solutions.

VINNOVA supports

- tests and evaluations of electronic solutions in real-life test environments, for example where a municipality is developing public e-services.
- establishment research and innovation environments across a range of scientific disciplines which will develop e-services for public administrations.
- work towards more intensive cooperation between the various public authorities at national, regional and local level.

ICT Implementation

The starting point for the knowledge platform is the on-going structural transformation from an industrial society to a service society is demonstrated, amongst other things, by the development of IT-based services in a range of growth areas. Knowledge about what motivates people to use new IT applications is a survival issue for telecom companies. Users' perceived benefit from IT services will determine the success or failure of the companies. Entertainment, that is pleasure and stimulation, is a key factor in influencing people to use different tools and systems. There are also gaps in the overlap and coordination between different technical platforms.

VINNOVA supports generic research that is of fundamental importance in removing these obstacles and streamlining the use of IT. The platform will contribute to the acquisition of knowledge and the development of more powerful tools in a number of VINNOVA's prioritised growth areas.

The central factor is the effective use of the Internet and related technologies, as a result of accessibility and a problem-free information flow. Another issue concerns the radical changes in companies' production logistics and capability, primarily with regard to intangible assets, the content of services and forms of payment. A third issue relates to the convergence between the net, services, equipment and markets in a dynamic innovation environment, which increases the need for standardisation, regulations and legislation. A fourth area concerns awareness of the needs and requirements of customers, consumers and citizens, and of the necessary conditions for introducing IT systems in different environments.

6.2 Information or statistics on the participation of service-sector firms in innovation programmes that are not targeted specifically at the service sector, but are open to service sector firms.

An important issue for VINNOVA is that the problem-oriented research projects will be integrated into innovation environments, which will be characterised by high levels of interaction between the actors involved. In almost all project funded by VINNOVA there is a demand of collaboration between actors in the fields of business, science and politics.

7. Policy evaluation

7.1 Recent changes in policies regarding the evaluation of innovation policy programmes or institutions.

The government puts forward a bill on research during each term of office on all public financing to research and development. The bill outlines priorities as regards volume and direction for the coming four years. Next bill is expected during autumn 2004.

On the 1 January 2001 the Swedish Parliament founded the Swedish Institute for Growth Policy Studies (ITPS). According to the Ordinance (2000:1133) on Instructions to the ITPS the institute's main task is to initiate, commission and evaluate industrial, innovation and regional policy measures. In addition, the institute is to provide the policy-making system with analysis of economic development and growth as a basis for decision-making as well as to develop and disseminate methods for facilitating learning and evaluation. In this respect ITPS cooperates with both Swedish and international bodies. The ITPS's foreign policy intelligence makes it possible to take advantage of established methods, such as trend projections, scenarios or qualitative analysis from different sources of information (ITPS has local offices in Brussels, Washington, Los Angeles, Tokyo and Beijing). In 2003 the government gave the institute two special commissions in the innovation area. One is to evaluate some of the R&D-programs initiated by the VINNOVA. Another commission is to make a survey of actors in the Swedish innovation system.

To ensure that the results of the analyses and evaluations find its way in to the process of policymaking, part of the work is coordinated time wise with the Government's work on Bills and is carried out in close contact with officials at the Ministry of Industry, Employment and Communication. For instance, ITPS was assigned by the Government to submit a proposal for an evaluation of the Government's IT policy in September 2002. The resulting report (http://www.itps.se/pdf/A2002_011.pdf) contains a proposal for the improvement, in the short term, of the data on which a possible IT bill in 2004 can be based, and a long-term plan for creating new knowledge on how IT use can be increased, as well as its effectiveness as a policy instrument for the improvement of goal fulfillment in different policy areas.

Since 2003 it is stated in the Ordinance on Instructions to The Swedish Agency for Innovation Systems, Vinnova, that the agency should analyse the results of their measures in at least two of their spheres of activities. The analysis should include estimations of the effects on sustainable growth and renewal as a consequence of the measures taken.

