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Working Party on Nanotechnology

INVENTORY OF NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION POLICIES FOR NANOTECHNOLOGY 2008

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FOREWORD

This paper reviews available information about current science, technology and innovation policies for nanotechnology and highlights the nature and organisation, some challenges and opportunities of different national STI policy approaches. The paper, prepared by Jacqueline Allan with assistance from Stéphanie Lacour and Christopher Palmberg of the Science and Technology Policy Division of the OECD Directorate for Science, Technology and Industry (DSTI), was supervised by the Working Party on Nanotechnology (WPN).

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INVENTORY OF NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION POLICIES FOR NANOTECHNOLOGY 2008

MAIN POINTS

Twenty-four countries responded to a policy questionnaire circulated in early 2008, 21 member countries of the OECD and 3observer countries. The resulting inventory of current science, technology and innovation (STI) policies for nanotechnology indicates that:

- The majority of the respondent countries have put nanotechnology-specific policies in place and have dedicated research and development (R&D) funding for nanotechnology.
- Approximately half of those countries have established new organisational and institutional frameworks.
- There is a wide range of policy objectives including fostering R&D, commercialisation and encouraging company involvement in nanotechnology-related business activity.
- Over half of the respondent countries have nanotechnology co-operation agreements with other countries.
- Nearly three-quarters are participating in international discussion fora and initiatives on nanotechnology other than those of the OECD or the EC.
- Most of the respondent countries have mechanisms to involve the public and industry in policy making around nanotechnology.
- The majority of policies in respondent countries consider ethical, legal and social issues in some form.
- Most respondent countries support education and training, have information about human resources needs and have policies to attract migrant workers.
- Key policy challenges for countries included health, ELS (ethical, legal and social) and education issues and the need for information in order for nanotechnology to be developed responsibly; and
- Where business-related policies exist, priority application areas are process engineering, chemicals and pharmaceuticals, and electronics.

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Background

Nanotechnology is emerging as a technology with the potential to impact daily life in many areas including healthcare and information technology, and to bring business opportunities across many industries. In the context of global challenges, nanotechnology is seen as a likely source of developments which will help to address existing and future problems in energy, healthcare, clean water and climate change. In light of these expectations, governments around the world have invested heavily in nanotechnology research and development and companies are also engaging on an increasing basis. Despite the perceived potential of nanotechnology and the growth of investment, nanotechnology developments are not well monitored in terms of measuring their current position in research; their entry into and strength within the marketplace; their growth in prominence in research and the economy; the policies supporting them; and the social and economic factors behind their status and growth.

In light of the growing prominence of nanotechnology and its perceived economic and social potential, the OECD established, in 2007, a Working Party on Nanotechnology to advise its member countries on emerging policy issues of science, technology and innovation related to the responsible development of nanotechnology. The Working Party is a subsidiary body of the Committee for Scientific and Technological Policy. The mission of the Working Party is to promote international co-operation that facilitates research, development, and responsible commercialisation of nanotechnology in OECD member countries and certain non-member economies. It aims, *inter alia,* to identify opportunities and impediments for realising the economic, environmental and social benefits of nanotechnology; facilitate the development of internationally comparable statistics and indicators that can track research, development and commercialisation of nanotechnology; to assess and take account of public perceptions related to advances in nanotechnology and its convergence with other technologies; and to foster a collaborative exchange on policy developments related to nanotechnology among member countries and certain non-member economies.

One challenging area for those involved in the development and implementation of policies for nanotechnology is the lack of data on the development and commercialisation of nanotechnology, including policy development. This document aims to begin to address the issue of lack of information about national policies by providing an inventory of national science, technology and innovation policies for nanotechnology in 2008. The work was undertaken under the supervision of the Working Party on Nanotechnology and in the context of the above aims. OECD member and observer countries provided much of the information herein in responding to a questionnaire on national science, technology and innovation policies for nanotechnology, that information being supplemented in this report with data from the OECD *Science, Technology and Industry Outlook 2008* (OECD, 2008).

Between February and August 2008, 24 national responses were received from 21 OECD member countries and 3 observer countries. Summary charts of key points made by each country are provided in Annex 2.

The inventory findings are presented here as follows:

- Definitions of nanotechnology.
- STI strategies and policies for nanotechnology.
- Research & development funding.
- Human resource considerations; and
- Policies related to the business environment.

Definitions of nanotechnology

Countries were invited to provide the *"definitions of nanotechnology that their governments and/or related agencies use for formulating and implementing STI policy"*. Seventeen countries[1] provided definitions ranging in length from a few lines to a page of text. Within those respondents, Sweden has adopted the definition of the ISO (see below) while the US National Nanotechnology Initiative (NNI) definition is being used by the United States and Israel. In the group of eight which did not have one formal definition, some have adopted the United Kingdom, United States or other definition on an informal basis, through general usage. Some commonly used definitions of nanotechnology are give in Table 1.

Table 1. Definitions of Nanotechnology

Source	Definition
US: National Nanotechnology Initiative (2001-)	Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometres, where unique phenomena enable novel applications. Encompassing nanoscale science, engineering and technology, nanotechnology involves imaging, measuring, modelling, and manipulating matter at this length scale.
EU: Seventh Framework Programme (2007-2013)	Generating new knowledge on interface and size-dependent phenomena; nano-scale control of material properties for new applications; integration of technologies at the nano-scale; self-assembling properties; nano-motors; machines and systems; methods and tools for characterisation and manipulation at nano dimensions; nano precision technologies in chemistry for the manufacture of basic materials and components; impact on human safety, health and the environment; metrology, monitoring and sensing, nomenclature and standards; exploration of new concepts and approaches for sectoral applications, including the integration and convergence of emerging technologies.
ISO TC229	Understanding and control of matter and processes at the nanoscale, typically, but not exclusively, below 100 nanometres in one or more dimensions where the onset of size-dependent phenomena usually enables novel applications. Utilising the properties of nanoscale materials that differ from the properties of individual atoms, molecules, and bulk matter, to create improved materials, devices, and systems that exploit these new properties.
Japan: Second Science and Technology Basic Plan (2001-2005)	Nanotechnology is an interdisciplinary S&T that encompasses IT technology, the environmental sciences, life sciences, materials science, etc. It is for controlling and handling atoms and molecules in the order of nano (1/1 000 000 000) meter enabling discovery of new functions by taking advantage of its material characteristics unique to nano size, so that it can bring technological innovation in various fields.
UK: New Dimensions for Manufacturing: A UK Strategy for Nanotechnology	Nanotechnology and nanoscience are concerned with materials science and its application at, or around, the nanometre scale (1 billionth of a metre). Manufacturing can reach the nano scale either from the top down, by 'machining' to ever smaller dimensions, or from the bottom up, by exploiting the ability of molecules and biological systems to 'self-assemble' tiny structures. It is in the conjunction of these two approaches, in the meeting of physical and chemical/biological manufacturing, that the potential for revolution lies. From the top down perspective, it interfaces with the larger-scale, more mature 'microsystems technology' being pursued very actively in the UK and around the world on a more immediate timescale.

1. Austria, Denmark, Finland, France, Germany, Ireland, Israel, Japan, Korea, Netherlands, Norway, Russia Federation, South Africa, Sweden, Switzerland, United Kingdom and United States.

STI strategies and policies for nanotechnology

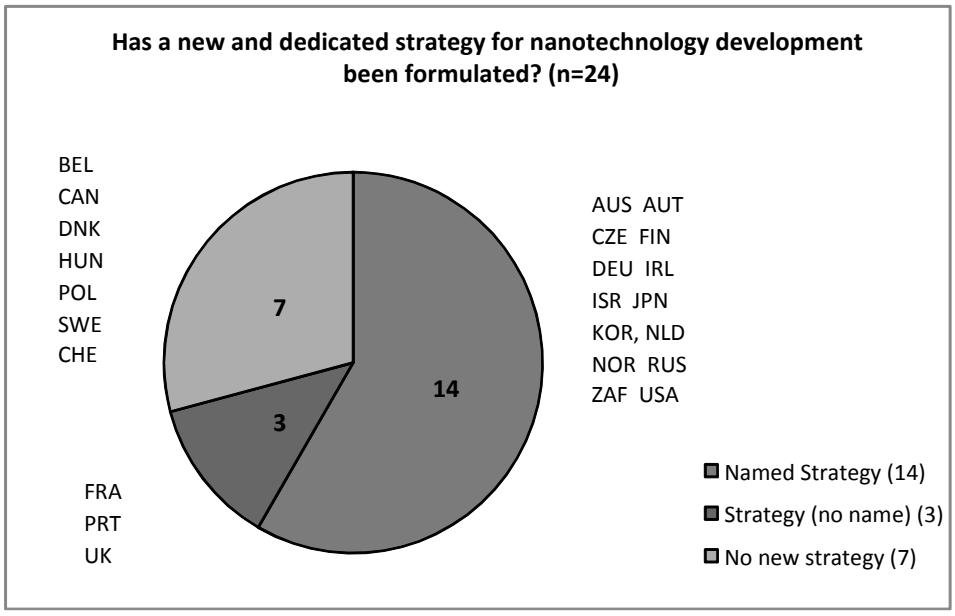
Implementation and organisation

Countries[2] have adopted different approaches and strategies to support the responsible development, commercialisation and industrial uptake of nanotechnology. In some countries a new and focused strategy for nanotechnology has been implemented at the level of governments or related agencies, while in others nanotechnology development is supported through existing strategies and/or policies. Depending on the overall governance system of countries, strategies in this field may be formulated and implemented at the regional or provincial rather than the national level.

In order to obtain further information about the strategies, the questionnaire asked whether "*a new and dedicated strategy for nanotechnology development has been formulated"*, and, if so, requested a brief description of this strategy.

Seventeen of the 24 respondent countries (71%) have a dedicated strategy for nanotechnology development, formulated at national governmental and/or agency level (Figure 1). The dates of the first implementation of the nanotechnology strategies ranged from the late 1990s (United Kingdom, 1999) to ongoing planning (Austria, anticipated 2010).

Figure 1. Existence of a national nanotechnology strategy



Source: OECD 2008.

The national strategies of some countries employ several policy instruments across a number of organisations including agencies (*e.g.* United Kingdom and Germany (see Boxes 1 and 2)). Some countries with a dedicated strategy indicated that other national strategies also mention nanotechnology.

2. Key to abbreviations: AUS=Australia; AUT=Austria; BEL=Belgium; CAN=Canada; CHE= Switzerland; CZE=Czech Republic; DEU=Germany; DNK=Denmark; FIN=Finland; FRA=France; IRL=Ireland, ISR=Israel; HUN=Hungary; JPN=Japan; KOR=Korea; NLD=Netherlands; NOR=Norway; POL=Poland; PRT=Portugal; SWE=Sweden; RUS=Russian Federation; ZAF=South Africa; UK=United Kingdom; and USA=United States.

In six of the countries[3] responding to the questionnaire, nanotechnology development is supported through existing strategies and/or policies, rather than a new, dedicated strategy. For example, Denmark undertook a Technology Foresight exercise on Danish Nanoscience and Nanotechnology culminating in an action plan in 2004. While the plan put to government has not been implemented in its entirety, several initiatives have been taken including the establishment of the Danish National Advanced Technology Foundation (in 2005) and the focusing on nanoscience and nanotechnology of funding programmes of the Danish Council for Strategic Research. One country (Belgium) indicated that it had neither a nanotechnology strategy nor any strategies in which nanotechnology is mentioned, due in part to the decentralisation of policy in general within the country and in part to the lack of differentiation between research and development fields within national funding programmes.

Box 1. Nanotechnology strategy: the United Kingdom

The nanotechnology strategy of the UK is enacted by the Technology Strategy Board (TSB) and three research councils:

- The Biotechnology and Biological Sciences Research Council (BBSRC)
- The Engineering and Physical Sciences Research Council (EPSRC) and
- The Natural Environment Research Council (NERC).

The BBSRC funds nanotechnology (budget c. GBP 5 million p.a.) as just one of several disciplines which support the understanding of biological systems; address user needs, in particular in the bioremediation, bio-processing, chemical, diagnostics, healthcare, instrumentation and pharmaceutical industries; and assist in the development of tools and technologies for use in the life sciences.

The EPSRC (c. GBP 35 million p.a. in 2005 to 2008, GBP 30 million in 2009 and 2010) is implementing its *Nanoscience through Engineering to Application* programme together with the other research councils and the TSB. GBP 19 million have been committed to research in 2008/2009 and GBP 17 million to training for 2008/2009 (over five years). It will develop interdisciplinary grand challenges in research areas of importance to society; fund research students to doctoral level; support leadership and career acceleration fellowships; and support fundamental research.

Under the *Environment and Human Health* theme of its *Next Generation Science for Planet Earth*, NERC will "determine the behaviour and effect of nanoparticles in the environment" (GBP 2.3 million in 2007).

Technology Strategy Board funding for nanotechnology rose from GBP 14 million in 2005 to GBP 21 million in 2007 and will decrease to GBP 6.5 million by 2010. The Board promotes innovation to solve problems or make new advances by investing in programmes and projects; knowledge transfer activities; policy work; networking and co-ordination. It specifically supports micro-technology and nanotechnology centres.

3. Canada, Denmark, Hungary, Poland, Sweden and Switzerland.

The principal organisations involved in formulating and implementing STI policy related to nanotechnology are many and varied: ministries and government departments; policy and funding agencies and corporations; councils and advisory groups including industry representative bodies; technology boards; foundations; institutions and networks. Eleven[4] of the respondent countries have recently founded organisations specifically to formulate and/or implement policies related to nanotechnology. Thirteen countries[5] report that they have new organisational or institutional frameworks in place for enhancing co-ordination between organisations involved in nanotechnology (see Table 2).

Box 2. Nano-Initiative - Action Plan 2010: Germany

The German national *Nano-Initiative - Action Plan 2010* is a stand-alone strategy within the national High-Tech Strategy. Involving seven federal ministries, the Action Plan aims to:

- Bring nanotechnology out of laboratory and into industry through dialogues, fostering research collaborations and promoting networking.
- Improve the environment for nanotechnology (through actions on national co-ordination, skills, attitudes, standards and testing).
- Evaluate effects of NT (in areas including environment, health and safety).
- Inform and engage the public; and
- Identify future demand for research.

The budget from the Ministry of Education and Research (BMBF) is USD 420 million annually to 2010 rising to an expected budget of up to USD 560 million annually by 2010.

The national High-Tech Strategy has a budget of USD 20.4 billion between 2006 and 2009 and covers 17 high technology fields including health research, biotechnology, energy, information and communication technologies, space, and production.

Among those who have set up new organisational and institutional frameworks, a variety of arrangements can be identified and some key examples are also set out in Table 2. Further details, including web links when available, are presented on a country-by-country basis in Annex 2.

4. Australia, Belgium, Canada, Denmark, Israel, Korea, Netherlands, Russian Federation, Switzerland, United Kingdom and United States.
5. Australia, Canada, Finland, France, Germany, Israel, Japan, Netherlands, Poland, Portugal, Russian Federation, Switzerland and United States.

Table 2. Organisations, organisational frameworks and institutional frameworks

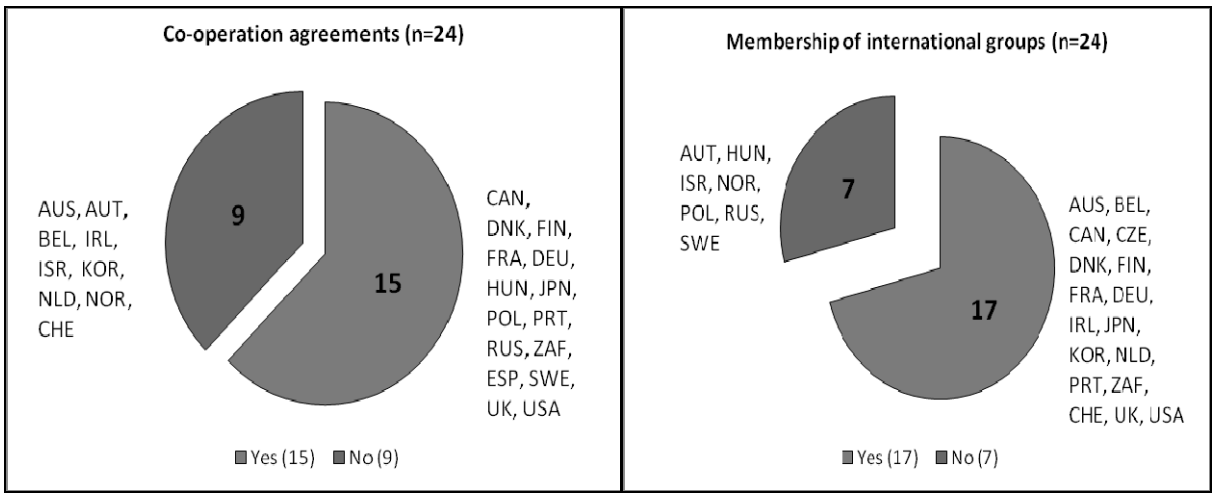
Country	Mechanism
Australia	A specific office (the Australian Office of Nanotechnology) was established to co-ordinate the strategy and ensure a whole-of-government approach to nanotechnology issues.
Belgium, Finland	Nanotechnology-dedicated strategic clusters have been established.
Canada	Many provincial frameworks are in place including the National Institute for Nanotechnology; the British Columbia Nanotechnology Alliance (Nanotech BC); NanoQuebec and the Nanotechnology Network of Ontario.
Finland	A Centre of Expertise Programme has been established.
France	"*Groupe interservices sur les nanotechnologies*" has been established to co-ordinate public actions conducted by the different national ministries in the field of nanotechnology, especially nanomaterials.
Germany	Organisations co-operate within the "Ressort Circle" a forum which meets twice a year and has an intranet platform.
Hungary	Technology platforms for nanotechnology fields are being established.
Israel	The Israel National Nanotechnology Initiative formulated national nanotechnology policy and a consortium of industry and academy groups was established to conduct research and development. Nanotechnology and nanoscience centres are in place and are contributing to the co-ordination of activities.
Japan	The Council for Science and Technology Policy was founded in 2001 and nanotechnology is within its remit. There is also a National Co-ordination Programme of S&T Projects (since 2005).
Korea	The organisation responsible for nanotechnology policy has set up information centres.
Netherlands	A risk observatory was established in 2007. The Interdepartmental Forum on Nanotechnologies (ION) is responsible for communication with Ministers on national nanotechnology developments.
Poland	The Polish Nanotechnology Platform was established.
Portugal	A structure was created within the Foundation for Science and Technology (FCT) to articulate nanotechnology policy issues between national bodies.
Russian Federation	Rosnanotech was established.
UK	The Technology Strategy Board was established in 2007.
US	The Nanoscale Science, Engineering and Technology (NSET) Subcommittee of the National Science and Technology Council (NSTC) and of the National Nanotechnology Co-ordination Office (NNCO) was founded. NSET and NNCO serve as a locus for communication, co-operation and collaboration amongst agencies which fund nanotechnology or which may participate in the National Nanotechnology Initiative to further their agency missions.

