

## Country Profile: Germany

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### 1. Political, institutional and economic framework and important actors

Germany's economic strength and strong export orientation is based on its high innovation performance (confirmed by the European Innovation Scoreboard, where Germany ranks above average on most indicators). However, a lot of debate has been triggered by the country's below-average economic growth in recent years. To counter this trend, the Federal Government has mostly exempted public research and education expenditure from recent budget cuts. In the beginning of 2006, the new Federal Government has announced further new policy measures and additional federal budget allocations to boost research and innovation.

German R&D expenditure was at a level of 2.49% of GDP in 2004, well above EU average. However, during 2001 and 2004, it grew by only 0.8% p.a. on average in real terms. The Private Sector accounted for 67.1% of R&D expenditure in 2004. The German government is committed to reaching the 3% target in 2010. The main research and innovation policy objectives include the accelerated development of new technologies and an enhanced diffusion of these technologies in priority sectors, an increased use and commercialisation of research results achieved at public research institutions, a more intense co-operation between academic institutions and Private Sector enterprises, an increased engagement of SMEs in R&D and innovation, the stimulation of new technology-based start-ups, the further development of research and technology-based regional clusters and the promotion of innovation in the five new states of the Federation (Länder) in the course of their economic restructuring.

According to current sources, the main challenges for sustaining the strengths of Germany's Science and Innovation System include the improvement of relevant framework conditions for financing R&D and innovation activities, (e.g. supply of venture capital, financing of enterprise R&D, financial support for R&D and innovation in SMEs), a continued reform of the higher education sector to secure quality and availability of trained and skilled young researchers, engineers, etc., a reduction of bureaucratic obstacles for research and innovation activities and continued reforms in the public research sector in order to strengthen technology transfer and links between industry and science<sup>1</sup>.

Due to the country's federal governance structure, the responsibility for research policy, for publicly funded research institutions, scientific infrastructure and other relevant activities is shared between the Federal Government and the 16 Länder. In this system, a multitude of actors interact in a complex structure on several levels (see Figure 1):

#### **a. Political and governmental authorities**

On the level of the German Federal parliament, a *Committee on Education, Research and Technology Assessment* deliberates on items such as draft laws, motions and briefings referred to it by the plenary. The results of the Committee's deliberations on a specific item are forwarded to the plenary in the form of a "recommendation for a decision", together with a report, setting out the course of the deliberations. In general, the plenary votes in line with this recommendation, either with or without a debate<sup>2</sup>. Hearings with participation of experts from the research and enterprise sectors are an important element of the Committee's work.

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<sup>1</sup> Sources of information and data in this and in the previous paragraphs: Bundesministerium für Bildung und Forschung, (1) *Forschung und Innovation in Deutschland 2006*; (2) *Bericht zur technologischen Leistungsfähigkeit Deutschlands 2006*, Bonn/Berlin, 2006; European Trend Chart on Innovation, *Annual Innovation Policy Trends and Appraisal Report Germany 2004-2005*; Eurostat, *Science and Technology in Europe – Data 1990 – 2004*, Luxembourg, 2006.

<sup>2</sup> The Committee is also responsible for the "Office of Technology Assessment", an advisory body attached to the Bundestag which produces studies assessing the impact of various technological developments and problems in the field of technology.