7.2. Information about the outcomes of recent major evaluations of R&D or innovation policies.

Since the beginning of 2001 ITPS has completed a number of evaluations of the possible effects of the Government's measures within the field of industrial and innovation policy. Most of the publications are available in English at the ITPS website (www.itps.se). A brief summary of two of the major evaluations are presented below:

i) *Structural funds: The Swedish Objective 4 programme* (http://www.itps.se/pdf/A2003_001.pdf)

The aim of Swedish objective 4 programme was to improve the development of worker skills and the organisation of work in especially small companies with less than 50 employees. The evaluation, which is based partly on the results from a survey, includes an analysis of the effects on both the participating companies and the effects on their employees. The quantitative evaluation indicates that the companies participating in the programme had a higher productivity, solidity and net profit margin compared to similar companies in the study's control group. However, no significant effects on unemployment and salaries were found in the analysis regarding the employees.

ii) *Financing and business development consultation by ALMI* (http://www.itps.se/pdf/A2002_002.pdf)

The ALMI group was founded in 1994 and is owned by the Government and the Swedish county councils. ALMI's mission is to stimulate growth and development for small and medium-sized companies and innovators. In doing that, ALMI offers complementary financing (loans) to companies that has not been granted all its need of financing in the private market. The aim of the evaluation was to determine if the financing activity interferes with or works as a complement to the private market and to investigate whether the support gives any effects on the success rate of the companies compared to companies without an ALMI loan. The evaluation indicates that the ALMI financing works as a complement to the financing market, especially regarding its services to newly started companies. In addition, it is shown that the supported newly started companies succeed to a higher degree compared to the companies in the study's control group.

Swedish Research Council relies on peer review for evaluation of the scientific quality their research. Since it's creation in 2001, the Council includes an analysis department that also initiates evaluations. So far, the departement has conducted sevral evaluations as Forskningsforum (2003), Svensk samhällsvetenskaplig datatjänst (2003), Survey of allergy and hypersensitivity research in Sweden (2003) and Utvärdering av SAFARI – a national internet-based information system on research (2002).

The Swedish Agency for Innovation Systems (VINNOVA) has, apart from mid term-oriented evaluations to secure and develop its activities, given impact assessments a high priority. These focus on broader perspectives and longer time horizons than regular evaluations of R&D programmes

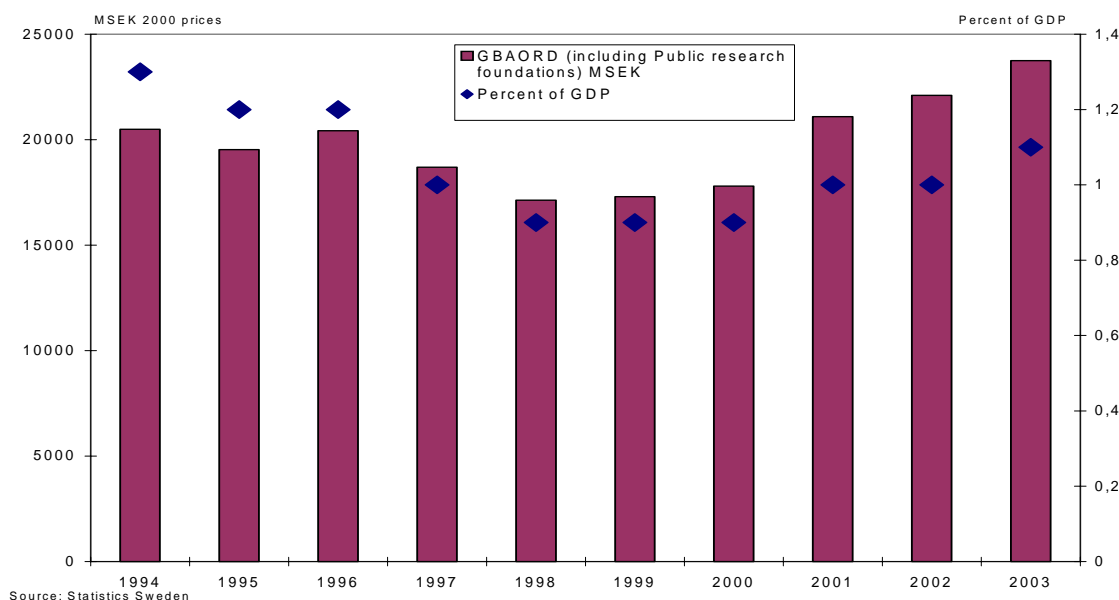
ANNEX: INNOVATIONS SYSTEM ANALYSIS BY ROLF NILSSON