Engagement

The majority of respondent countries (71%) are engaged in "*international discussion fora and initiatives on nanotechnology other than those at the OECD or EU"* including the World Health Organisation (WHO); the International Standards Organisation (ISO); and the International Risk Governance Council (IRGC) (See Annex 3 for further examples and Figure 2 for the countries).

The nanotechnology STI policy of 15 respondent countries (63%) includes "*significant co-operation agreements with other countries"* (both bi-lateral and multi-lateral) with relevance to nanotechnology. (See Figure 2 for the countries.)

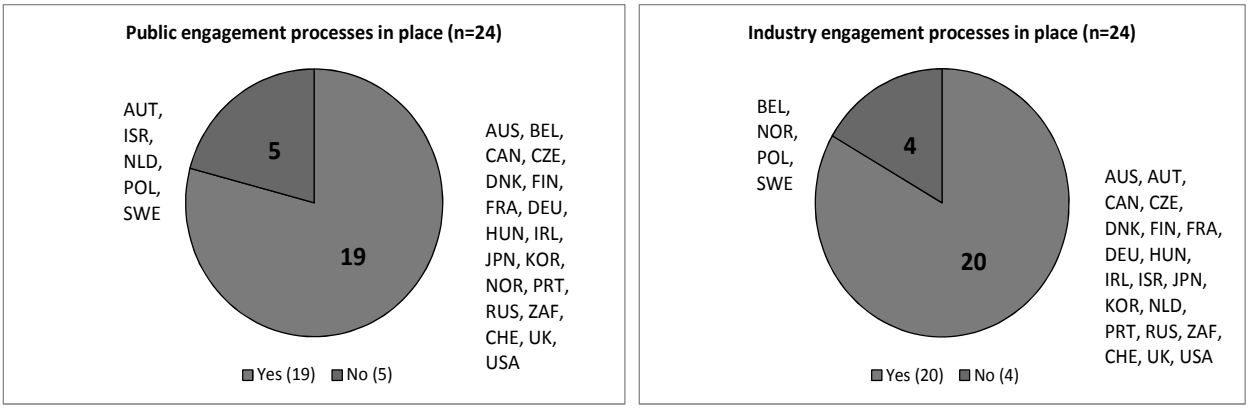
Figure 2. Co-operation agreements and international discussion fora



Source: OECD 2008.

The questionnaire sought information on the extent to which "formal or informal processes for public input to nanotechnology-related policies development" or "formal and/or informal processes for industry input to nanotechnology-related policies" operate in the countries, independent of whether they adhere to a dedicated strategy or have set up other specific organisational and institutional arrangements. A large number of countries report activities or specific policy initiatives related to one or both of these forms of stakeholder engagement (see Figure 3).

Figure 3. Stakeholder engagement



Source: OECD 2008.

Nineteen countries[6] (79%) have processes for public input to nanotechnology-related policy development. Target audiences for the many national initiatives reported by the respondent countries include civil society; industry and business organisations; teachers, educators and students. For example:

- Australia has a co-ordinated Public Awareness and Engagement Programme as part of the National Nanotechnology Strategy which includes public forums, promotional materials, conference events and roadshows. Community engagement forums are also used by some regulatory and research agencies seeking input on nanotechnology issues (*e.g.* food standards agencies, the gene technology regulator and the pesticides and veterinary medicines authority).
- The Flemish Institute for Science and Technology Assessment (viWTA) in Belgium organised a two-day nanoscience and nanotechnology festival (Nano Nu) in 2007 which used media including art, circus, film theatre, printed material and a web-site to provide information about nanoscience and nanotechnology but also to stimulate debate within civil society.
- France has organised national public discussions as well as local public debates to address issues of national importance such as nanotechnology.
- In the United Kingdom, public input has been sought through activities including citizens' juries (*e.g.* NanoJury UK), discussion meetings (*e.g.* at the Edinburgh Science Festival 2006) and public dialogues on specific research programmes (*e.g.* by the Engineering and Physical Sciences Research Council (EPSRC)).
- Many countries (*e.g.* Japan, Korea and Hungary, in addition to those above) use workshops, discussion forums and seminars to engage with the public.
- The European Commission uses mechanisms including expert groups, open consultations and workshops to access public input to nanotechnology-related policy development.

Further information on public engagement activities in nanotechnology is available at the Working Party on Nanotechnology web-site at *www.oecd.org/sti/nano.*

Twenty of the respondent countries[7] (83%) have processes for industry input to nanotechnology-related policies development including:

- Working groups for industrial liaison (*e.g.* the United Kingdom Nanotechnology Stakeholders Forum).
- Industry-driven activities (*e.g.* the Nanotechnology Business Creation Initiative, Japan).
- Technology foresight and technology assessment activities and vision groups (*e.g.* Denmark, Finland (FinNano) Ireland (NanoIreland)).
- Surveys and interviews (Korea).

6. Australia, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Japan, Korea, Norway, Portugal, the Russian Federation, South Africa, Switzerland, United Kingdom and United States.

7. Australia, Austria, Canada, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Japan, Korea, the Netherlands, Portugal, the Russian Federation, South Africa, Switzerland, United Kingdom and United States.

- Steering committees and advisory boards responsible for either the direction of funding programmes or for the governance of nanotechnology strategies (*e.g.* France, Germany, Russian Federation, South Africa).
- Links with innovation centres and agencies or with research centres (*e.g.* Hungary, Israel, Switzerland); and
- Topical workshops and business fora (*e.g.* Australia, Austria, Canada, the Czech Republic, Finland, Germany, Portugal, United States).

Policy objectives

The questionnaire asked about the "*main objectives of science, technology and innovation policy related to nanotechnology*". Many countries emphasise co-ordination within the reasons for having a dedicated strategy. Other reasons include:

- "Capturing the benefits of nanotechnology while addressing … responsible development; financing research and development activities in the field.
- Developing science nationally.
- Building infrastructure.
- For long-term national development in the field.
- Encouraging enterprises to see the benefits, introducing nanotechnology to new sectors.
- Strengthening existing research and creating new know-how; and
- Accelerating the use of research, exploiting research and development results".

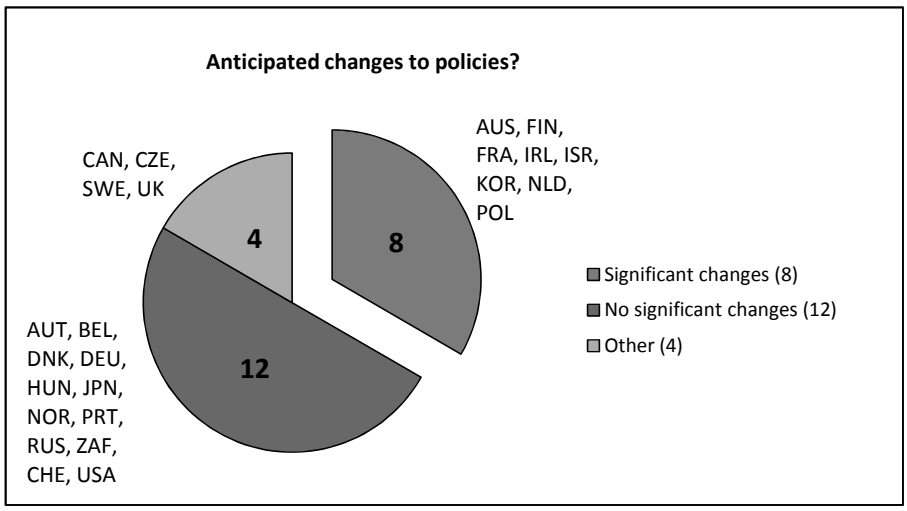
Commercialisation, technology transfer and involving companies more in nanotechnology were policy objectives emphasised by some countries (*e.g.* Finland, France, Germany) with, for example, the "vision of strengthening the national position as a high-tech country" and "enhancing the welfare of society". Some set very specific targets (*e.g.* Korea) of "achieving percentage market shares of nano-related markets". Others (*e.g.* Norway) have more general aims but within them they group sub-sectors of nanotechnology into priority areas (such as "energy and environment; ICT and micro-systems; health and biotechnology; and oceans and food").

For eight countries,[8] the formulation of STI policies for nanotechnology is likely to undergo significant change in the near future (Figure 4). For example, in Australia, the Review of the National Innovation System begun in January 2008 includes enabling technologies (and therefore nanotechnology) and may result in changes in nanotechnology policy[9].

8. Australia, Finland, France, Ireland, Israel, Korea, Netherlands and Poland.

9. The review was released in May 2009: See www.innovation.gov.au/innovationreview/pages/home.aspx

Figure 4. Expected changes to the formulation of STI Policy for nanotechnology (n=24)



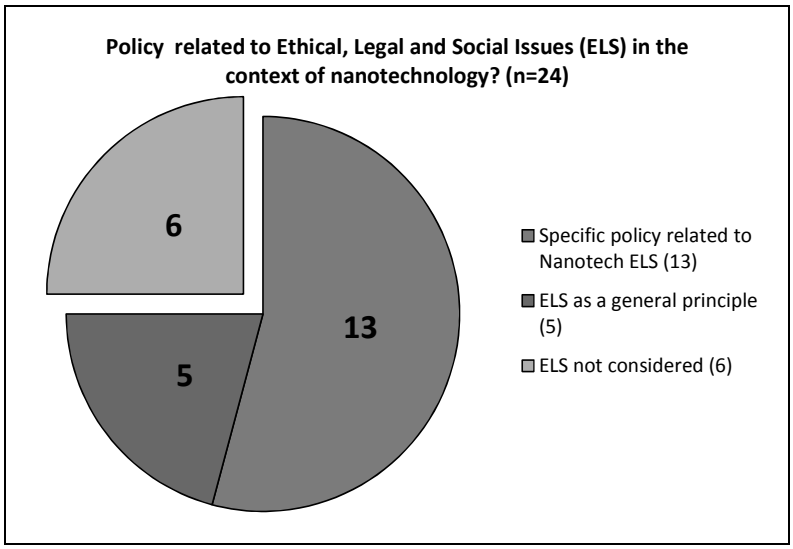
Source: OECD 2008.

The questionnaire addressed the level and type of inclusion of ethical, legal and social issues (ELS) issues in policies, i.e. "*do …nanotechnology-related policies include ELS?"*, or is there *"a specific policy related to ELS?"* Together these questions help to identify the extent to which ELS is included in nanotechnology-related policies, as illustrated in Figure 5. The policies of 18 countries[10] include considerations of ethical, legal and social issues with 13[11] having a specific policy related to ELS issues in the context of nanotechnology while the remainder have ELS as a general principle in their policies.

10. Australia, Austria, Canada, Denmark, Finland, France, Germany, Ireland, Japan, Korea, Netherlands, Norway, Portugal, the Russian Federation, South Africa, Switzerland, United Kingdom and United States.

11. Austria, Canada, France, Germany, Ireland, Japan, Korea, Netherlands, Norway, the Russian Federation, Switzerland, United Kingdom and United States.

Figure 5. Ethical, legal and social issues in policy



Source: OECD 2008.

Key policy challenges

Challenges in developing nanotechnology policies as highlighted by respondent countries included:

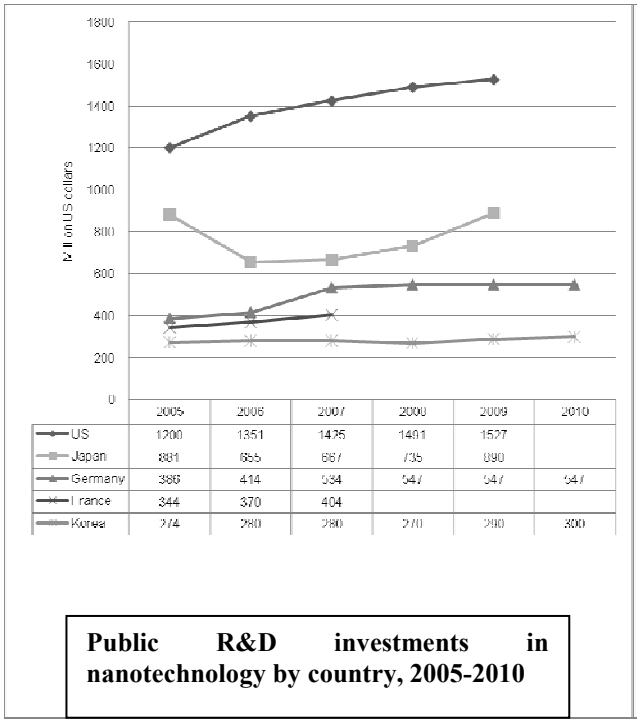
- Health and environmental concerns.
- Ethical issues in using new materials.
- Concerns about the lack of complete information about the effect of nanoparticles;
- Communication with the public.
- The need to balance development with caution.
- Mechanisms to involve all stakeholders including industry and regulators in policy development and implementation.
- Embedding the educational opportunities of nanotechnology.
- Supporting young and small companies in nanotechnology development and use; and
- The difficulty of implementing policies across many ministries and institutions.

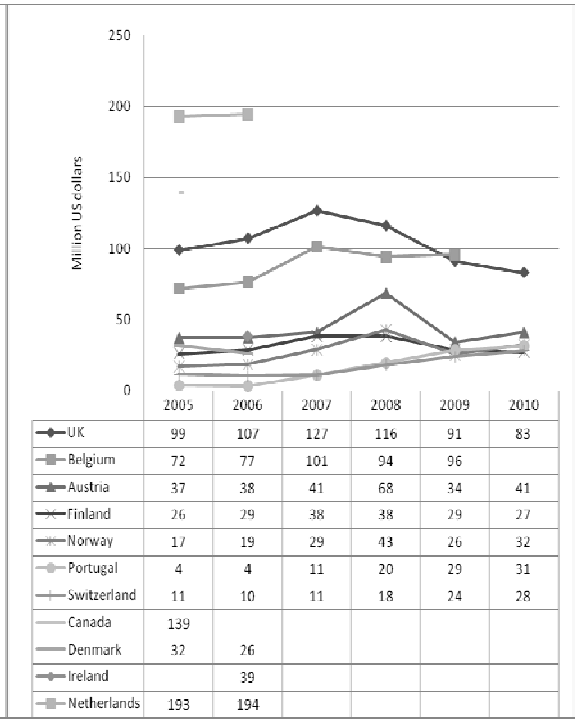
Research and Development Funding

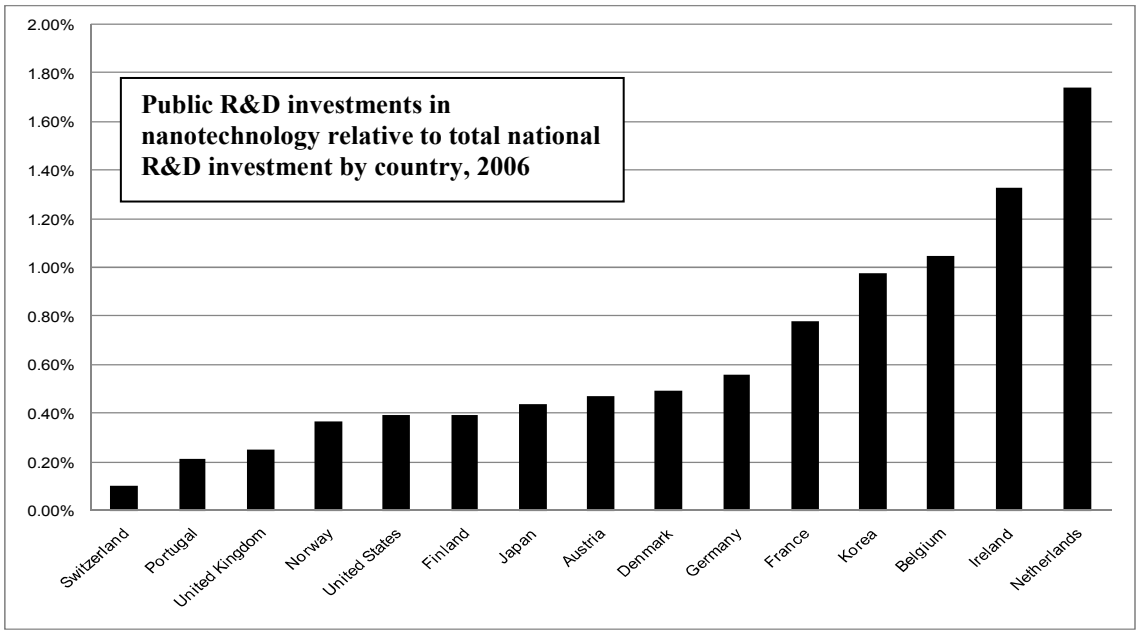
Such data as is available on public R&D investments in nanotechnology is principally based on surveys and country sources and on information gathered, for example, by the EC and the US National Nanotechnology Initiative. Work ongoing at the Working Party on Nanotechnology is seeking to make the data more comparable and reliable by developing and advocating the use of agreed definitions and statistical frameworks. In the meantime, this project sought to collect new data on national R&D investments on nanotechnology.