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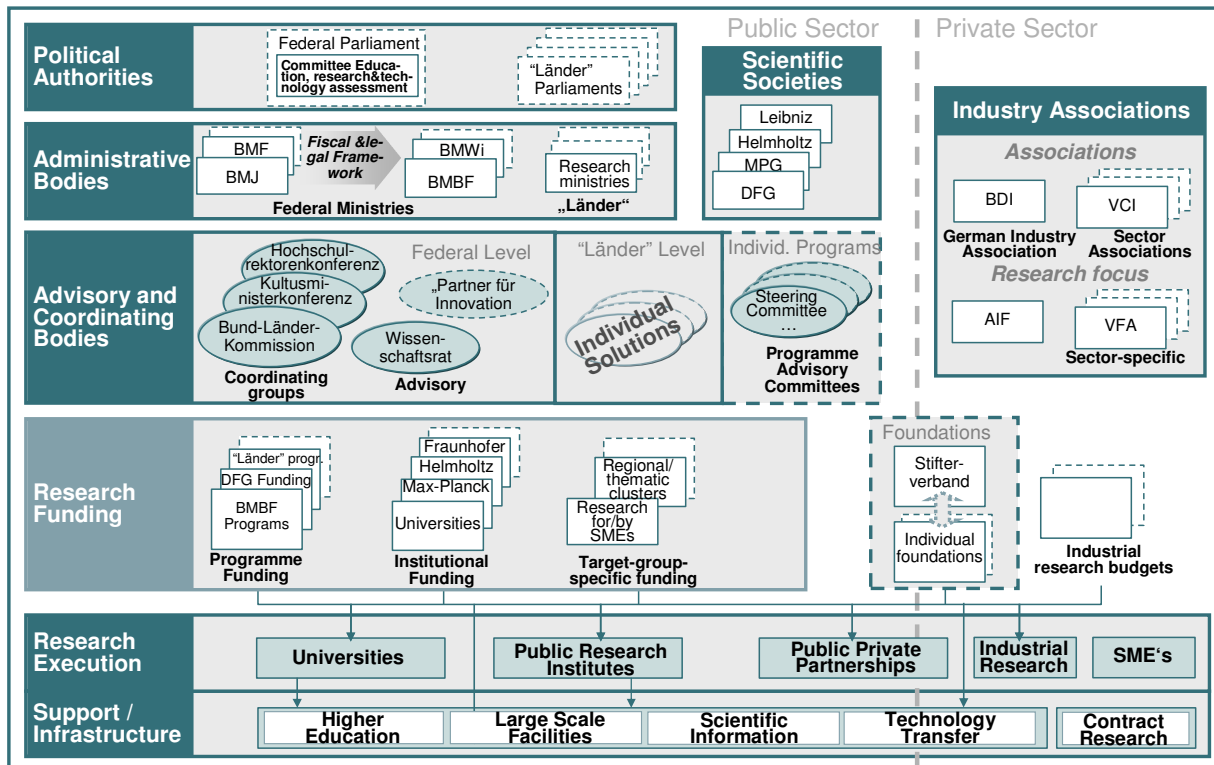


Figure 1: Relevant decision structures of the German National Innovation System

On the governmental level, the *Federal Ministry for Education and Research* (Bundesministerium für Bildung und Forschung, BMBF) is the main actor in the definition and implementation of detailed research policies. Its responsibilities include funding and support for research at public research and higher education institutions<sup>3</sup> and of public research infrastructure, the financing of R&D projects in public research institutions and Private Sector enterprises (mainly through thematic programmes), technology transfer, research-/innovation-oriented networking activities and the federal elements of tertiary education policies<sup>4</sup>, including activities that concern the availability and mobility of students and scientists.

The *Federal Ministry of Economics and Technology* (BMW) is responsible for federal technology and innovation policy. This includes the promotion of innovation, research- and technology-based cooperation and knowledge transfer with a special emphasis on SMEs and on specific sectors (e.g. energy, aviation and multimedia) and the development of positive conditions for innovation and entrepreneurial activities. In addition, BMW is responsible for several federal service institutions with relevance for research and innovation<sup>5</sup>.

To a limited extent, several other Federal ministries are also promoting or funding research and innovation-related activities in their areas of interest (for example the Federal Ministries of Health and of Environment, Nature Conservation and Nuclear Safety). Important framework conditions for research are also set by the Ministry of Finance (focus on budget issues) and the Ministry of Justice (legal measures with relevance for research, including IP regulations, etc.) in close coordination with BMBF and with other ministries involved.

The governments of the states of the Federation (*Länder*) are responsible for education policies and institutions, including research carried out by universities and by other research

<sup>3</sup> In the case of Higher Education Institutions, the BMBF provides only selective support in coordination with the responsible Länder.

<sup>4</sup> Overall responsibility for universities is with the Länder.

<sup>5</sup> National Metrology Institute (PTB), Federal Institute for Materials Research and Testing (BAM), Federal Institute for Occupational Safety and Health (BAuA), and Federal Institute for Geosciences and Natural Resources (BGR).

institutions under their auspices. In addition, they also co-fund the public research institutions described under c. and formulate own research and innovation policies<sup>6</sup>.

Policies defined and implemented by both the Federal and the Länder Governments are co-ordinated by joint commissions<sup>7</sup>. The *Bund-Länder Commission for Educational Planning and Research Promotion* (BLK) is the permanent forum for the discussion of all questions of education and research promotion which are of common interest to the Federal and the Länder Governments. BLK makes recommendations to the Heads of the Federal and Länder Governments on educational planning and research promotion. The *Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany* (Kultusministerkonferenz, KMK) unites the ministers and senators of the Länder responsible for education, higher education and research as well as of cultural affairs. KMK is an important instrument for the co-operative partnership between the Länder and the Federal Government and represents the common interests of the Länder at Federal Government and European Union level. This includes the coordination of training in the workplace (responsibility of the Federal Government) and vocational training (competency of the Länder).

On a regional or local level, a multitude of individual research policy approaches exist, for example in the areas of regional clusters. On the Public Sector side, these are typically governed and administered by local Public Sector authorities.