GBAORD IN SWEDEN 1994-2003

The latest official R&D-survey in Sweden was conducted by Statistics Sweden in 2001. In order to get more up to date information regarding public R&D funding we use data stemming from Statistics Sweden "Government Budget Appropriations or Outlays for Research and Development 2003". The major downside of using the Government Budget is that the figures are preliminary and may deviate from the actual figures. GBAORD includes not only the R&D finance by the government but also the R&D financed by the public research foundations.

The Swedish Government including the public research foundations will in 2003 fund R&D to a sum of almost 24 billion SEK in the price level of 2000. Compared to 1994 this is an increase by 15 percent. If instead related to the GDP the funding amounts to 1.1 percent, which is slightly less than in 1994, but little more than in recent years (figure 1).

Figure 1: GBAORD in Sweden 1984-2003, MSEK, 2000 prices and as a share of GDP



The overwhelming majority of Government financed R&D is received by other public actors, who in turn uses the money to finance R&D, but only a very small amount is directed to the business sector directly.

The higher education sector is the biggest recipient of public financed R&D and the R&D targeted to this sector has increased steadily since 1998. The increase from 2002 to 2003 was 10 percent in fixed prices. As a share of GBAORD the higher education sector is receiving around 50 percent, and the level has been more or less constant since 2001. The defence sector is the second biggest recipient, and its public R&D funding has increased from 1 billion SEK in 1998 to almost 5 billion SEK in 2003. In percentage terms this equals an increase from 5 percent in 1998 to 20 percent in 2003 (figure 2 and figure 3). However, the level and increase in the defence R&D has been debated and there exists some questions about the accuracy on the defence R&D.