The questionnaire requested the information "*does your government and/or related agencies commit dedicated R&D funding"* to nanotechnology? Twenty countries replied in the affirmative, the earliest allocation being in 1987 (Sweden), followed by several countries in the 1990s (Canada, the United Kingdom, Finland, Germany and Switzerland). Data received on amounts of funding were patchy with some countries identifying trends in funding over time and others providing data for one year or none. Figure 6 shows public R&D investments in nanotechnology by country (2005-2010, including national estimates for 2008-2010) and investments by country as a percentage of total R&D investment (2006).

Figure 6. National investments in publicly funded research and development in nanotechnology[12]







Adjusted by purchasing power parities.

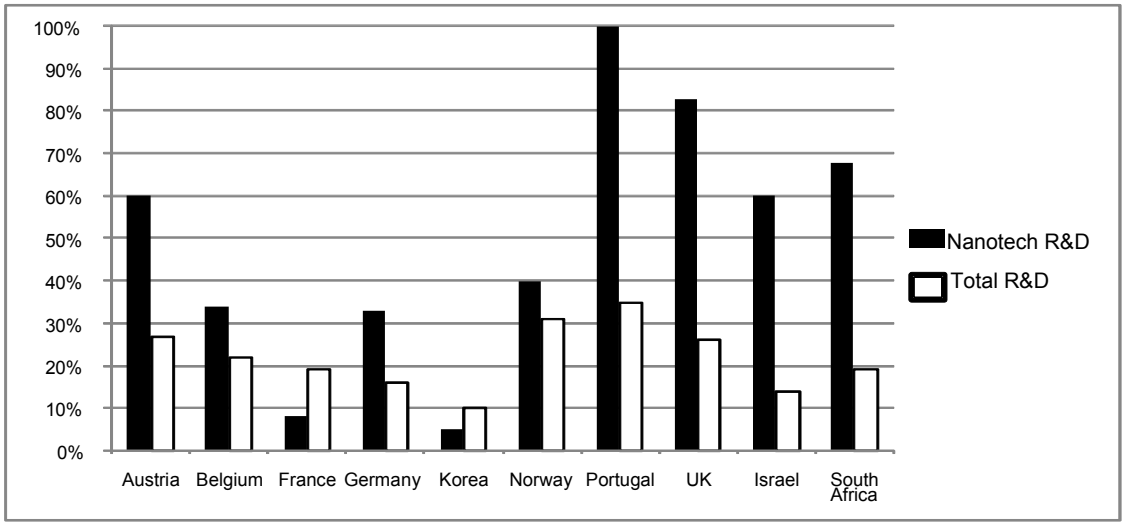
Source : OECD, 2008.

The information from the questionnaire is complemented in Figure 7 by data from the OECD *STI Outlook 2008* which gives national figures for shares of public R&D performed in the higher education sector. The figure shows that many of the WPN countries which responded (n=10) are investing in

12. In 2006 and subsequent years, a different method of calculation of the aggregate was used than in 2005.

nanotechnology R&D at a level above their average funding for R&D as a whole, the exceptions in this data being France and Korea.

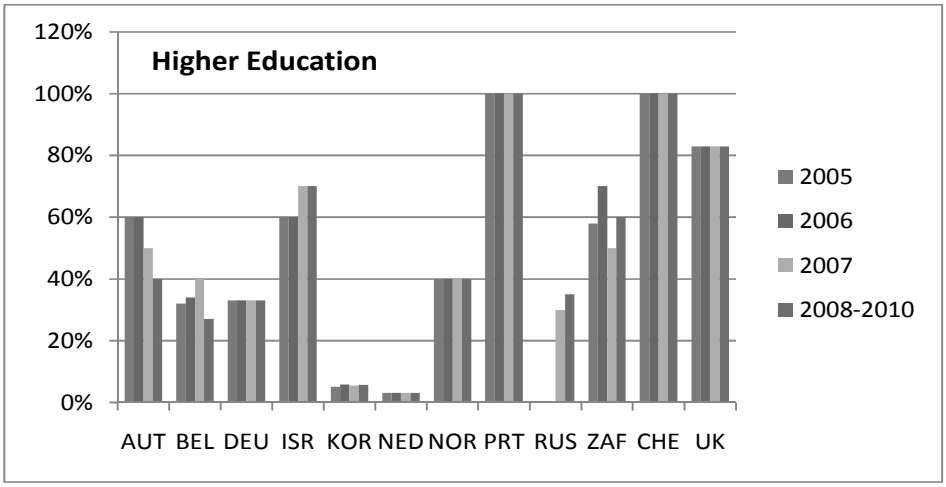
Figure 7. Share of R&D performed by the higher education sector (universities and equivalent), 2005

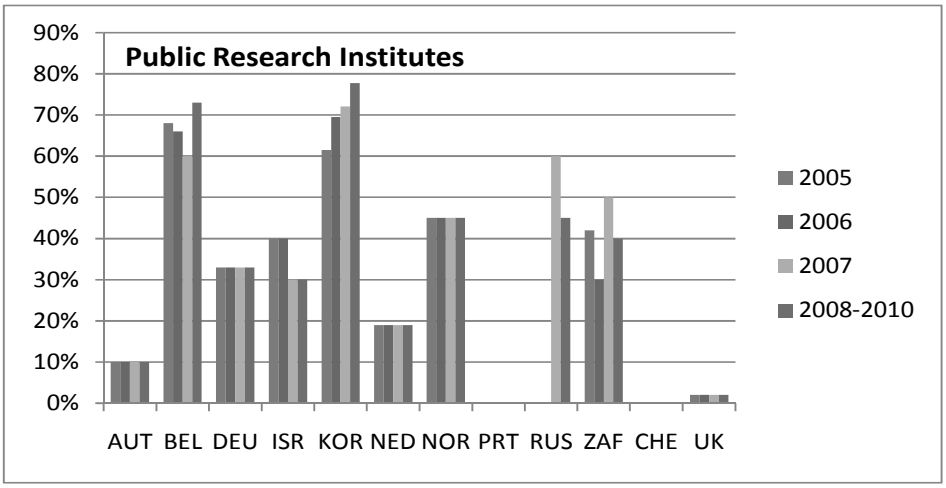


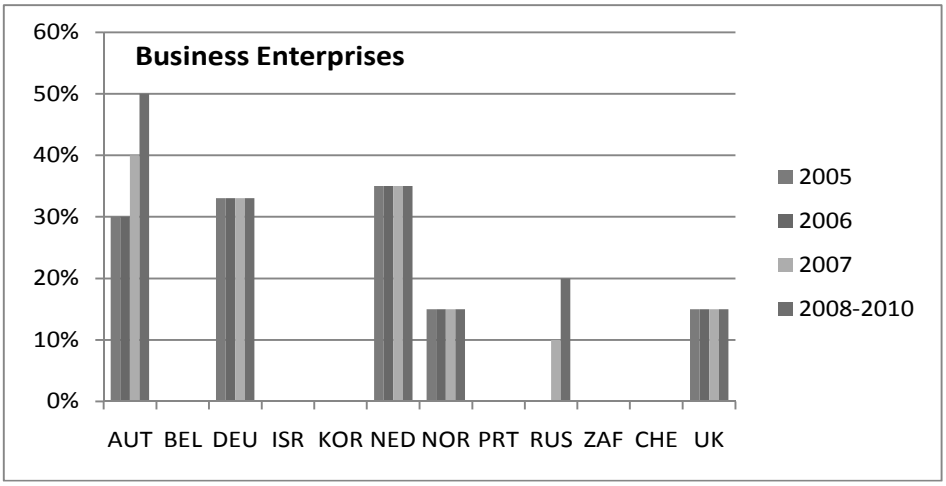
Source: OECD 2008.

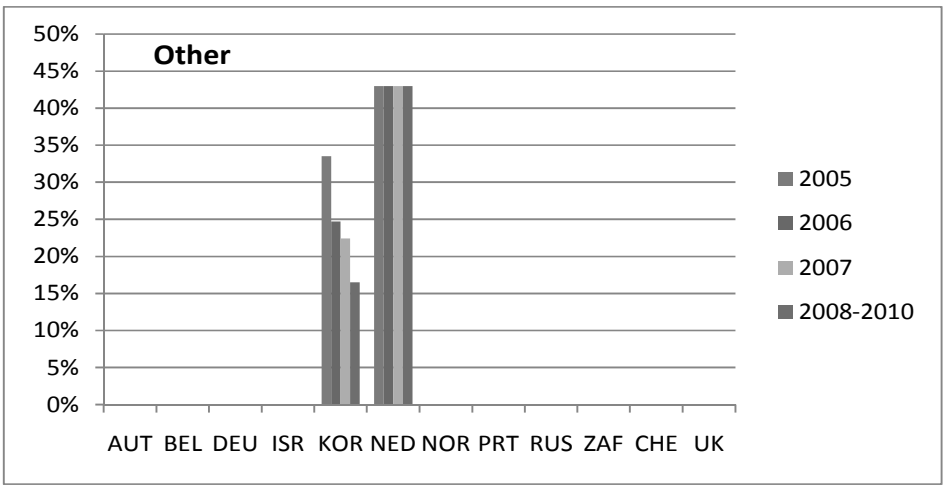
National data on public sector R&D investment by sector and year (2005–2010 (projected)) from the questionnaire is shown in Figure 8 for higher education, public research institutes, business enterprises and other (*i.e.* infrastructure establishment (Korea), public/private partnerships (Netherlands) and participation in the International Nanotechnology Research and Development Institution (INL) (Portugal)).

Figure 8. Public sector expenditure on nanotechnology R&D by sector (% of total nanotechnology R&D)





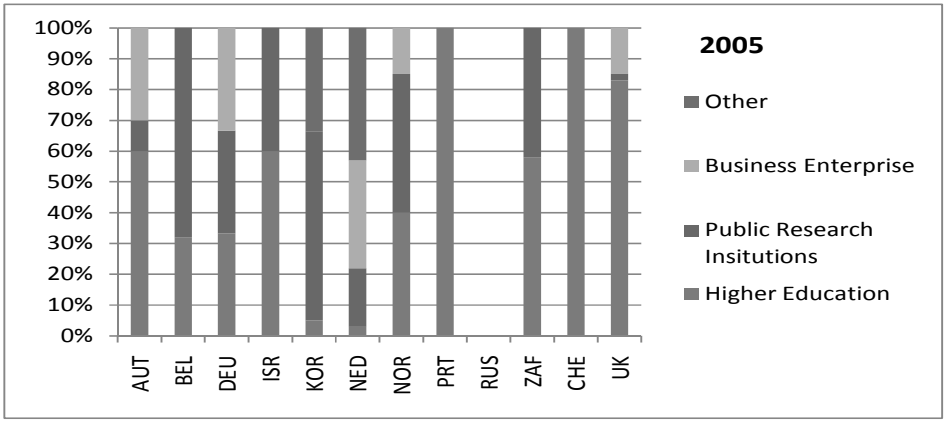


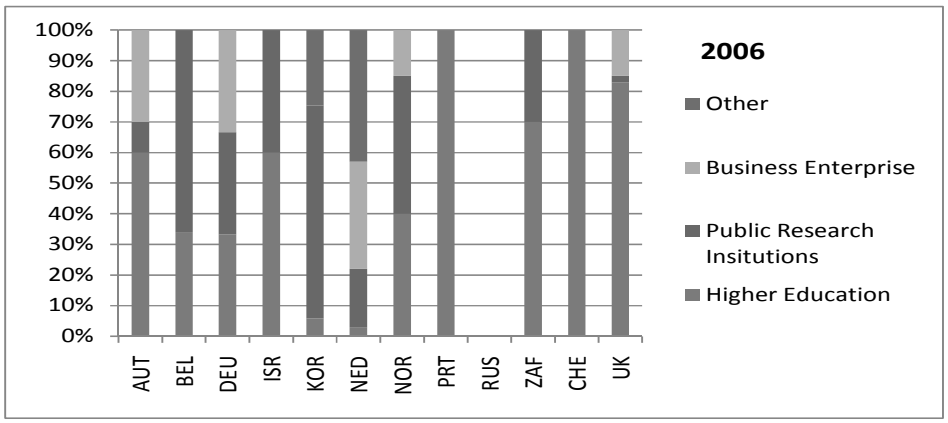


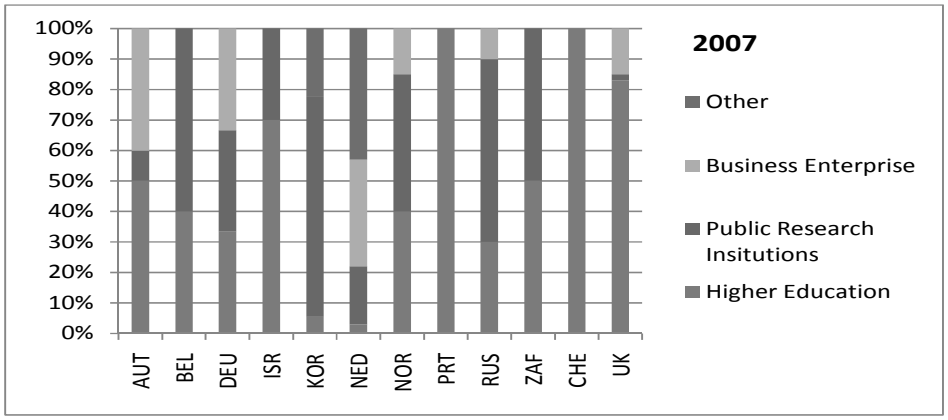
Source: OECD 2008.

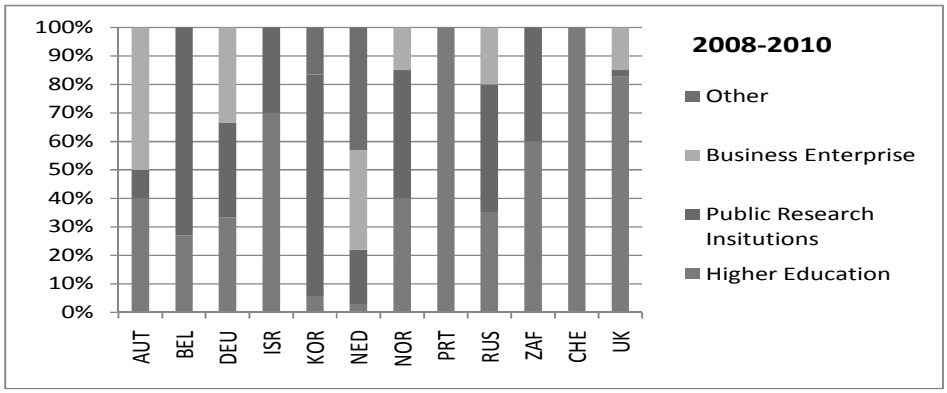
The national data on public sector R&D investment by sector from the questionnaire are also presented by year (Figure 9) for 2005, 2006 and 2007, with projections for 2008-2010 to illustrate any national changes in funding distribution over time across the sectors of higher education, public research institutions, business enterprise and other recipients.

Figure 9. Public sector expenditure on nanotechnology R&D by sector 2005-2010(% of total nanotechnology R&D)



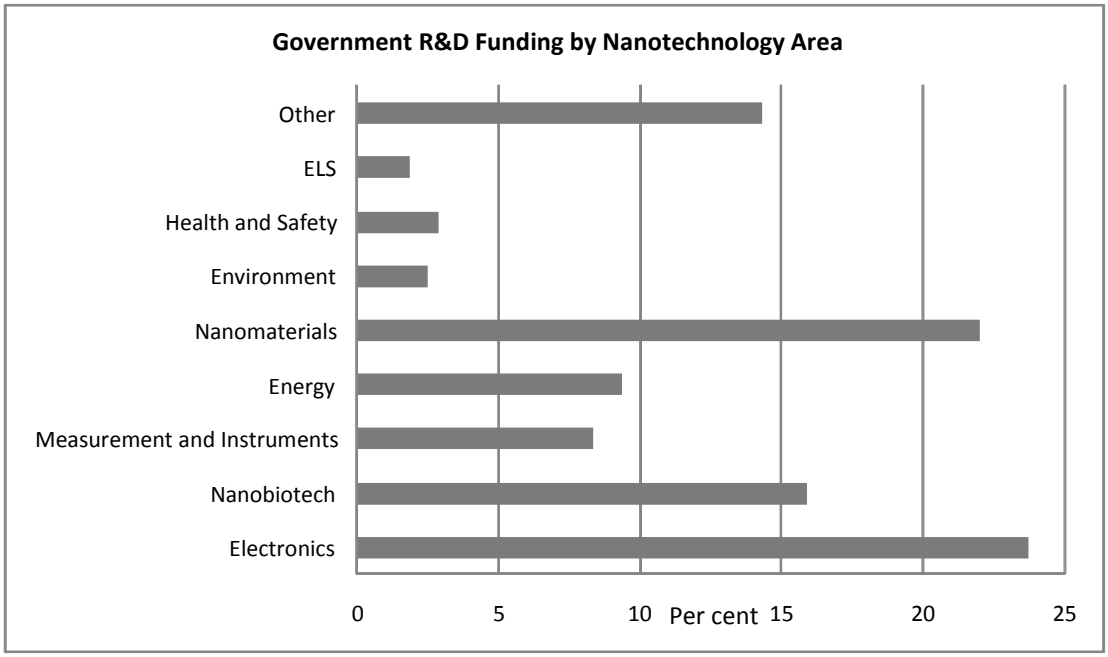






Ten countries[13] provided information (with percentages totalling 100%) in response to the question on "total government R&D funding amount by nanotechnology relevant areas". Nanoelectronics and nanomaterials are the two most strongly funded areas, with nanobiotechnology in third position (See Figure 10). "Other" includes devices and systems, facilities and instruments, manufacturing, fundamental phenomena and processes, public relations, networks, accompanying measures, "general nanotechnology", sea and food, interface/surface science and catalysis, and nano-manipulation.

Figure 10. Total government R&D funding amount by nanotechnology relevant areas



Source: OECD 2008.

13. Austria, Finland, Germany, Korea, Netherlands, Norway, Portugal, South Africa, United Kingdom and United States.

Human resource considerations

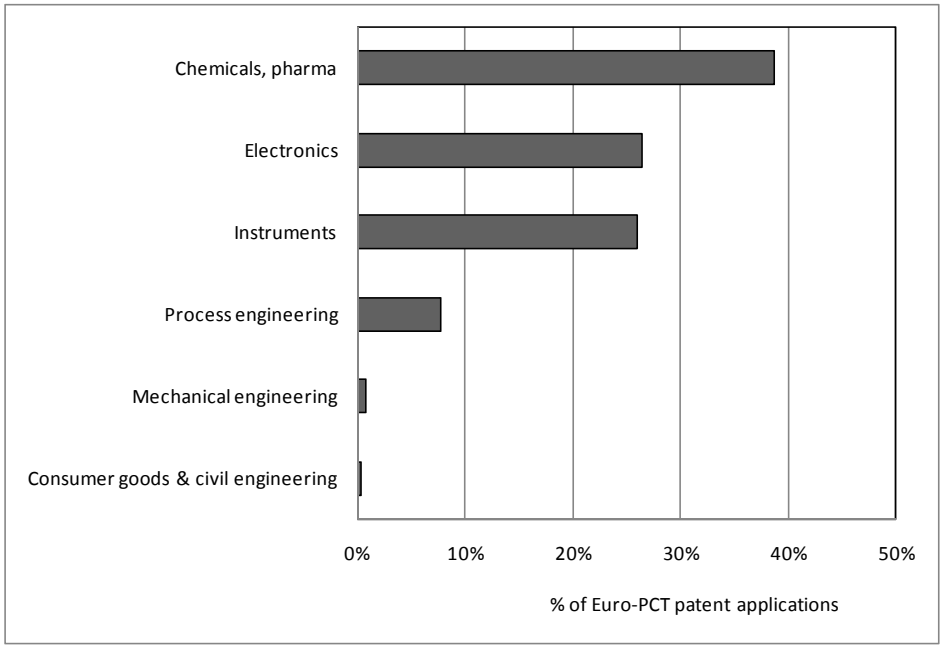
The survey gathered little specific data on human resource-related policies targeted in nanotechnology. However, there are studies available in 15 countries with another due in 2008. Few countries provided information about or links to web-sites related to the studies: this information is provided in Annex 5. Twenty countries provide support for the introduction of specific education and training programmes aimed at the development of human resources related to nanotechnology. Eighteen countries have or will introduce measures to attract foreign experts to work on nanotechnology. Further investigation of the relevant policies concerning nanotechnology may be appropriate.

Policies related to the business environment

In seeking to identify the application areas in which nanotechnology is most commonly found in business, patent data is an often-used source of information as a proxy for industrial activity, largely because it is one of very few sources of information and has the merit of covering multiple countries, if not the globe. The connection between industrial activity and patents is not rigorous but patent activity is at least an indication of where industry is seeking to guard its nanotechnology intellectual property.

Chemicals and pharmaceuticals feature strongly in patent applications to the European Patent Office with almost 40% of applications (See Figure 11), followed by electronics and instruments with over 25% each. Process engineering attracts 8% of EPO patent applications.

Figure 11. Distribution of patents for application areas (% of Euro PCT patent applications)



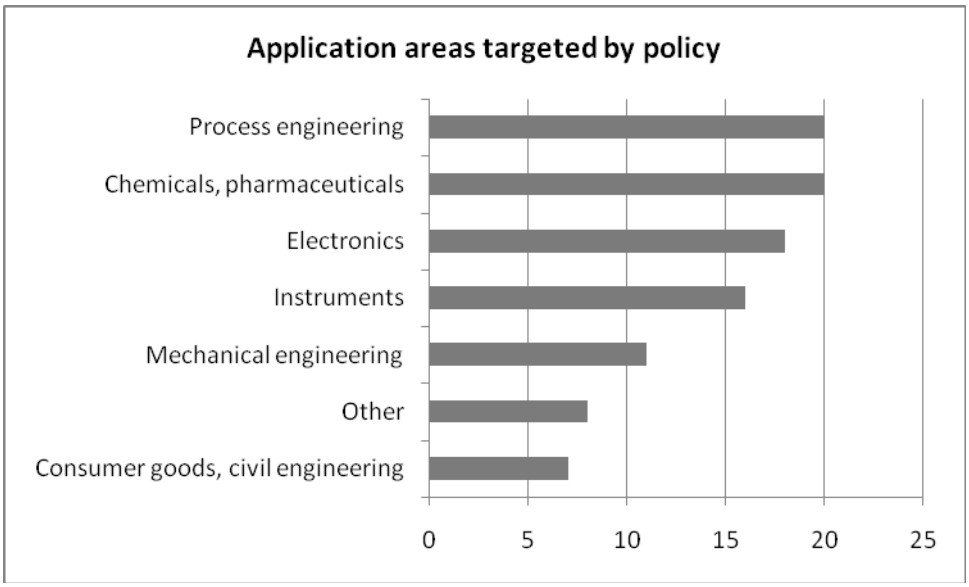
Source: OECD 2008.

National policies related to nanotechnology may target specific nanotechnology application areas, exploiting existing technological and industrial strengths within a country or seeking to foster new ones, or be directed at nanotechnology as a whole. To explore this issue, information was gathered through the questionnaire about nanotechnology application areas being targeted by national science, technology and innovation policies. While a one-to-one correspondence between aggregated patent classes and policy

target areas is not expected, the comparison may be helpful in identifying interesting trends and gaps. Patent categories were used to identify the main application areas and countries were asked which application areas (if any) were being targeted in their policies.

Figure 12 shows the distribution in terms of the number of positive responses for each category. Countries could identify as many or as few categories as they felt appropriate. Where all categories were selected, it was because the country policy is to support R&D in general (*e.g.* in the United States). For the 21 countries which provided information, process engineering and chemicals/pharmaceuticals appear to be the dominant application areas targeted by policy, followed closely by electronics, then instruments and mechanical engineering.

Figure 12. Distribution of responses (number of occurrences) for application areas targeted by policy



Source: OECD 2008.

In both patent examiner filings (Figure 11) and the self-reporting of our survey respondents (Figure 12), chemicals/pharmaceuticals and electronics feature strongly. Process engineering is not as strong for patents as for policy activities, possibly reflecting the nature of the activity, processes not being very commonly patented. The results are in line with commonly held expectations about the primary commercialisation pathways for nanotechnology.

The category *"Other"* includes the following areas identified by countries: biotechnology, electronics, energy, environment, materials, photonics and quantum computing/quantum applications; textiles, toxicology, automotive, illumination elements; corrosion and its inhibition; sensors; materials for solar energy, fuel cells and batteries; mining, minerals; and composites, sensors, healthcare.

Japan is one example of a country which targets particular industrial application areas in its science, technology and innovation policies for nanotechnology (See Box 3: The Third Science and Technology Basic Plan (2006-2010): Japan).

Box 3. The third science and technology basic plan (2006-2010): Japan

Under the Third Science and Technology Basic Plan (2006-2010), the Japanese Government is providing funding for four key strategic areas under the heading of research and development for national/social issues:

- Life sciences.
- Information telecommunications.
- Environmental sciences ; and
- Nanotechnology /materials.

Four other areas are being funded as R&D on indispensable fields for the existence of the nation:

- Energy.
- Manufacturing technology.
- Infrastructure; and
- Frontier R&D.

These eight areas received 46 % of the total science and technology budget in 2005, the Second S&T Basic Plan also having highlighted them as of national importance.

The Basic Plan is based on the stances that *i)* S&T should be supported by the public and of benefit to society and *ii)* there should be an emphasis on fostering human resources and competitive research.

Concluding summary

Twenty-four countries responded to the policy questionnaire circulated in early 2008. The resulting inventory of current STI policies for nanotechnology indicates that:

- The majority of respondent countries have put nanotechnology-specific policies in place and have dedicated R&D funding for nanotechnology.
- Approximately half of those countries have established new organisational and institutional frameworks.
- There is a wide range of policy objectives including fostering R&D, commercialisation and encouraging company involvement.
- Over half of the respondent countries have nanotechnology co-operation agreements with other countries.
- Nearly three quarters are participating in international discussion fora and initiatives on nanotechnology other than those of the OECD or the EC.
- Most of the respondent countries have mechanisms to involve the public and industry in policy making around nanotechnology.
- The majority of policies in respondent countries consider ethical, legal and social issues in some form.
- Most countries support education and training, have information about human resources needs and have policies to attract migrant workers; and
- Key policy challenges for countries included health, ELS and education issues and the need for information in order for nanotechnology to be developed responsibly, and
- Where business-related policies are in place, priority application areas are chemicals/pharmaceuticals, process engineering and electronics.

ANNEX 1
THE POLICY QUESTIONNAIRE

Paris, 22 January 2008
WORKING PARTY ON NANOTECHNOLOGY (WPN)
OECD WPN Policy Questionnaire

Purpose

In March 2007 a Working Party on Nanotechnology (WPN) was established under the OECD Committee on Scientific and Technological Policy (CSTP). The objective of this Working Party is to advise on emerging policy-relevant issues in Science, Technology, and Innovation (STI) related to the responsible development of nanotechnology. Its work programme seeks to promote international co-operation that facilitates research, development, and commercialisation of nanotechnology in this context.

Among its current work activities, the WPN is undertaking projects on *i)* the opportunities and challenges for business investment in the development, application, and commercialisation of nanotechnology and related policy needs (project B), and *ii)* similarities and differences in national STI policy approaches and challenges for policy makers related to nanotechnology (project E). This second project also seeks to facilitate an informed dialogue between policy makers and other stakeholders in STI policy. The success of these projects depends, in an essential way, on information provided by national representatives involved in STI policy formulation and implementation.

In order to avoid overwhelming national representatives with multiple information requests, this document contains one consolidated questionnaire addressing the information needs of the above-mentioned WPN projects. The questionnaire is very important in ensuring that the projects have systematic, cross-country comparable information on key issues. The information that is collected through the questionnaire will be complemented with company case studies and publicly available information, some of which has already been provided to us. We have taken care not to request information on your countries' activities that could be considered confidential. The questionnaire should be **returned by 29 February 2008** (see Contact point and deadline below).

The attached questionnaire will be used to develop a synthesis report on the main trends, developments, and challenges that characterise STI policies related to nanotechnology. This report will also contribute to highlighting common areas of interest and concern across countries. The projects will conclude with workshops where policy makers will be able to meet and discuss the results of the projects and areas of common interest and concern related to STI policies for the responsible development of nanotechnology.

Guidelines

The primary target for completion of the questionnaire is policy makers in OECD member and observer countries in charge of STI nanotechnology dedicated policies and/or policy makers with an overall responsibility for STI policy formulation. Country delegates are encouraged to identify the most suitable person to provide the responses and designate this person as the primary contact person whose

name and contact information are requested on the front page of the questionnaire. Nonetheless, it is recognised that responding to some of the questions may require collaboration with other experts as well.

Please note that responses to the questionnaire should be provided electronically by saving it first on your computer desktop and by filling in the tick boxes and allocated spaces (marked in grey colour). The responses can be relatively brief but should focus on the most significant issues and developments in the respective countries. Wherever possible in your responses, please provide electronic links to publicly available material.

Once completed, the document should be returned as an e-mail attachment. In the case of any technical problems, you can also respond by way of a separate Word file, making sure to follow the numbering of the questions in the questionnaire. Completed questionnaires, along with any questions, should be sent to the OECD contact person indicated below.

The questionnaire is divided into two main sections. The first section covers broader framework conditions related to STI policies concerning nanotechnology (Project E). The second section is more focused on specific aspects of the business environment for companies involved in nanotechnology (Project B).

Especially the first section of the questionnaire is intended to be addressed at the national policy level as this is the most relevant reference point for country comparisons. If the national viewpoint is totally irrelevant for some of the questions, please indicate this **on the last page of the questionnaire** and provide your answer to those questions from the viewpoint of the region or province etc. that you consider most significant in this context. In this way we can also highlight some issues from a regional perspective when appropriate.

Contact point and deadline

Please send completed questionnaires **electronically by 29 February 2008 at the latest** to the following contact person at the OECD Secretariat. Please refer to the "OECD WPN Policy Questionnaire" in the subject field of your response e-mail:

Primary contact person:
Christopher Palmberg, OECD
Email: *christopher.palmberg@oecd.org*
Tel: +33(0) 1 45 24 78 94

Please also copy your responses to:
Stéphanie Lacour, OECD
Email: *stephanie.lacour@oecd.org*

It is important that the responses to both sections of the questionnaire are returned by the deadline to allow the OECD Secretariat sufficient time to provide a first rough synthesis of the information for the next WPN meeting in April 2008. Further, please only provide one response for your country.

In case of any further questions about the WPN, the projects referred to above, or about the questionnaire please do not hesitate to contact us for further information.

REQUEST FOR INFORMATION

CONTACT DETAILS OF THE PRIMARY CONTACT PERSON IN THE RESPONDING COUNTRY

Country:

Name:

Professional affiliation:

Position:

Area of responsibility:

Telephone number:

E-mail address:

PART I – BROAD FRAMEWORK FOR SCIENCE, TECHNOLOGY AND INNOVATION (STI) POLICY IN THE FIELD OF NANOTECHNOLOGY

A. STI strategies and policies for nanotechnology development: Implementation, organisation, and public/stakeholder engagement

Countries have adopted different overall strategies to support the responsible development of nanotechnology. In some countries a new and dedicated strategy has been adopted at the government and/or related agency level while in others nanotechnology development is supported through existing strategies and/or policies and/or at regional or provincial levels.

1. In the case of your country, has a new and dedicated strategy for nanotechnology development been formulated at the national governmental and/or related agency level?

Yes ☐

No ☐

If Yes, can you please provide:

1.1 The official name of this strategy:

1.2 The year of first implementation of this strategy:

1.3 References (e.g. a weblink) to the main and most recent public documents that describe this strategy and any further information that you consider relevant. You will be asked to provide further details on the objectives of the strategy and related policy instruments in section B below.

If No, can you please provide[14]:

1.4 The official names of other existing strategies in which nanotechnology is mentioned as an important area:

1.5 The year of first implementation of these other existing strategies:

1.6 References to the main and most recent public documents that describe these other existing strategies and any further information that you consider relevant:

1.7 If there is no mentioning of nanotechnology in other existing strategies please indicate and explain if required

2. Please briefly name and describe the main organisations (government ministries, agencies, other public bodies, think thanks, NGOs etc.) involved in formulating and implementing STI policy related to nanotechnology in your country as indicated in the table below.[15]

Name of organisation	Primary responsibility area	Size (~number of employees)	Website address	Person in charge of communication and/or public engagement issues (e-mail address, if possible) [16]

14. If the national viewpoint is totally irrelevant for some of the questions, please indicated this at the last page of the questionnaire and provide your answer to those questions from the viewpoint of the region or province etc. that you consider most significant in this context.

15. Please note that from here on we use the term "government and/or related agencies" as a general one to refer to public organisations involved in the formulation and implementation of policies.

16. Please note that this contact information would be very valuable for activities planned in the WPN project D "Outreach and Public Engagement".

2.1 Briefly describe the mandate/objectives of the above-mentioned organisations in terms of formulation and implementation of STI nanotechnology-related policies:

2.2 Highlight if any of the organisations have recently been founded specifically to formulate and/or implement policies related to nanotechnology:

2.3 Briefly describe any new organisational or institutional frameworks that have been set up for enhancing coordination between these organisations related to nanotechnology:

3. Has your government and/or related agencies put in place formal and/or informal processes for public input to nanotechnology-related policies development (e.g. conferences, workshops, discussion forum, publications, etc.)?

Yes ☐

No ☐

If Yes, please describe how these processes are organized:

4. Has your government and/or related agencies put in place formal and/or informal processes for industry input to nanotechnology-related policies development (e.g. dialogue with companies, business incubator schemes, workshops, think tank and visions work)?

Yes ☐

No ☐

If Yes, please describe how these processes are organized:

5. Do your nanotechnology-related policies include considerations about Ethical, Legal and Social Issues (ELS)?

Yes ☐

No ☐

If Yes, please provide details:

6. Does your government and/or related agencies have a specific policy related to Ethical, Legal and Social Issues (ELS) issues in the context of nanotechnology?

Yes ☐

No ☐

If Yes, please provide the reference to this document and any further information that you consider relevant.

7. Does the STI policy related to nanotechnology in your country include significant cooperation agreements with any other countries (we here refer to cooperation agreements concluded with foreign governments and/or key agencies involved in formulating and/or implementing policies related to nanotechnology research, development or commercialisation)?

Yes ☐

No ☐

If Yes, please highlight the name, partners and objectives of these significant agreements as indicated in the table below.

Name of agreement	*Partners to agreement*	*Objectives briefly from the viewpoint of your country*

8. Is your government participating in international discussion fora and initiatives on nanotechnology other than those of the OECD or the EC?

Yes ☐

No ☐

If Yes, please name the other discussion fora and initiatives:

B. STI Policies for Nanotechnology Development: Nanotechnology Definitions, Policy Objectives and Instruments, Key Policy Challenges

9. Please provide the definition of nanotechnology that your government and/or related agencies uses for formulating and implementing STI policy in your country.

10. Please briefly describe the main objectives of STI policy related to nanotechnology in your country.

11. Is the STI policy related to nanotechnology in your country targeting particular application technology/industry areas?

Yes ☐

No ☐

Please indicate the most important "Main areas" based on the list in the table below and specify further the "Sub-areas"[17] within these main areas whenever possible. If there are additional areas relevant for your country that are not listed below, please indicate these in the last row of the table:

Main area	*Sub-areas*	
I. Electronics ☐	Electronic devices	☐
	Audiovisual technology	☐
	Telecommunications	☐
	Information technology	☐
	Semiconductors	☐
II. Instruments ☐	Optics	☐
	Analysis, measurement and control	☐
	Medical engineering	☐
III. Chemicals, pharmaceuticals ☐	Organic fine chemistry	☐
	Macromolecular chemistry, polymers	☐
	Pharmaceuticals	☐
	Biotechnology	☐
	Materials, metallurgy	☐
	Agriculture, food	☐

17. The table is based on a taxonomy of patent technology classes in order to enable some comparisons with patenting trends.