Figure 2: GBAORD divided on recipient bodies 1998 –2003, MSEK, 2000 prices

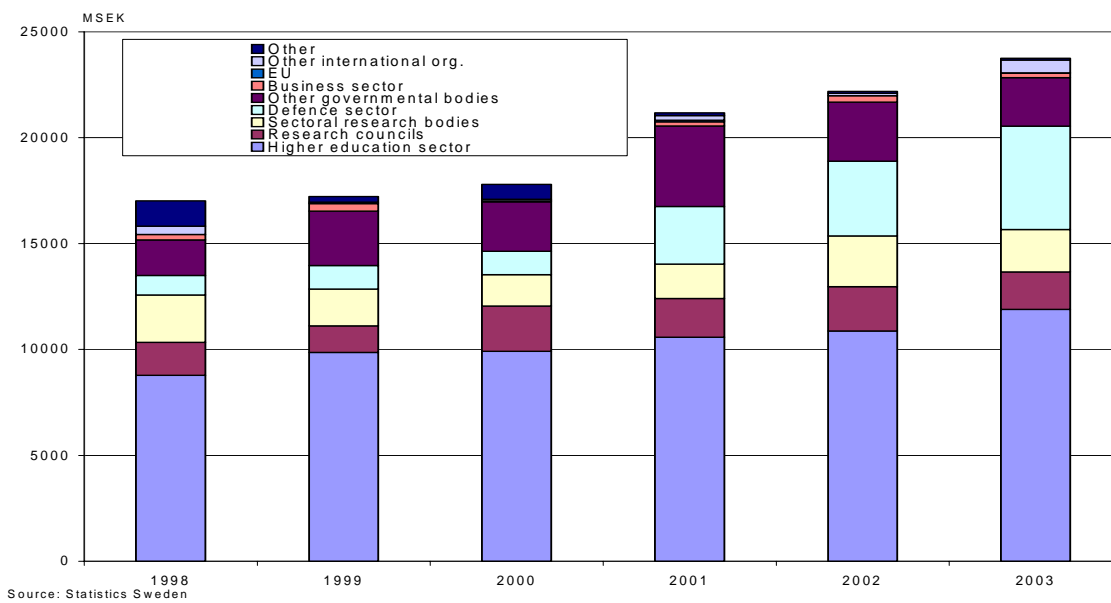
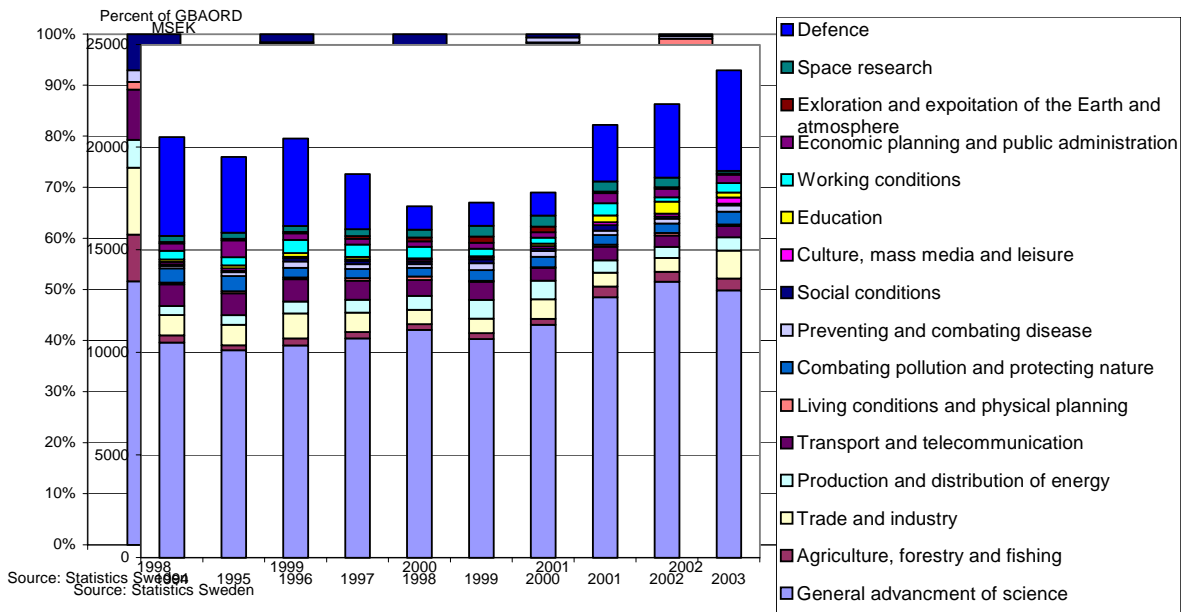


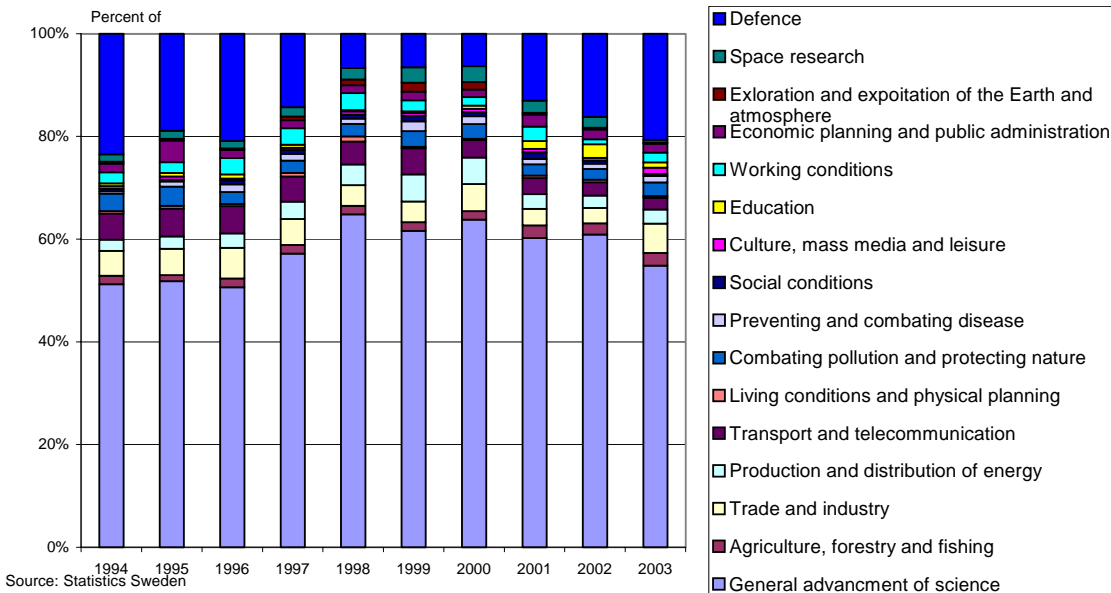
Figure 3: GBAORD divided on recipient bodies 1998 –2003, percent



Turning to how the governmental financed R&D is distributed on the different socio-economic objectives we see that the biggest objective is General advancement of science. The public financed R&D to this objective has since 1994 increased by 25 percent. However, compared to 2002 there was a small reduction. As a percentage of public financed R&D the objective General advancement of science increased its share during the second half of the 1990's, but the share has since decreased somewhat and in 2003 where it amounted to 55 percent of GBAORD. The second biggest socio-economic objective is defence. Public financed R&D to defence decreased substantially during the period 1994 to 1998, but has since 2000 increased sharply and in 2003 it was back to the same level as in 1994. As a share of the public financed R&D it amounted to 20 percent in 2003. The public R&D targeted to the objective Transport and telecommunication has been halved since 1994, while the objective Trade and industry shows a sharp increase from 2002 to 2003 (figure 4 and 5).

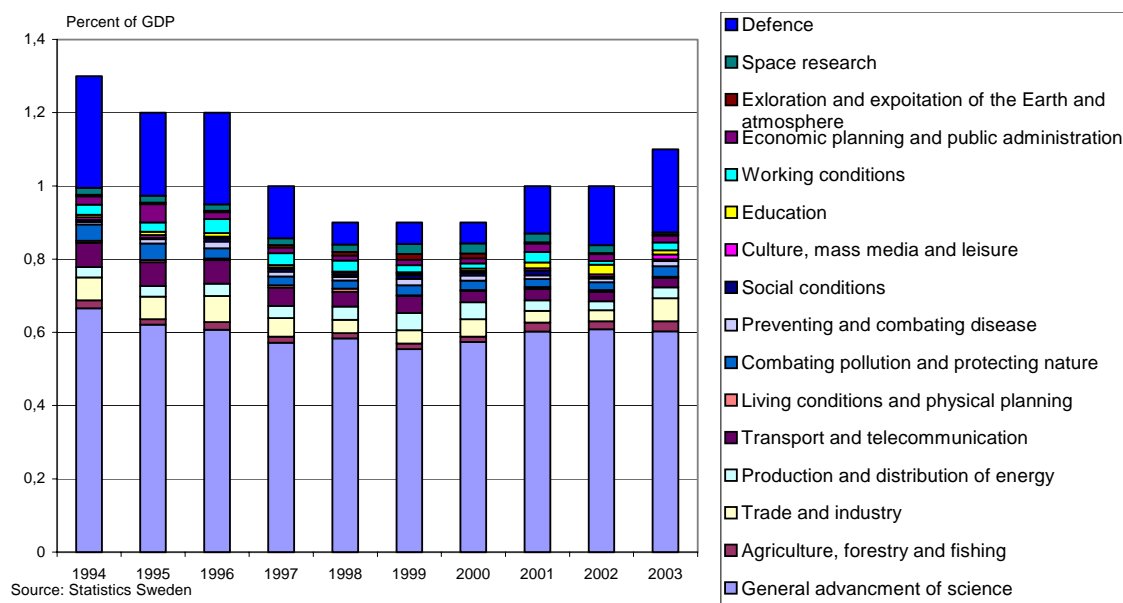
Figure 4: GBAORD divided on objectives 1994-2003, MSEK, 2000 prices