IV. Process engineering ☐	General technological processes	☐
	Surfaces, coating	☐
	Materials processing	☐
	Thermal processes and apparatus	☐
	Chemical industry, petrol, basic metals	☐
	Environment, pollution	☐
V. Mechanical engineering ☐	Machine tools	☐
	Engines, pumps, turbines	☐
	Mechanical elements	☐
	Handling, printing	☐
	Agricultural and food machinery	☐
	Transport machinery	☐
	Nuclear engineering	☐
	Defence sector	☐
VI. Consumer goods, civil engineering ☐	Equipment	☐
	Civil engineering, construction	☐
VII. Other ☐	Please indicate:	

12. Please give a couple of examples of important policy instruments that are used in the implementation of STI policy in your country related to nanotechnology:

12.1 Which of these instruments originate from good practices/lessons learned in promoting ICT and/or modern biotechnology (please indicate which of these) as another major example of an emerging technology field with multiple application areas?

13. Please highlight characteristics of nanotechnology developments that provide truly specific STI policy challenges when compared with other emerging technologies (for example ICT and modern biotechnology) and briefly describe these.

14. Will there be significant changes in your country in the formulation of STI policy related to nanotechnology as described above in the near future?

Yes ☐

No ☐

If Yes, please highlight the main changes and briefly describe the main reasons for these changes.

C. Research and Development (R&D) funding[18]

15. Does your government and/or related agencies commit dedicated R&D funding to the field of nanotechnology (by the definition of nanotechnology used in your country)?

Yes ☐

No ☐

If Yes, please provide:

15.1 The year when this public R&D funding started

15.2 The total accumulated amount of this public R&D funding until present

15.3 A breakdown of this public R&D funding in millions of your currency by the years as indicated in the table below, including estimates for the next three years.

	2005	*2006*	*2007*	*2008 (estimate)*	*2009 (estimate)*	*2010 (estimate)*
Total public R&D funding						
Give currency						

15.3.1 If you cannot provide an estimate for the next three years please indicate whether the public R&D funding will increase, stay at the same level or decrease during this period

15.4 An indicative percentage breakdown of this amount of public R&D funding provided to the main R&D performing sectors as indicated in the table below:

Sector	*% of total for 2005*	*% of total for 2006*	*% of total for 2007*	*% of total for 2008 - 2010 (estimate)*
Higher education (universities and equivalent)				
Public research institutes				
Business enterprises				
Other (please specify):				
TOTAL ACCUMULATED PUBLIC R&D FUNDING	100%	100%	100%	100%

15.5 An indicative percentage distribution of the total accumulated government R&D funding amount by nanotechnology relevant areas as indicated in the table below

18. If the national viewpoint is totally irrelevant for some of the questions, please indicate this at the last page of the questionnaire and provide your answer to those questions from the viewpoint of the region or province etc. that you consider most significant in this context.

Technology Area	*% of total*
Electronics	
Nanobiotechnology (including medicine and pharma)	
Measurement, instruments	
Energy	
Nanomaterials	
Environment	
Other	
Health and safety	
Ethical, legal and societal issues	
Others, which?	
TOTAL ACCUMULATED PUBLIC R&D FUNDING	100%

16. Please also provide available estimates/subjective observations about whether the *private business enterprise sector funding* will increase, stay at the same level or decrease in your country during the next three years:

D. Human resources

17. Do you have any data or information about the number of nanotechnology related scientists, researchers, teachers, company employees etc. available or demanded in the future in your country or have any studies been undertaken on these issue?

Yes ☐

No ☐

If Yes, please send us references to relevant information or studies that are available in your country.

18. What are the needs of your country in the future with respect to human resources in general in the field of nanotechnology, for example related to the adequacy of the present education system to supply company employees and researchers with the relevant skills?

19. Has your government and/or related agencies provided support for the introduction of specific education and training programmes aimed at the development of these human resources related to nanotechnology?

Yes ☐

No ☐

If Yes, please describe a few of the main ones that you consider significant and indicate whether any one of them have specifically been targeted for the needs of companies:

20. Will your government and/or related agencies introduce measures to attract foreign experts to work on nanotechnology in your country?

Yes ☐

No ☐

If Yes, please describe how:

21. Is your government and/or related agencies considering any changes to existing approaches with respect to human resource requirements related to nanotechnology in the near future?

Yes ☐

No ☐

If Yes, which are these changes and for what reason?

PART II – POLICIES RELATED TO THE BUSINESS ENVIRONMENT OF NANOTECHNOLOGY

A. Business incentives for nanotechnology

22. Has your government and/or related agencies assessed the business-related policy needs in your country with respect to the responsible development, application, and commercialisation of nanotechnology?

Yes ☐

No ☐

If Yes, describe the key recommendations and whether any of these have been implemented?

23. Does your government and/or related agencies have targeted business incentive programmes related to nanotechnology? (*e.g.* technology transfer schemes for research-business linkages, support for technology adoption, support for science or technology parks or incubators, support for industrial cluster formation, support for nanotechnology industry associations, dialogue and think thank forums involving companies).[19]

Yes ☐

No ☐

If Yes, please provide additional information on each of these programmes as indicated in the table below (you can add rows if needed):

19. If the national viewpoint is totally irrelevant in this question, please indicate this at the last page of the questionnaire and provide your answer to those questions from the viewpoint of the region or province etc. that you consider most significant in this context.

Name of programme	Brief description	Year established	Accumulated investments until now (millions in national currency)	Main type public of investment	Number of companies involved	Focus on small or larger companies (>250 employees)?

23.1 Please provide any other additional comment about the above-mentioned business incentive programmes that you consider important:

23.2 Is your government and/or related agencies considering any significant changes to any of the above mentioned programmes in the near future?

Yes ☐

No ☐

If **Yes**, please describe:

23.2.1 What these changes will be?

23.2.2 Why they will occur?

24. Have your nanotechnology business incentive programmes been evaluated?

Yes ☐

No ☐

If Yes, please describe:

24.1 What were the key recommendations?

24.2 Have these led to policy and programme changes?

25. Has your government and/or related agencies identified any innovative approaches by national companies that are bringing nanotechnology products and processes to the marketplace more effectively than others?

Yes ☐

No ☐

If Yes, please provide details:

26. Has your government and/or related agencies identified any best policy practices for encouraging business investments in nanotechnology?

Yes ☐

No ☐

If Yes, please describe these and indicate how you have implemented them:

27. Is your government and/or related agencies considering any changes to existing nanotechnology business incentives policies and/or programmes in the near future?

Yes ☐

No ☐

If Yes, please describe:

27.1 What these changes will be?

27.2 Why will they occur?

B. Other aspects of the nanotechnology business environment

28. Does your government and/or related agencies have targeted policies and programmes in place that impact business and nanotechnology in the following areas?

28.1 Public procurement

Yes ☐

No ☐

If Yes, please provide a detailed description:

28.2 Activities in nano metrology, quality and other standards

Yes ☐

No ☐

If Yes, please provide a detailed description:

28.3 Nanotechnology-specific tax incentives/subsidies

Yes ☐

No ☐

If Yes, please provide a detailed description:

28.4 Trade promotion

Yes ☐

No ☐

If Yes, please provide a detailed description:

28.5 Technology forecasting

Yes ☐

No ☐

If Yes, please provide a detailed description:

28.6 Other business regulations (such as, labelling, marketing controls, transportation and security)

Yes ☐

No ☐

If Yes, please provide a detailed description:

29. Is your government and/or related agencies considering any changes to these policies and/or programmes in the near future?

Yes ☐

No ☐

If Yes, please indicate

29.1 What these changes will be?

29.2 Why will they occur?

C. Financing nanotechnology

30. Does your government and/or related agencies have targeted policies and programmes in place that address nanotechnology-related business financing issues, such as incentives to encourage venture capital investments, business angels, seed/start-up funding, loan guarantees with banks etc.?

Yes ☐

No ☐

If Yes, please provide details:

31. Is your government and/or related agencies considering any changes to these policies and/or programmes in the next five years?

Yes ☐

No ☐

If Yes, please indicate:

31.1 What these changes will be?

31.2 Why will they occur?

D. Intellectual property rights regime (IPR)

32. Does your government and/or related agencies consider that current IPR regimes need updating to reflect the nanotechnology business climate and/or features of nanotechnology per se?

Yes ☐

No ☐

If Yes, please describe these changes:

33. Has your government and/or related agencies implemented any changes to IPR regimes as a result of the above?

Yes ☐

No ☐

If Yes, please describe these changes:

34. Is your government and/or related agencies planning to implement any changes to IPR regimes in the near future as a result of the above?

Yes ☐

No ☐

If Yes, please describe these changes:

35. Does your government and/or related agencies have any policies in place to facilitate the transfer of intellectual property arising out of nanotechnology research in government and/or university laboratories to the private sector?

Yes ☐

No ☐

If Yes, please provide details:

35.1 Is your government and/or related agencies considering any changes to these policies and/or programmes in the near future?

Yes ☐

No ☐

If Yes, please indicate

35.1.1 What these changes will be?

35.1.2 Why they will occur?

With reference to the cover page please indicate which of the questions above you have responded to at a regional/provincial etc. level and name the region/province to which the responses relate.

Number of question concerned	*Name of region/province*

Finally, please do not hesitate to add any comments on important issues that this questionnaire might have failed to address or that you otherwise consider important and wish to highlight/elaborate/underline further!

Thank you for your co-operation!!

ANNEX 2
COUNTRY AND EC RESPONSES TO QUESTIONNAIRE

Countries which responded:

- Australia
- Austria
- Belgium
- Canada
- Czech Republic
- Denmark
- Finland
- France
- Germany
- Hungary
- Ireland
- Israel
- Japan
- Korea
- Netherlands
- Norway
- Poland
- Portugal
- Russian Federation
- South Africa
- Sweden
- Switzerland
- United Kingdom
- United States

AUSTRALIA

Question	Country Response
Contact name Organisation	Alison Hemmings Australian Office of Nanotechnology (AON)
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, in 2007-2008 Australian National Nanotechnology Strategy (NNS) *http://www.innovation.gov.au/Section/Innovation/Pages/AustralianOfficeofNanotechnology.aspx*
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, see the NNS Public Awareness and Engagement Programme Yes, through the AON
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, *e.g.* World Health Organisation; ISO
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	No
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, these are being developed within the context of the National Review of Innovation System No
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes, see Options for a National Nanotechnology Strategy (www.innovation.gov.au/nano) No No No Yes, see National Measurement Institute No No No Yes, health, safety and environment activities under the NNS.
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	DIISR - Department of Innovation, Industry, Science and Research *www.innovation.gov.au* ARC - Australian Research Council *www.arc.gov.au* National Measurement Institute *www.measurement.gov.au* EEWR - Department of Education, Employment and Workplace Relations DEWHA - Department of the Environment, Water, Heritage and the Arts NHMRC - National Health and Medical Research Council DoHA - Department of Health and Ageing www.health.gov.au

Further information on nanotechnology in Australia is available at:

- *http://www.innovation.gov.au/Section/Innovation/Pages/AustralianOfficeofNanotechnology.aspx*
- *http://www.innovation.gov.au/Section/Industry/Pages/NationalAcademiesForumReportfortheNationalNanotechnologyStrategyTaskforce.aspx*
- *www.innovation.gov.au/nano*
- *http://www.innovation.gov.au/Section/Innovation/Pages/Nanotechnology.aspx*

AUSTRIA

Question	Country Response
Contact name Organisation	Alexander Pogány BMVIT
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, probably in 2010 NANO2009+
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	No Yes, programme of focus groups established
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, a programme line to deal with research in risk and safety is to be established Yes, research project NanoTrust
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No No
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2004
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	No No
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No No Yes, Bridge Programme (established 2006) No No No *No* No No
Are there policies relating to financing of nanotechnology-related business?	Yes, programme of Seed Financing

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Federal Ministry for Transport Innovation and technology (BMVIT) *www.bmvit.gv.at* Federal Ministry for Science and Research (BMWF) *www.bmwf,g.at* Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) *www.bmlfuw.gv.at* Austrian research promotion agency (FFG) *www.ffg.at* Austrian science fund *www.fwf.ac.at* Christian Doppler research organisation (CDG) *www.cdg.ac.at* aws the Austrian Business Service Organisation *www.awsg.at* Austrian Council for research and technology development (RFT)

BELGIUM

Question	Country Response
Contact name Organisation	Karel Goossens Department of Economy, Science and Innovation
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No n/a n/a
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, viWTA Nano Nu festival of science and technology (2007) *www.nanonu.be* No
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, Bureau for Normalisation (*www.nbn.be)* is engaged with ISO.
Is there a national definition of nanotechnology in your country?	No, not officially
Is your country committing dedicated R&D funding to nanotechnology? Since when?	No
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, Master of Nanoscience and Nanotechnology programme recently launched at universities, and under EU Erasmus Mundus Programme Yes, Odysseus programme (not just for nanotechnology)
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No Yes, electronics, chemicals & pharmaceuticals, process engineering No No No No No No No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	EWI, Flemish Government, Department of Economy, Science and Innovation *http://www.ewi-vlaanderen.be/* IWT, Institute for the Promotion of Innovation by Science and Technology in Flanders *http://www.iwt.be/* VIWTA, The Flemish Institute for Science and Technology Assessment *http://www.viwta.be/* VRWB, Flemish Science Policy Council *http://www.vrwb.be* SERV, Flanders Social and Economic Council *http://www.serv.be/* Belgian Federal Science Policy Office *http://www.belspo.be*

Further information on nanotechnology in Belgium is available at:

- *http://mrw.wallonie.be/mrw*
- *http://www.nano.be/index.html*
- *http://www.fnba.be*
- *http://www.vrwb.be/home/index.cfm?menu_id=240&content_id=60&publicatieitem=298*
- *www.nanonu.be*
- *http://www.imec.be*
- *http://www.vito.be*
- *http://www.vib.be/VIB/EN/*
- *http://www.pmvlaanderen.be*
- *http://www.bvassociation.org/*
- *http://www.banvlaanderen.be/content/BanVla*
- *http://economie.fgov.be/intellectual_property/home_en.htm*

CANADA

Question	Country Response
Contact name Organisation	Laurent Gémar Health Canada
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No The Canadian Science and Technology Strategy: *http://www.ic.gc.ca/cmb/welcomeic.nsf/532340a8523f33718525649d006b119d/3e7f6374fd018f9c852572de00503b8a!OpenDocument* (Federal)
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, NINT Nanoscience and Nanotechnology Forum; Health Canada workshop on Appropriate Policy Framework for Nanotechnology; Council of Canadian Academies report; and other Environment Canada and Health Canada activities. Yes, through NINT Innovation Centre and Alberta Nanotechnology Strategy.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No. Yes, see Quebec statement on Nanotechnology and Ethics *(www.ethique.gouv.qc.ca/ethics-and-nanotechnology-a-basis.html)*
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, including India, China, US, France, Japan Yes, e.g. ISO, International Risk Governance Council, International Dialogue on Responsible R&D in NT, UNESCO.
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1999 (Canada's National Institute for Nanotechnology)
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, at federal and provincial levels, e.g. NT Winter School, Canada Research Chairs Yes, Canada Research Chairs, Alberta Ingenuity Fund Accelerator Programme
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which?	Yes, see Advisory Council on Science and Technology Reports (2006) Yes, multiple areas including electronics, instruments, chemicals & pharmaceuticals, process engineering, consumer goods, civil engineering, aerospace and medicine
Do you have targeted business incentive programmes related to nanotechnology?	Yes, NRC Industrial Research Programme, NRC Canadian Photonics Fabrication Centre, Industry Partnership Facilities, Nanotechnology Industrial Research Programme, Alberta Ingenuity nanoWorks Programme, Alberta Centre for Advanced MNT Products, Alberta MSTRI programme for prototyping and entrepreneur development

Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	 No Yes, under Federal Laboratory, NRC-INMS No No Yes, S&T Foresight Directorate of Office of the National Science Advisor (2004-8) and CFIA. No
Are there policies relating to financing of nanotechnology-related business?	Yes, under Business Development Bank of Canada, Sustainable Development Technology Canada and Alberta IVAC Capacity Builder and Commercialisation Fund
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Canadian Food Inspection Agency (CFIA) *http://www.inspection.gc.ca/* Canadian Institutes of Health Research *http://www.cihr-irsc.gc.ca/e/193.html* Defence Research & Development Canada *http://www.drdc-rddc.gc.ca/* Environment Canada *http://www.ec.gc.ca* Health Canada *http://www.hc-sc.gc.ca/* Industry Canada *http://www.ic.gc.ca/epic/site/aimb-dgami.nsf/en/Home* National Research Council of Canada *WWW.NRC-CNRC.GC.CA* National Institute for Nanotechnology *http://nint-innt.nrc-cnrc.gc.ca/* Department of Foreign Affairs and International Trade *http://www.international.gc.ca/international/index.aspx*

Further information on nanotechnology in Canada is available at:

- *http://www.advancededucation.gov.ab.ca/technology/wwwtechnology_asp/techprior/techcomm/Nanotechnology/Nanotechnology_Strategy.asp*
- *http://www.nanotechbc.ca*
- *http://nanoquebec.ca*
- *www.nanoontario.ca*
- *http://www.ethique.gouv.qc.ca/Ethics-and-nanotechnology-a-basis.html*
- *www.newbrunswick.ca*
- *http://www.mri.gov.on.ca*
- *www.technology.gov.ab.ca*
- *www.mdeie.gouv.qc.ca*
- *http://www.ic.gc.ca/cmb/welcomeic.nsf/532340a8523f33718525649d006b119d/3e7f6374fd018f9c852572de00503b8a!OpenDocument*

HR related studies are available at:

- *http://www.statcan.ca/; http://www.nanotechbc.ca/*

CZECH REPUBLIC

Question	Country Response
Contact name Organisation	Alena Blazkova MEYS - Department of International Cooperation in R&D
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, in 2006 Nanotechnologies for Society (2006-12) http://www.cas.cz/en/ostatni.php?m=4&ID=163
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Nanomedicine Conference (2006), Nanoforum International Conference (2009) Yes, through the Technology Centre
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes Yes
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2006
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, accredited programmes at some third level colleges No
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering No No No No No No No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	The Grant Agency of the Academy of Sciences *http://www.cas.cz/en/ostatni.php?m=4&ID=159* Ministry of Education, Youth and Sports *http://www.msmt.cz/vyzkum/dotace-granty http://www.msmt.cz/mezinarodni-vztahy/vyzkum-a-vyvoj-1* Ministry of Industry and Trade *http://www.mpo.cz/cz/podpora-podnikani/* Czech Science Foundation *http://www.gacr.cz/fund-02gap.htm* Technology Centre of the Academy of Sciences of the CR – NICER *http://www.fp7.cz/* Czech Society for New Materials and Technologies, section Nanoscience and Nanotechnology *http://csnmt.fme.vutbr.cz/csnmt/?lang=1* CzechInvest *http://www.czechinvest.org/en* National Institute of Public Health *http://www.szu.cz/English/english.htm*

Further information on nanotechnology in the Czech Republic is available at:

- *http://www.cas.cz/en/ostatni.php?m=4&ID=163*

DENMARK

Question	Country Response
Contact name Organisation	Jens Haisler Danish Agency for Science, Technology and Innovation
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No Technology Foresight on Danish Nanoscience and Nanotechnology, 2004: http://fi.dk/site/english/publications/2004/technology-foresight-danish-nanoscience-and-nanotechnology Progress, Innovation and Cohesion. Strategy for Denmark in the Global Economy, 2006: http://www.globalisering.dk/multimedia/Pixi_UK_web_endelig1.pdf The Danish National Advanced Technology Foundation: http://www.hoejteknologifonden.dk/?id=29 The Danish Council for Strategic Research: http://fi.dk/site/english/councils-commissions-committees/the-danish-council-for-strategic-research http://fi.dk/site/english/apply-for-funding/calls/calls-2008/strategic-research-in-nanotechnology-biotechnology http://fi.dk/site/english/apply-for-funding/calls/calls-2008/strategic-research-in-nanotechnology-biotechnology
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Technology Foresight for Nanotechnology (2004), Nanotechnology Day (2007) (Danish Environmental Protection Agency), RESEARCH 2015 Internet hearing (2007), Nanotech Northern Europe Conference 2008. Yes, Technology Foresight for Nanotechnology (2004), RESEARCH 2015 Internet hearing (2007)
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, Technology Foresight for Nanotechnology report chapter 7; Ministry of Health and Prevention review (2007), work by Danish Standards. No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with China Yes, International Dialogue for Responsible R&D in Nanotechnology
Is there a national definition of nanotechnology in your country?	Yes

Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2003
Have you supported specific education and training to develop human resources in nanotechnology?	Yes, graduate programmes and two graduate schools (iNANO at Aalborg and Copenhagen Graduate School for Nanoscience and Nanotechnology) have been approved by Ministry of STI
Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, through strategy on *Knowledge Based Collaboration between Denmark and China* (2008)
Have the business-related needs been assessed with respect to nanotechnology development?	No
Is STI policy targeting particular application technology/ industry areas? If so, which?	No
Do you have targeted business incentive programmes related to nanotechnology?	Yes, National Advanced Technology Foundation, Commission on Strategic Growth Technologies (Danish Council for Strategic Research)
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	Yes, through Danish Standards
Tax incentives or subsidies	No
Trade promotions?	No
Technology forecasting?	Yes, Technology Foresight on Danish Nanoscience and Nanotechnology (2004)
Other business regulations? If so, give examples.	No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place?	No
Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Agency for Science, Technology and Innovation (Ministry of Science, Technology and Innovation) *www.fi.dk;* Ministry of Health and Prevention *www.sum.dk;* Environmental Protection Agency (Ministry of the Environment) *www.mst.dk*; Council for Strategic Research *www.fi.dk;* Council for Technology and Innovation *www.fi.dk;* National Research Foundation *www.dg.dk*; National Advanced Technology Foundation *www.hoejteknologifonden.dk* Board of Technology *www.tekno.dk*; NaNet *www.nanet.nu*; Ministry of Economic and Business Affairs and Danish Standards *www.oem.dk www.ds.dk*

Further information on nanotechnology in Denmark is available at:

- *http://fi.dk/site/english/publications/2004/technology-foresight-danish-nanoscience-and-nanotechnology*
- *http://www.globalisering.dk/multimedia/Pixi_UK_web_endelig1.pdf*
- *http://www.hoejteknologifonden.dk/?id=29*
- *http://fi.dk/site/english/councils-commissions-committees/the-danish-council-for-strategic-research*
- *http://fi.dk/site/english/apply-for-funding/calls/calls-2008/strategic-research-in-nanotechnology-biotechnology*
- *http://fi.dk/site/english/apply-for-funding/calls/calls-2008/strategic-research-in-nanotechnology-biotechnology*

FINLAND

Question	Country Response
Contact name Organisation	Markku Lämsä Governmental Agency (Tekes)
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, in 2005 FinNano, Finnish nanoscience and nanotechnology programme www.tekes.fi/finnano; www.aka.fi/FinNano; www.nanocluster.fi http://www.minedu.fi/export/sites/default/OPM/Julkaisut/2005/liitteet/opm_266_tr39.pdf?lang=fi
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Tekes, Academy of Finland and Nanotechnology Cluster programme, annual seminars or workshops, leaflets and other written materials Yes, Tekes FinNano programme
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, horizontal NanoForum discussion group established by Ministry of Education No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, Denmark, Iceland, Norway and Sweden (Nordic countries), China, Russia, etc. Yes, International Dialogue on Responsible R&D in NT, ISO
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1997
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, various Master of Science Programmes Yes, FiDiPro (Finland Distinguished Professor Programme) *www.fidipro.fi*
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology?	No Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering Yes

Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	 No Yes, *www.metsta.fi* Metsta group on standardisation No Yes, through Tekes Yes, Tekes FinNano (www.tekes.fi/finnano) No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, but not nano specific
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Tekes, Finnish Funding Agency for Technology and Innovation *www.tekes.fi* Academy of Finland *www.aka.fi* Ministry of Education *http://www.minedu.fi/OPM/?lang=en* Ministry of Employment and the Economy *http://www.tem.fi/?l=en* Nanotechnology Cluster Programme *http://www.nanocluster.fi/* Ministry of the Environment *http://www.ymparisto.fi/default.asp?node=5295&lan=en* Finland's environmental administration

Further information on nanotechnology in Finland is available at:

- *http://akseli.tekes.fi/opencms/opencms/OhjelmaPortaali/ohjelmat/NANO/fi/Dokumenttiarkisto/Viestinta_ja_aktivointi/Aihealueryhmat/Nanotechnology_in_Finnish_Industry_2006_Public.pdf*
- *http://www.fidipro.fi/*
- *http://www.metsta.fi/komiteat/laajuus.html*
- *www.tekes.fi/finnano*
- *http://akseli.tekes.fi/opencms/opencms/OhjelmaPortaali/ohjelmat/NANO/en/thematic_groups.html*

HR related studies are available at:

- *http://www.minedu.fi/OPM/Julkaisut/2005/nanotieteen_keihaankarjet_suomessa?lang=fi*
- *www.oske.net/@Bin/9991/Nanoteknologia.pdf*
- *http://helsinkinano.tkk.fi/HelsinkiNano%20loppuraportti.pdf*

FRANCE

Question	Country Response
Contact name Organisation	Patrick ALNOT (DGRI) & Louis TREPIED (DGE) *Direction Générale de la Recherche et de l'Innovation et Direction Générale des Etudes*
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, multiple strategies in 2003-2006 http://www.industrie.gouv.fr/portail/politiques/index_nanotech.html
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, national public discussion required by Prime Minister (2006), Nanotechnologies and Society (*Cité des Sciences*, annually), several events including Nanoforum (*Conservatoire National des Arts et Métiers*) Yes, through the ANR (*Agence Nationale de la Recherche*)
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, national public discussion (2006); City of Science and Industry exhibition (2007); many public debates including Nanoforum of *Conservatoire National des Arts et Métiers*. Yes, through ANR funded research projects including programmes Pnano, SEST.
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, CEE Forum
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2003
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes Yes, chair of excellence
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology?	No Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering No

Do you have policies or programme s which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	 No No No No No No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	ANR *www.agence-nationale-recherche.fr* CNRS *www.cnrs.fr* CEA *www.cea.fr*

Further information on nanotechnology in France is available at:

- *http://www.industrie.gouv.fr/portail/politiques/index_nanotech.html*
- *www.triangledelaphysique.fr*
- *www.cirfc.fr*
- *www.instituts-carnot.eu*
- *www.leti.cea.fr*
- *www.femto-st.fr*
- *www.iemn.univ-lille1.fr*
- *www.iemn.univ-lille1.fr/plateforme/plateforme_03.htm*
- *www.institutoptique.fr*
- *www.minalogic.com*
- *www.pole-scs.org*
- *www.s2e2.fr*
- *www.popsud.org*
- *www.polemicrotechniques.fr*
- *www.recherche.gouv.fr/cid5758/les-contrats-de-projets-etat-region-c.p.e.r.-2007-2013.html*
- *www.laas.fr*
- *www.laas.fr/laas/1-6062-RTB.php*
- *www.phys.ens.fr*
- *www.cime.inpg.fr*
- *www.insa-rennes.fr/foton*
- *www.ctm.univ-montp2.fr*
- *www.ietr.org*
- *www.lpmi.uhp-nancy.fr/SalleBlanche*
- *www.cnanoidf.org*
- *www.cnano-rhone-alpes.org*
- *www.cnano-rhone-alpes.org/spip.php?article63*
- *www.cnanoge.org*
- *www.iemn.univ-lille1.fr/cnanono*
- *www.cnanogso.org*
- *www.omnt.fr*
- *www.dsm.cea.fr*
- *www.drecam.cea.fr*
- *www.drecam.cea.fr/spec*
- *www.drfmc.cea.fr*
- *www.drt.cea.fr*
- *www.leti.cea.fr*
- *www.dsv.cea.fr*
- *www.cnrs.fr/mppu*
- *www.cnrs.fr/st2i*
- *www.cnrs.fr/chimie*
- *www.cnrs.fr/sdv*
- *www.rtb.cnrs.fr*
- *www.lpn.cnrs.fr/fr/TECHNO/ct.php*
- *http://neel.cnrs.fr/spip.php?rubrique57*
- *http://inl.cnrs.fr*
- *www.crhea.cnrs.fr/crheatec*
- *www.r3n.org*

GERMANY

Question	Country Response
Contact name Organisation	Martin Rieland Federal Ministry of Education and Research Division Nanomaterials, New Materials
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, in 2006 Nano-Initiative Action Plan 2010 http://www.bmbf.de/en/nanotechnologie
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, BMBF contact sheets, BMELV consumer conference, BMU *Nanokommission* NanoDialogue Yes, BMBF *Forschungsunion* and BMWi branch dialogues
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, beginning discussion with the *Nanokommission* (see www.bmu.de) Yes, see *Nanokommission* background paper on Nanodialogue
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with EU and ISO members and others Yes, ISO and CEN
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1998
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, following BMBF educational mapping. Also 19 full study possibilities at *www.nano-bildungslandschafter.de/index.php?content=map* Yes, research marketing, see *www.research-in-germany.de/coremedia/generator/dachportal/en/08_links_20and_20Downloads/Downloads/Nano/Nanobroschuere.pdf*
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards?	Yes, see Nano-Initiative Action Plan 2010 Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering and other Yes, NanoChance (2006), High-Tech Gründerfonds, EXIST-SEED, Power to Female Founders (not restricted to nanotech) Yes, NanoTruck (*www.nanotruck.de*), BMBF brochures, BMELV consumer conferences, Stakeholder Dialogues Yes, for ISO and CEN

Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No Yes Yes No
Are there policies relating to financing of nanotechnology-related business?	Yes
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, in general project funding and through BMBF
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Federal ministry of education and research - BMBF *www.bmbf.de/en/nanotechnologie* Federal Ministry of Economics and Technology – BMWi *www.bmwi.de* Federal Ministry for the Environment, Nature Conservation and Nuclear Safety – BMU *http://www.bmu.de/english/nanotechnology/nanodialog/doc/37324.php* Federal Ministry of Labour and Social Affairs – BMAS www.bmas.de *http://www.baua.de/en/Topics-from-A-to-Z/Hazardous-Substances/Nanotechnology/Nanotechnology.html__nnn=true* Federal Ministry of Food, Agriculture and Consumer Protection – BMVEL *www.bmelv.de http://www.bfr.bund.de/cd/8568* Federal Ministry of Health – BMG *www.bmg.bund.de* Federal Ministry of Defence – BMVg *www.bmvg.de* Federal Ministry of Transport, Building and Urban Affairs - BMVBS *www.bmvbs.de*

Further information on nanotechnology in Germany is available at:

- *http://www.bmbf.de/en/nanotechnologie*
- *http://www.bmbf.de/pot/download.php/M%3A0+Nano-Initiative+-+Action+Plan+2010/~DOM;/pub/nano_initiative_action_plan_2010.pdf*
- *http://www.bmu.de/english/nanotechnology/general_information/doc/37323.php*
- *http://www.bmu.de/english/nanotechnology/nanodialog/doc/40549.php*
- *http://www.research-in-germany.de/coremedia/generator/dachportal/en/08__Links_20and_20Downloads/Downloads/Nano/Nano broschuere.pdf*
- *http://www.creavis.com/site_creavis/en/default.cfm?content=nanotronics/s2b-nanotronics*
- *http://www.sustech.de/engl/index.htm*
- *http://www.cnt.fraunhofer.de/EN/index.jsp*
- *www.nanotruck.de*
- *http://www.bfr.bund.de/cm/220/verbrauchervotum_zur_nanotechnologie.pdf*
- *http://www.nanopartikel.info/navi-rechts/veranstaltungen.html*

HR related studies are available at:

- *http://www.nano-bildungslandschaften.de/index.php?content=map*

HUNGARY

Question	Country Response
Contact name Organisation	Jozsef Gyulai KFKI and Academy of Science
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No http://www.mfa.kfki.hu/; http://hunn.chemres.hu/; http://www.bzaka.hu/bzaka/
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, through Research Institute BAYNANO (2007), ALBANANO nanotechnological centre (Hungarian Academy of Sciences) and National Office for Research and Technology workshops, discussion forums and project funding. Yes, through National Technological Platforms and Innovation centres
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with Russian Federation, Sweden No
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2004
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	No Yes
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering and other Yes No No No No No No
Are there policies relating to financing of	Yes

nanotechnology-related business?	
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Hungarian Academy of Sciences, HAS *www.mta.hu* Office for Technology and Innovation, HAS www.kutatas.hu NKTH-National Office for Research and Technology nkth.gov.hu

Further information on nanotechnology in Hungary is available at:

- *http://www.mfa.kfki.hu/*
- *http://www.bzaka.hu/bzaka/*

IRELAND

Question	Country Response
Contact name Organisation	Seamus Bannon Forfás
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2007 NanoIreland *http://www.forfas.ie/publications/forfas_annrpt06/capturing/nan.html* ; http://www.entemp.ie/science/technology/sciencestrategy.htm
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, through focus groups in a study for the NanoIreland project (2006-8) Yes, under NanoIreland project and by Health and Safety Authority (web questionnaire for medical device companies on engineered nanoparticles)
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, being developed from NanoIreland Technology Assessment Yes, BioEthics Council (*www.bioethics.ie*) (www.bioethics.ie/pdfs/AnnualReport2006.pdf)
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, International Risk Governance Council
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	No
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, Dublin Institute of Technology BSc programme in Nanotechnology Yes, under Science Foundation Ireland but not specific to nanotechnology
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes Yes, Electronics, Instruments, Chemicals & pharmaceuticals, Process engineering and Other No No No No No No No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, but not specific to nanotechnology
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Department of Enterprise, Trade and Employment (DETE) *www.entemp.ie* Forfas *www.forfas.ie* Discover Science and Engineering *www.science.ie* Health and Safety Authority *www.hsa.ie* Science Foundation Ireland *www.sfi.ie* Department of Education and Science *www.education.ie* Environmental Protection Agency *www.epa.ie*

Further information on nanotechnology in Ireland is available at:

- *http://www.bioethics.ie/pdfs/AnnualReport2006.pdf*

ISRAEL

Question	Country Response
Contact name Organisation	Avraham Cohen Ministry of Science, Culture and Sport
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2001 Israel National Nanotechnology Initiative (INNI) www.nanoisrael.org
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	No Yes, through the Nano-Centres industry has access to equipment for 30% of the time
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No No
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2003
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, mostly interdisciplinary nano-related M.Sc. programmes in the universities Yes, they are accepted as academic staff with better conditions than existing researchers and a personal lab is provided for their expert area
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering No No Yes, companies have been established in nanometrology No No No No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Planning and Budgeting Committee, Council of Higher Education Office of the Chief Scientist, Ministry of Industry, Trade & Labour (ITL) Chief Scientist, Ministry of Science & Technology *www.most.gov.il* Israel National Nanotechnology Initiative (INNI) http://www.nanoisrael.org/

Further information on nanotechnology in Israel is available at:

- *www.nanoisrael.org*

HR related studies are available at:

- INNI web site *http://www.nanoisrael.org/*

JAPAN

Question	Country Response
Contact name Organisation	Yujiro Naruse Bureau of Science, Technology and Innovation Policy, Cabinet Office
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2006 3rd Science & Technology Basic Plan http://www8.cao.go.jp/cstp/english/basic/index.html#third
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, under Coordination Programme of S&T Projects, occasional seminars related to nanotechnology Yes, collaborative work with Nanotechnology Business Creation Initiative, an industry-driven organisation
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, in 3rd Science and Technology Basic Plan, www8.cao.go.jp/cstp/english/basic/index.html#third Yes, Science and Technology Basic Plan, see www8.cao.go.jp/cstp/english/basic/index.html#third
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, International Dialogue on Responsible Development of Nanotechnology Research and Development; ISO (International Organisation for Standardization); IEC (International Electrotechnical Commission); VAMAS (Versailles Projects on Advanced Materials and Standards); INC (International Nanotechnology Conference on Communication and Cooperation)
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2001
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, including Super Executive Engineer Development (SEED) programme (METI) organized by AIST (includes internship in supporting companies); and Nanotechnology Summer School (MEXT) organized by National Institute for Material Science (NIMS). Yes, including MEXT NIMS 'Nanotechnology network'; Need and seed matching symposium (Feb 2008 with Germany).

Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which?	No Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering and consumer goods & civil engineering
Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No No Yes, research on standardization in governmental research institute and AIST (National Institute of Advanced Industrial Science and Technology) participates in ISO/TC229 (Nanotechnologies) No Yes No No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Cabinet Office *http://www.cao.go.jp/index-e.html* Ministry of Internal Affairs and Communications *http://www.soumu.go.jp/english/index.html* Ministry of Education, Culture, Sports, Science and Technology *http://www.mext.go.jp/english/index.htm* Ministry of Health, Labour and Welfare *http://www.mhlw.go.jp/english/index.html* Ministry of Agriculture, Forestry and Fisheries *http://www.maff.go.jp/eindex.html* Ministry of Economy, Trade and Industry *http://www.meti.go.jp/english/index.html* Ministry of Land, Infrastructure, Transport and Tourism http://www.mlit.go.jp/english/ Ministry of the Environment *http://www.env.go.jp/en/* National Institute for Materials Science *http://www.nims.go.jp/eng/index.html*

Further information on nanotechnology in Japan is available at:

- *http://www8.cao.go.jp/cstp/english/basic/index.html#third*
- *http://www8.cao.go.jp/cstp/english/basic/index.html#third*

KOREA

Question	Country Response
Contact name Organisation	Ho Seong LEE Korea Science and Engineering Foundation
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2001 Korean National Nanotechnology Initiative www.k-nano.or.kr
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, through workshops, discussion forum Yes, through General Survey, Interview
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, Ethical Platform for Scientists and Engineers since 2007 Yes, no specific documents, but see report on the nanotechnology assessment on social impact (KISTEP)
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, Korea-U.S. Nano Forum, Korea-Japan Nano Forum
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2001
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, nanotechnology re-education programmes for industrial R&D manpower; and nanotechnology education footholds at technology high schools and colleges for cultivation of engineers and a skilled workforce is designated and nurtured Yes, programme to attract foreign scientists and provide support for their R&D activities.
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No Yes, electronics, chemicals & pharmaceuticals, process engineering and mechanical engineering No No No No No No No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	Yes, report on the domestic trend of patents on nanotechnology in Korea in 2004 and will update the report periodically reflecting the business climate. Yes, patent analysis report is provided on a continuous basis to support the IPR strategy of companies
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Ministry of S&T (MOST) *http://www.most.go.kr* Korea Institute of S&T evaluation and Planning(KISTEP) *http://www.kistep.re.kr* Korea science and engineering foundation(KOSEF) *http://kosef.re.kr* Nano Technology Research Association(NTRA) *http://nanokorea.net* Korea Nano Technology Research Society(KONTRS) *http://kontrs.or.kr* Nanotechnology Information Centre in KISTI *http://nanonet.info*

Further information on nanotechnology in Korea is available at:

- *www.nanonet.info/nanonet/wsp/english/main/index.jsp (Temporary site)*
- *www.k-nano.or.kr*

NETHERLANDS

Question	**Country Response**
Contact name Organisation	Jacqueline Mout Ministry of Education, Culture and Science
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2006 Cabinet View on Nanotechnologies, Action Plan for Nanotechnology
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	No, but public dialogue will start in Autumn 2008 Yes, NanoNed, STW and FOM staged 7 workshops with about 175 experts from industry, universities, knowledge institutes and NGO's the content of the Strategic Research Agenda for the Netherlands Nanotechnology Initiative.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, they are priorities in the Cabinet View and the Action Plan Yes, ethical issues will be addressed in the public dialogue
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, NATO Research and Technology Organisation's committees, International Standards organisation (ISO) and CEN (European Committee for Standardization)
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2003
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	No No
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies	No Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering and other Yes, Seed fund and valorisation programme Point One No Yes, businesses and National Normalisation Institute (NEN) participate in ISO re TC 229 Yes, Innovation Programmes like Point One, CTMM, BMM, TI Pharma, NanoNed, BioMaDe, Holst Centre

Trade promotions? Technology forecasting?	No No
Other business regulations? If so, give examples.	No
Are there policies relating to financing of nanotechnology-related business?	Yes, Seed fund and valorisation programme Point One
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Ministry of Economic Affairs (EZ) *www.minez.nl* Ministry of Education, Culture and Science (OCW) *www.minocw.nl* Ministry of Housing, Regional Development and the Environment (VROM) *www.vrom.nl* Ministry of Health, Welfare and Sports (VWS) *www.minvws.nl* Ministry of Defence (def) *www.mindef.nl* Ministry of Social Affairs and Employment (SZW) *www.szw.nl* Ministry of Agriculture, Nature Management and Fisheries (LNV) *www.minlnv.nl* Ministry of Interior and Kingdom Relations (BZK) *www.minbzk.nl* Ministry of Justice (Jus) *www.minjus.nl* NanoNed *www.nanoned.nl* Rathenau Institute *www.rathenauinstituut.com* National Health Council *www.gr.nl* National Institute for Public Health and Environmental Protection (RIVM) *www.rivm.nl* Foundation on fundamental Research on matter (FOM) *www.fom.nl* Netherlands organisation on scientific Research (NWO) *www.nwo.nl* Foundation for technical sciences (STW) *www.stw.nl*

HR related studies are available at:

- *http://www.onderzoekinformatie.nl/nl/oi/nod/classificatieaz/C60000/#persoon*

NORWAY

Question	Country Response
Contact name Organisation	Carl Gjersem Ministry of Trade and Industry
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2006 National Strategy for Nanoscience and Nanotechnology *http://www.forskningsradet.no/servlet/Satellite?cid=1187636539224&pageid=1187636539224&pagename=nanomat%2FPage%2FHovedSideEng&site=nanomat*
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, approach based on 2005 White Paper on Research *e.g.* Research Council of Norway and Norwegian Board of Technology public consultations; recent study by independent group appointed by Research Council of Norway, National Research Ethics Committee for Science and Technology (NENT) and Norwegian Board of Technology presented in open hearing (Feb 2005) No
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, broad set of guidelines related to ELS in general. Also Research Council of Norway and Norwegian Board of Technology include these issues in their general work and public presentations on nanotechnology. Yes, broad set of guidelines related to ELS at the general level.
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No No
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2002
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, MSc degree, NTNU and University of Oslo; BSc degree, University of Bergen; PhD-courses at all three institutions. NTNU is expected to fill the needs of the companies, with the Centres for Research-based Innovation at UiO. Yes, scholarships for PhD-students, post doc funding; as a part of research programmes, projects at the different research institutes and universities and The Norwegian Government Scholarship Pool
Have the business-related needs been assessed with respect to nanotechnology development?	Yes

Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering and other Yes, with a focus on ethical, legal and social analyses as well as potential impacts on health and the environment. No No No No Yes, Research Council report: "Advanced Materials Norway 2020: Our challenging future in nano- and materials technology" No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, but general rather than nanotechnology specific
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Ministry of Education and Research *www.regjeringen.no/kd* Ministry of Trade and Industry *www.regjeringen.no/nhd* Ministry of the Environment *www.regjeringen.no/md* Norges Forskningsråd - Research Council of Norway *http://www.forskningsradet.no* Statens forurensingstilsyn (SFT) - Norwegian Pollution Control Authority *http://www.sft.no/aktuelt____29292.aspx* Teknologirådet - The Norwegian Board of Technology *http://www.teknologiradet.no/default.aspx?m=3*

Further information on nanotechnology in Norway is available at:

- *http://www.forskningsradet.no/servlet/Satellite?cid=1187636539224&pageid=1187636539224&pagename=nanomat%2FPage%2FHovedSideEng&site=nanomat*

HR related studies:
"Advanced Materials Norway 2020: Accompanying report I - Research on materials in Norway" (in Norwegian only/published in 2006)

POLAND

Question	Country Response
Contact name Organisation	Witold Lojkowski Institute of High pressure Physics
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No http://www.nanonet.pl/index.php?option=com_content&task=category&sectionid=27&id=131&Itemid=331
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	No No
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with Spain and Singapore No
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	No
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	No Yes, but not nanotechnology specific
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No No No No No No No Yes, call for proposal for studies No
Are there policies relating to financing of nanotechnology-related business?	No

Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	National Centre for Research and Development *http://www.ncbir.pl/www/* Ministry for Research and Higher Education *http://www.nauka.gov.pl/mn/index.jsp?place=Menu01&news_cat_id=-1&layout=0*

Further information on nanotechnology in Poland is available at:

- *http://www.nanonet.pl/index.php?option=com_content&task=category&sectionid=27&id=131&Itemid=331*
- *http://www.nauka.gov.pl/mn/index.jsp?place=Lead08&news_cat_id=254&news_id=4328&layout=2&page=text*
- *http://www.nauka.gov.pl/mn/index.jsp?place=Lead08&news_cat_id=244&news_id=3861&layout=2&page=text*

PORTUGAL

Question	Country Response
Contact name Organisation	Luis Viseu Melo Fundação para a Ciência e a Tecnologia (FCT)
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2006 For International Iberian Nanotechnology Laboratory: http://www.umic.pt/index.php?option=com_content&task=view&id=2795&Itemid=212 For two Associate Laboratories on Nanotechnologies see: www.fct.mctes.pt/labs/associados/ For Portuguese Nanotechnology Network, PortugalNano (www.portugalnano.org)
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, exhibitions by National Agency for Scientific and Technological Culture (Ciência Viva) Yes, meetings on Nanoscience and Nanotechnology International Iberian Nanotechnology Laboratory. The Associate Laboratories have produced industry spin-offs and maintain regular dialogue with industry.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, as an integral part of the policy. Active participation in ELS discussion fora is a way to actively contribute to the establishment of good practices and regulations. INL includes ELS in priority areas of Environmental Monitoring and Food Quality and Security. New centre for public dissemination of science, within the network of centres Ciência Viva being created next to INL with Nanotechnology theme. No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, France and Spain Yes, International Risk Governance Council
Is there a national definition of nanotechnology in your country?	No
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2007
Have you supported specific education and training to develop human resources in nanotechnology?	Yes, PhD in Nanomedicine, collaboration between Northern Portuguese Universities and Galician (Spain) Universities from 2008-2009; specific PhD and Post-Doc programme coordinated by INL.

Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, through INL and Associated Laboratories in Nanotechnology
Have the business-related needs been assessed with respect to nanotechnology development?	No
Is STI policy targeting particular application technology/industry areas? If so, which?	Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering
Do you have targeted business incentive programmes related to nanotechnology?	No
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	No
Tax incentives or subsidies	No
Trade promotions?	No
Technology forecasting?	No
Other business regulations? If so, give examples.	No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place?	No
Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Ministry of Science, Technology and Higher Education (MCTES) *www.mctes.pt* Fundação Para a Ciência e a Tecnologia (FCT) *www.fct.mctes.pt* UMIC *www.umic.pt*

Further information on nanotechnology in Portugal is available at:

- *http://www.umic.pt/index.php?option=com_content&task=view&id=2795&Itemid=212*
- *http://www.fct.mctes.pt/labs/associados/*
- *www.portugalnano.org*

HR related studies are available at:

- *www.portugalnano.org*

RUSSIAN FEDERATION

Question	**Country Response**
Contact name Organisation	Sergey Lebedev Ministry of Education and Science
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2007 Strategy of NanoIndustry Development www.realeconomy.ru/969/index.shtml www.mon.gov.ru
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Public discussions, dedicated articles in media, TV and radio programmes, forums (incliding Internet), round tables, conferences hosted by public authorities, leading research institutions, prominent scientisits, universities. Yes, special procedure in the framework of federal S&T programmes when the industrial companies are strongly encouraged to take part in (a) formulation the R&D subject and (b) co-funding of those R&D
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, as special part of federal programme "Developing of nanoindustry infrastructure in Russian Federation in 2008-2010" Yes, in federal programme "Developing of nanoindustry infrastructure in Russian Federation in 2008-2010"
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with EU No
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2007
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, special educational programmes have been introduced in leading universities Yes, through the Federal R&D Programme (2007-2012)
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement?	Yes Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering and mechanical engineering Yes, The Nanocorporation Yes, through federal laws

Nanometrology, quality and other standards? Tax incentives or subsidies	No No
Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No No No
Are there policies relating to financing of nanotechnology-related business?	Yes, Russian Corporation of Nanotechnologies programme and Russian Venture Company
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, through 4th Chapter of the Civil Code, recently adopted in order to establish clear regulation in this area
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Ministry of Education and Science of the RF *www.mon.gov.ru* Federal Agency of Science&Innovations *www.fasi.gov.ru* State Corporation "Russian Corporation of Nanotechnology" (the Nanocorporation) *www.rusnano.com*

Further information on nanotechnology in the Russian Federation is available at:

- *www.realeconomy.ru/969/index.shtml*
- *www.mon.gov.ru*

SOUTH AFRICA

Question	Country Response
Contact name Organisation	Daniel Adams Department of Science & Technology (DST)
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2006 National Nanotechnology Strategy http://www.dst.gov.za/publications-policies/strategies-reports/reports/Nanotech.pdf
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, through the DST Nanotechnology Public Understanding programme Yes, in a Nanotechnology Advisory Board, overseeing the implementation of the National Nanotechnology Strategy, and steering committees of Nanotechnology Innovation Centres.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, through DST Nano-Ethics Committee No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, Argentina, Cuba, India, Japan, Malaysia, Indonesia, Taiwan Yes, International Dialogue on Responsible Research and Development of Nanotechnology Nanotechnology for Developing Countries, organized by Meridian Institute
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2005
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, the Nanotechnology Research Chairs and Nanotechnology Innovation Centres Yes, the Nanotechnology Research Chairs programme and the Nanotechnology Innovation Centres have internationalisation plans to attract foreign researchers. International agreements the country signs pave the way to attracting foreign researchers. DST initiatives, aimed at attracting post-doctoral researchers from foreign countries (exchange programmes).
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement?	No Yes, chemicals & pharmaceuticals, process engineering and other No No

Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes, South African Bureau of Standards (SABS) technical committee focusing on the development of Nanotechnology standards. No No No No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes, within the existing IPR regime
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Department of Science & Technology (government) *www.dst.gov.za* National Research Foundation (NRF) *www.nrf.ac.za* South African Nanotechnology Initiative *www.sani.org.za*

Further information on nanotechnology in the South Africa is available at:

- *http://www.dst.gov.za/publications-policies/strategies-reports/reports/Nanotech.pdf*

SWEDEN

Question	Country Response
Contact name Organisation	Ulf Holmgren VINNOVA, Swedish Agency for Innovation Systems
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No 1) Innovative Sweden - A strategy for growth through renewal, 2004: http://www.regeringen.se/sb/d/283/a/32462 2)Strategi för tillväxt BIOTEKNIK, 2005: http://www.vinnova.se/vinnova_shop/ProductList.aspx?id=568&quicksearchquery=Strategi 3) Strategies for increased Swedish benefit of R&D-programmes on EC level 2006 4) En nationell strategisk forskningsagenda (NRA) för den skogsbaserade näringen i Sverige, Nov 2006 (area: the forest and wood industry) www.nra-sweden.se 5) Forskningsstrategi för miljöteknik, 2007 (area: environmental technology) http://www.vinnova.se/Publikationer/Produkter/Forskningsstrategi-for-miljoteknik/
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	No No
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No No
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No No
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1987
Have you supported specific education and training to develop human resources in nanotechnology?	Yes, Lunds University degree programme in nanoscience from university entrance level to Master's degree: Master of Science in Engineering, Engineering Nanoscience. Other universities offer a variety of courses in nanotechnology within their programmes.

Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, tax reductions for foreign guest researchers (not specific to nanotechnology).
Have the business-related needs been assessed with respect to nanotechnology development?	Yes
Is STI policy targeting particular application technology/ industry areas? If so, which?	Yes, electronics, instruments, chemicals & pharmaceuticals and process engineering
Do you have targeted business incentive programmes related to nanotechnology?	Yes, Designed Materials (for feasibility study), Vinn Verification (for commercialisation), The Swedish defence (from research to demonstration), minST Mikro- och nanosystemteknik (to educate companies in micro- and nano system technology), Vinn Excellence centres (FunMat-Functional Materials and HERO-M - Hierarchic Engineering of Industrial Materials).
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	No
Tax incentives or subsidies	No
Trade promotions?	No
Technology forecasting?	Yes, "Choosing Strategies for Sweden"- A synthesis report from Swedish Technology Foresight, 2004
Other business regulations? If so, give examples.	No
Are there policies relating to financing of nanotechnology-related business?	Yes, not nano-specific but see Verification programme at VINNOVA and the FOCUS verification programme at Innovationsbron AB
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place?	No
Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	n/a

Further information on nanotechnology in Sweden is available at:

- *http://www.regeringen.se/sb/d/283/a/32462*
- *http://www.vinnova.se/vinnova_shop/ProductList.aspx?id=568&quicksearchquery=Strategi*
- *www.nra-sweden.se*
- *http://www.vinnova.se/Publikationer/Produkter/Forskningsstrategi-for-miljoteknik/*
- *http://www.kemi.se/templates/News____5077.aspx*

SWITZERLAND

Question	Country Response
Contact name Organisation	Rachel Grange EPFL, Optics Laboratory
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	No *www.sbf.admin.ch* *www.environnement-suisse.ch/div-4002*-f
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, federal institute EMPA annual conference on research and public understanding (*www.empa.ch*); and Swiss TA (ta-swiss.ch) publifora on nanotechnology Yes, microtechnology and nanotechnology network (Swiss Innovation Agency) brings together academia and industry for research project (matching funds): *www.mnt-era.net* Recently launched programme NanoTera (*www.nanotera.ch*) aimed at technology transfer in nanoscience to industry.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	No Yes, safety concerns are compiled in a government report (www.environnement-suisse.ch/div-4002-f)
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	No Yes, International Risk Governance Council
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1996
Have you supported specific education and training to develop human resources in nanotechnology? Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, nationwide doctoral schools within NCCRs (National Centres of Competence for Research) with many students spending time in industry. No
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which?	No Yes, instruments, chemicals & pharmaceuticals, process engineering and mechanical engineering

Do you have targeted business incentive programmes related to nanotechnology?	Yes, NanoTera Network of universities and technology transfer organisations; MNT Network of academia and industry, matching funds, for micro and nanotechnologies; NCCR Nanoscience Network of academia (leading house Univ. Basle) with participation of industry
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	No
Tax incentives or subsidies	No
Trade promotions?	No
Technology forecasting?	No
Other business regulations? If so, give examples.	Yes, government action plan on security of nanomaterials will lead to national programme of risk research in nanotechnology and if necessary, to health / environmental regulations.
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place?	No
Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	Yes, NanoTera programme (www.NanoTera.ch) is specifically designed to transfer knowledge in nanoscience to applications.
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	State secretariat for Education and research *www.sbf.admin.ch* Federal office of professional training and technology *www.bbt.admin.ch* Swiss National Science Foundation *www.snf.ch* The Innovation Society *www.innovationsociety.ch* Swiss Technology Assessment *www.ta-swiss.ch* MNT (Microtechnology and Nanotechnology network) *www.mnt-era.net* NanoTera *www.nanotera.ch* National Centre of Competence for Nanoscale Science *www.nccr-nano.org* Federal office of public health (with Federal Office of Environment) *www.bag.admin.ch www.bafu.admin.ch*

Further information on nanotechnology in Switzerland is available at:

- *www.sbf.admin.ch*
- *www.environnement-suisse.ch/div-4002-f*
- *www.empa.ch*
- *www.ta-swiss.ch*
- *www.systemsX.ch*

UNITED KINGDOM

Question	Country Response
Contact name Organisation	Lee Vousden DIUS
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 1999 Multiple: Bionanotechnology (BBSRC), Environment and Human Health Theme (NERC), Nanoscience through Engineering to Applications (EPSRC), Technology Strategy Board strategy *http://www.bbsrc.ac.uk/funding/grants/engineering_biological/bionanotechnology.pdf* *http://nerc.ac.uk/publications/strategicplan/nextgeneration.asp* *http://www.epsrc.ac.uk/ResearchFunding/Programmes/Materials/ReviewsAndConsultations/Nanotechnology/NanotechnologyStrategy.htm*
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Nanodialogues; Small Talk; Science horizons; Nanotechnology Engagement Group; and Nanojury UK Yes, UK Nanotechnologies Stakeholders Forum; BBSRC's Technology Strategy consultations; industry participates in EPSRC governance and consultations ; 23 Knowledge Transfer Networks (between companies; business; academia), one NT KTN *http://ktn.globalwatchonline.com*
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, through Nanotechnologies Research Task force looking at socio-economic and ethical areas; and through funding grant requirements. Yes, the need to understand the social and ethical implications of nanotechnologies, through a programme of public dialogue and social research, has been prioritised by Government.
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, including Austria, Finland, France, Ireland, Germany, Poland, Slovakia, other EU countries. Yes, ISO and CEN (European Committee for Standardization)
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1994

Have you supported specific education and training to develop human resources in nanotechnology?	Yes, including schemes in schools to encourage scientists (*e.g.* Beacons for Public Engagement; Science Technology Engineering and Mathematics Network and the Science and Engineering Ambassadors); MNT Academy (Cardiff University) training engineers/ apprentices; components in undergraduate courses; some MSc and PhD training, often with Research Council funding; Institute of Nanotechnology accreditation for Masters courses. Bionanotech PhD studentships (1999-2005); EPSRC call for Doctoral Training Centres; EPSRC Co-operative Awards in Science and Engineering (CASE).
Will your country introduce measures to attract foreign experts to work in nanotechnology?	
Have the business-related needs been assessed with respect to nanotechnology development? Is STI policy targeting particular application technology/ industry areas? If so, which? Do you have targeted business incentive programmes related to nanotechnology? Do you have policies or programmes which impact business and nanotechnology in: Public procurement? Nanometrology, quality and other standards? Tax incentives or subsidies Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	Yes Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering and other Yes, MNT Capital Facilities Programme and Collaborative R&D Programme No Yes, 2 open access centres (Begbroke Nano, and CEMMNT); National Measurement System (NMS) in nanometrology research; 2 EPSRC funded centres under its Science and Innovation Awards Scheme; 22 Micro and Nanotechnology Centres funded by TSB and industry; participation in ISO and ISO and CEN (European Committee for Standardization) No Yes No No
Are there policies relating to financing of nanotechnology-related business?	Yes
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No Yes
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	BBSRC *www.bbsrc.ac.uk*; DIUS *www.dius.gov.uk*; NERC *http://www.nerc.ac.uk/*; DEFRA *http://www.defra.gov.uk/ENVIRONMENT/nanotech/index.htm*; EPSRC *www.epsrc.ac.uk*; Technology Strategy Board *www.innovateuk.org*;

Further information on nanotechnology in the UK is available at: *http://www.bbsrc.ac.uk/funding/grants/engineering_biologic*

http://www.stemnet.org.uk/ambassadors_seas.cfm
http://nerc.ac.uk/publications/strategicplan/nextgeneration.asp
http://ktn.globalwatchonline.com
http://www.nanotec.org.uk/finalReport.htm
http://www.bbsrc.ac.uk/society/dialogue/activities/nanojury.htmlh
http://www.stemnet.org.uk/
http://www.bbsrc.ac.uk/society/meetings/exhibition_nano/index.htm; http://www.mntacademy.org
http://www.publications.parliament.uk/pa/cm200304/cmselect/cmsctech/56/5605.htm#a4
al/bionanotechnology.pdf
http://www.nano.org.uk/nanomasters/
http://www.epsrc.ac.uk/ResearchFunding/Programmes/Materials/ReviewsAndConsultations/Nanotechnology/NanotechnologyStrategy.htm
http://www.bbsrc.ac.uk/society/dialogue/activities/nanodialogues.html
http://www.bbsrc.ac.uk/publications/innovation/technology_strategy.pdf http://www.rcuk.ac.uk/sis/beacons.htm
http://www.bbsrc.ac.uk/science/grants/index.htm

USA

Question	Country Response
Contact name Organisation	Robert Rudnitsky/Philip Lippel/Travis Earles Dept. of State/Nat'l Nanotechnology Coordination Office/Office of S&T Policy
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2001 National Nanotechnology Initiative (NNI) National Nanotechnology Initiative Strategic Plan, December 2007, at http://www.nano.gov/NNI_Strategic_Plan_2007.pdf Previous version: http://www.nano.gov/NNI_Strategic_Plan_2004.pdf Other official documents at *http://www.nano.gov/html/res/pubs.html* American Competitiveness Initiative www.whitehouse.gov/stateoftheunion/2006/aci/aci06-booklet.pdf Small Business Innovation Research Programme and the Small Business Technology Transfer Programme SBIR and STTR, see http://www.sba.gov/SBIR/
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, through NNI participation in meetings, conferences; NNI workshops; agency grants to organisations to provide public conferences, citizens classes, workshops and exhibitions; fora about environment, health etc. (FDA, EPA, NIOSH) Yes, through workshops (see *www.nano.gov/html/res/pubs.html*); NSET working group for industrial liaison; also actions at state level.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)? Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, ELSI research funding is reported annually in NNI supplement to President's Budget. Yes, within NNI strategic plan. See also report on Nanotechnology workshop (2003) at *www.nano.gov/nni_societal_implications.pdf.*
Does your STI policy for nanotechnology include significant co-operation agreements with other countries? Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, numerous Yes, ISO, IEEE, ASTM International
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 2000
Have you supported specific education and training to develop human resources in nanotechnology?	Yes, extensive support by agencies for graduate and some undergraduate training. NSF research into Nanotechnology Science and Engineering

	Education (NSEE) for primary and secondary schools; see also *www.nclt.us* National Centre for Learning and Teaching and NanoEd Resource Portal; NSF sponsored projects.
Will your country introduce measures to attract foreign experts to work in nanotechnology?	Yes, this is an ongoing activity
Have the business-related needs been assessed with respect to nanotechnology development?	Yes
Is STI policy targeting particular application technology/ industry areas? If so, which?	Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering and other
Do you have targeted business incentive programmes related to nanotechnology?	Yes, NanoScale Characterisation Lab (NCL); National Nanomanufacturing Network; NNI Centres
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	Yes, ISO participation
Tax incentives or subsidies	No
Trade promotions?	No
Technology forecasting?	No
Other business regulations? If so, give examples.	No
Are there policies relating to financing of nanotechnology-related business?	No
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place?	No, policies are sufficient
Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	Nanoscale Science, Engineering, and Technology Subcommittee, National Science and Technology Council, Committee on Technology(NSET/TC/NSTC) *www.nano.gov*; Office of Science and Technology Policy *http://www.ostp.gov/*; National Nanotechnology Coordination Office; *http://www.nano.gov/html/about/nnco.html;* Individual Federal agencies *http://www.nano.gov/html/about/nniparticipants.html*

Further information on nanotechnology in the United States is available at:

- *http://www.nano.gov/NNI_Strategic_Plan_2007.pdf*
- *http://www.nano.gov/html/res/pubs.html*
- *www.whitehouse.gov/stateoftheunion/2006/aci/aci06-booklet.pdf*
- *http://www.sba.gov/SBIR/*
- *www.nano.gov*
- *http://www.nano.gov/html/society/home_society.html*
- *http://www.nano.gov/html/res/pubs.html*
- *www.nano.gov/nni_societal_implications.pdf*

HR related studies are available at:

- *http://cns.asu.edu/programme/rtta1.htm; http://www.nsf.gov/pubs/2006/nsf0654/index.jsp*

EUROPEAN COMMISSION RESPONSE

Question	Country Response
Contact name Organisation	Angela Hullmann European Commission - Directorate-general Research
Has a new and dedicated strategy been formulated for nanotechnology? When? What is the name of the strategy? What web links are there to relevant strategies?	Yes, 2004 Towards a European Strategy for Nanotechnology http://cordis.europa.eu/nanotechnology/actionplan.htm (see the strategy (ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nano_com_en_new.pdf), the action plan (ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/action_plan_brochure.pdf) and in particular the implementation report of the action plan (ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/com_2007_0505_f_en.pdf))
Are there mechanisms for public input to this policy area? Are there mechanisms for industry input to this policy area?	Yes, Expert groups (see 'Scientific committees, groups and agencies working on nanotechnology' on http://ec.europa.eu/nanotechnology/links_en.html), open consultations (see e.g. ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanosurveyexecsum.pdf or http://cordis.europa.eu/nanotechnology/src/consultation.htm), collections of opinion (see e.g. ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/inputs_nanoecotox.pdf), workshops (see e.g. http://cordis.europa.eu/nanotechnology/src/pe_workshop_reports.htm), etc. Yes, European Technology Platforms: industry led fora that develop vision papers and strategic research agendas for specific research topics, such as nanoelectronics, nanomedicine, and sustainable chemistry, amongst many others.
Does your nanotechnology-related policy include ethical, legal and social issues (ELS)?	Yes, ELS issues are one pillar of strategy and are implemented by workshops, publications and projects. See *e.g.* http://cordis.europa.eu/nanotechnology/ src/public_debate.htm, the European projects NanoDialogue (www.nanodialogue.org), Nanologue (www.nanologue.net) and Nanobioraise (http://nanobio-raise.org). Also, for ethical aspects - European Group of Ethics (EGE, http://ec.europa.eu/european_group _ethics/index_en.htm), see e.g. the EGE-Report on Nanomedicine (http://ec.europa.eu /european_ group_ethics/publications /docs/final_publication_%20op21_en.pdf).

Are there specific policies related to ethical, legal and social issues in the context of nanotechnology?	Yes, See the European strategy, the action plan (http://cordis.europa.eu/nanotechnology/actionplan.htm) and the opinion of the European Group of Ethics (http://ec.europa.eu/european_group_ethics/index_en.htm)
Does your STI policy for nanotechnology include significant co-operation agreements with other countries?	Yes
Is your government participating in international discussion fora on nanotechnology, apart from OECD and EU fora?	Yes, with EU Member States, Associated Countries, Candidate Countries; Third Countries with bilateral agreements
Is there a national definition of nanotechnology in your country?	Yes
Is your country committing dedicated R&D funding to nanotechnology? Since when?	Yes, 1998-2002
Have you supported specific education and training to develop human resources in nanotechnology?	Yes, in Integrated, Large Projects in FP6 and FP7, (include training courses, university lectures, development of training tools/materials). Capability to generate knowledge depends upon the up-to-date education, training and lifelong learning of researchers, engineers and other skilled personnel. Mobility across borders and disciplines and between academia and industry improves the quality of education and training, particularly in nanotechnology where progress is fast and interdisciplinarity plays a determinant role. Special focus on attraction of young people to science in general and nanotechnology in particular. See chapter on Human Resources in European Strategy and Action Plan on Nanotechnology and website http://cordis.europa.eu/nanotechnology/src/mobility.htm
Will your country introduce measures to attract foreign experts to work in nanotechnology?	n/a
Have the business-related needs been assessed with respect to nanotechnology development?	Yes
Is STI policy targeting particular application technology/ industry areas? If so, which?	Yes, electronics, instruments, chemicals & pharmaceuticals, process engineering, mechanical engineering, consumer goods & civil engineering and other
Do you have targeted business incentive programmes related to nanotechnology?	Yes, see the Action Plan and the EC's innovation policy, which is not specifically related to nanotechnology but is relevant http://ec.europa.eu/enterprise/innovation/index_en.htm#2
Do you have policies or programmes which impact business and nanotechnology in:	
Public procurement?	No
Nanometrology, quality and other standards?	Yes, see European Committee for Standardisation (CEN)
Tax incentives or subsidies	No

Trade promotions? Technology forecasting? Other business regulations? If so, give examples.	No No Yes, see the 1st Implementation report Action Plan *http://cordis.europa.eu/nanotechnology/actionplan.htm*
Are there policies relating to financing of nanotechnology-related business?	Yes, see Strategy and the Action Plan on nanotechnology and the website http://cordis.europa.eu/nanotechnology/src/financing.htm.
Are the intellectual property right regimes perceived to need updating for nanotechnology? If so, has that updating taken place? Are there policies to facilitate the transfer of nanotechnology intellectual property from the public to the private sector?	No, see proceedings of the workshop on IPR in nanotechnology (http://cordis.europa.eu/nanotechnology/src/iprworkshop.htm) Yes, large, integrated projects and European Technology platforms are the typical vehicles for the transfer of IPR between public and private sector.
Please name the main bodies involved in formulating and implementing STI policy related to nanotechnology.	European Commission - Inter Service Group (ISG) Nanotechnology *http://ec.europa.eu/nanotechnology/links_en.html*

Further information on nanotechnology in the EU is available at:

- *http://cordis.europa.eu/nanotechnology/actionplan.htm*
- *http://ec.europa.eu/nanotechnology/links_en.html*
- *ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nanosurveyexecsum.pdf*
- *http://cordis.europa.eu/nanotechnology/src/consultation.htm*
- *ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/inputs_nanoecotox.pdf*
- *http://cordis.europa.eu/nanotechnology/src/pe_workshop_reports.htm*
- *http://cordis.europa.eu/nanotechnology/src/public_debate.htm*
- *www.nanodialogue.org*
- *www.nanologue.net*
- *http://nanobio-raise.org*
- *http://ec.europa.eu/european_group_ethics/index_en.htm*
- *http://ec.europa.eu/european_group_ethics/publications/docs/final_publication_%20op21_en.pdf*
- *http://cordis.europa.eu/nanotechnology/src/intldialogue.htm*
- *ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/a-interactions-global.pdf*
- *http://ec.europa.eu/enterprise/innovation/index_en.htm#2*
- *http://cordis.europa.eu/nanotechnology/src/financing.htm*
- *http://cordis.europa.eu/nanotechnology/src/iprworkshop.htm*

HR related studies are available at:

- *http://cordis.europa.eu/nanotechnology/src/mobility.htm*

ANNEX 3
INTERNATIONAL DISCUSSION FORA AND INITIATIVES

(EXCLUDING OECD AND EU)

Organisation/ forum	**Countries**
ASTAM International	USA
CEN (European Committee for Standardisation)	DEU (TC 352), UK (BSI)
Continuing Engineering Education (CEE) Forum	FRA
Food Standards Australia and New Zealand (FSANZ)	AUS, NZ
Global Dialogue on Nanotechnology	CAN
IEEE	USA
International Dialogue on Responsible R&D in Nanotechnology	CAN, DNK, FIN, JPN, PRT, USA, ZAF
International Electrotechnical Commission (IEC)	JPN
International Risk Government Council (IRGC)	CAN, IRL, PRT, CHE, USA
International Standards Organisation (ISO)	AUS, BEL, CAN, DNK, FIN, DEU, JPN, BGR, USA
Korea-Japan Nanoforum	JPN, KOR
Korea-US Nanoforum	KOR, USA
Nanotechnology for Developing Countries	ZAF
NATO	NLD
Risk Governance of Nanotechnology Applications in Food and Cosmetics Workshop	PRT
Rockefeller Foundation	CAN
UNESCO	CAN
Versailles Project on Advanced Materials and Standards (VAMAS)	JPN

ANNEX 4
WEB LINKS TO SITES WITH NATIONAL STUDIES ON HUMAN RESOURCES IN NANOTECHNOLOGY

Country	**Link**
Canada	*http://www.statcan.ca/* *http://www.nanotechbc.ca/*
Finland	*http://www.minedu.fi/OPM/Julkaisut/2005/nanotieteen_keihaankarjet_suomessa?lang=fi* *www.oske.net/@Bin/9991/Nanoteknologia.pdf* *http://helsinkinano.tkk.fi/HelsinkiNano%20loppuraportti.pdf*
Germany	*http://www.nano-bildungslandschaften.de/index.php?content=map*
Israel	*http://www.nanoisrael.org/*
Netherlands	*http://www.onderzoekinformatie.nl/nl/oi/nod/classificatieaz/C60000/#persoon*
Portugal	*www.portugalnano.org*
United States	*http://cns.asu.edu/programme/rtta1.htm* *http://www.nsf.gov/pubs/2006/nsf0654/index.jsp*