Figure 5: GBAORD divided on objectives 1994-2003, in percent



The objective General advancement of science includes almost all of basic research, while the other objectives can be categorised as applied research. If related to GDP we see that basic research in 2003 amounts to 0.6 percent of GDP, and that it has fairly stable on that level during the whole period. Public financed applied R&D, including defence, amounted to 0.5 percent of GDP in 2003, which is slightly less than in the middle 1990's, but considerably more than in recent years (figure 6). However, the majority of the increase of applied R&D is due to the increase in defence R&D, and as stated earlier the accuracy of these figures is debatable. If defence is excluded, the amount of public financed R&D to applied R&D amounts to 0.25 percent of GDP, and has been on approximately that level after a decrease in the late 1990's (figure 6).

Figure 6: GBAORD divided on objectives 1994-2003, percent of GDP



Taking a closer look on how the public financed R&D to General advancement of science is distributed on field of science show that that the R&D in most fields has increased over time. Since 1994 social science has increased the most (70 percent), followed by medical science (38 percent) and mathematics & natural science (24 percent). The increase in engineering and technology has during the period been relatively modest (4 percent). In percent of General advancement of science medical science has the largest share with around 30 percent in 2003. The share has increased somewhat during the period. Mathematics and natural science and engineering and technology represent around 20 percent each. The share for engineering and technology has decreased somewhat during the period mainly due to the decline in financing between 2002 and 2003. Comparing 2002 with 2003 also reveals a sharp increase in medical science (10 percent), while engineering and technology as well as mathematics and natural science show sharp decreases (-10 percent). The decrease is probably related to the overall reduction in financing stemming from the Public research foundations. But it is important to remember that the figures presented here are preliminary (figure 7 and figure 8).

**Figure 7: General advancement of science distributed on field of science, 1994-2003
MSEK, 2000 prices**

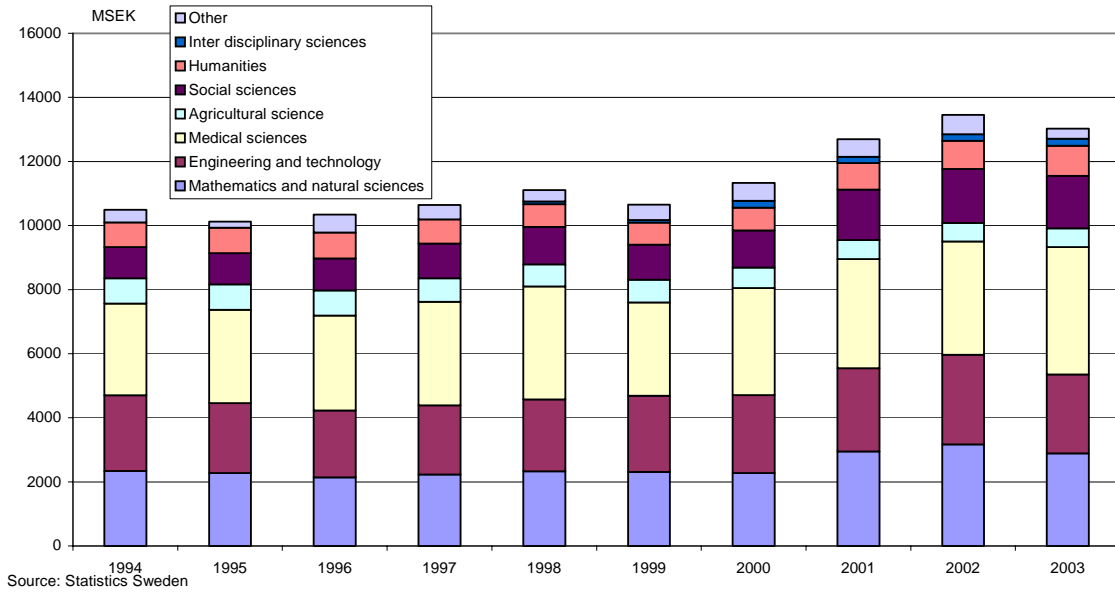


Figure 8: General advancement of science distributed on field of science 1994-2003 in percent