### **b. Intermediate/ advisory bodies, scientific associations and research-performing institutions**

As the most important advisory body, the *Science Council* (Wissenschaftsrat, WR), advises the Federal and Länder Governments. The WR issues statements and recommendations and prepares reports which primarily concern the two major fields of science policy, namely the development of scientific institutions (in particular their structure and performance, development and financing) and general questions relating to the system of higher education (e.g. structural aspects of research and teaching, strategic planning and assessment of specific fields and disciplines). Its members, appointed by the German President, include 24 scientists and eight other important personalities, from which currently five represent Private Sector enterprises and institutions.

Extra-university research is organised in a group of Scientific and Research Societies<sup>8</sup> which play a double role. They concentrate funds and research institutes under umbrella organisations. At the same time, they enjoy a high degree of independence to formulate and implement their own research policies and to allocate budgets in accordance with the priorities which they define. In this sense, they act partially as 'intermediate policy makers':

- The *German Research Foundation* (Deutsche Forschungsgemeinschaft, DFG) is the most important source of project funding for fundamental research. As a self-governing research organisation, DFG funds research projects carried out by scientists and academics working at universities or research institutes, selected in a transparent competition process. DFG's legal status is that of an association under private law. DFG membership is made up of German universities, non-university research institutions, scientific associations as well as of the Academies of Science and Humanities. The federal (Bund) and state (Länder) authorities which fund DFG are represented on all decision-making

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<sup>6</sup> See Chapter 3

<sup>7</sup> As a basis for the modernisation of the German Federal system, the German Federal Parliament has approved the necessary legal framework Juli 30, 2006 (*Gesetz zur Änderung des Grundgesetzes* (Bundestags-Drucksache 16/813) and *Föderalismusreform-Begleitgesetz* (Bundestags-Drucksache 16/814)). For a first discussion of possible implications for research and innovation, see the statement of the BMBF under <http://www.bmbf.de/de/1263.php>.

<sup>8</sup> Typically co-funded by Federal and Länder Governments on the basis of a 50:50 split (i.e. the Max-Planck-Society (MPG), the Blue-List-Institutes under the umbrella of the Wilhelm-Gottfried-Leibniz-Association (WGL), the Academies of Sciences (AoS) and the German Research Foundation (DFG); the Fraunhofer-Society (FhG) and the Helmholtz Centres (HGF) are funded on the basis of a 90:10 split of institutional funding.

bodies, but scientists and academics hold the majority. The Private Sector is not represented on governing bodies, with the exception of one Private Sector Senate member.

- The *Max Planck Society for the Advancement of Science* (MPG) is an independent, non-profit research organization that primarily promotes and supports fundamental research at its own institutes. The Private Sector is represented among the society's supporting members, through representatives on the senate and through two top industry managers serving as members of the administrative board (Verwaltungsrat).

As a part of its mission, MPG is committed to research co-operations with local universities and with other partners (including Private Sector R&D) and to knowledge and technology transfer. To promote the latter, the MPG has established an own company in 1970: *Garching Innovation* (GI) advises institutes on matters pertaining to the legal protection of intellectual property, does the necessary patent research, arranges legal counsel and advises the researchers on patent registration procedures in Germany and abroad. In special cases, GI approaches also Private Sector enterprises with inventions stemming from MPG institutes.<sup>9</sup>

- The *Helmholtz Association* is the umbrella organisation of 15 scientific-technical and biological-medical research centres. These centres have been commissioned with pursuing long-term research goals on behalf of the state and of society. The Association identifies and works on the grand challenges faced by society, science and industry through research in strategic programmes in six core fields: Energy, Earth and Environment, Health, Key Technologies, Structure of Matter, Transport and Space. Its senate makes recommendations to the financial sponsors on thematic priorities and funding for research programmes. The senate is chaired by the President of the Helmholtz Association and consists of two members of the German Parliament, five Federal or Länder Ministers or Ministry Representatives, two representatives of other scientific societies, six external scientists and six Private Sector representatives. Collaborative research and knowledge/technology transfer are important elements of the research centres' mission.
- The *Scientific Association Gottfried Wilhelm Leibniz* (Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz e.V., WGL) consists of 84 non-university research institutes and service facilities<sup>10</sup>. The activities of these institutes are grouped in five sections (humanities and education, economic and social sciences, life sciences, physical sciences and environmental research). The institutes collaborate closely with universities and Private Sector partners and position themselves as demand-oriented and interdisciplinary centres of competence. The umbrella organisation coordinates the mutual interests of the associated institutes, represents them in public and is responsible for the development of a comprehensive system of quality management. Institutes are assessed externally at regular intervals by independent experts<sup>11</sup>. Currently, there are no Private Sector representatives on WGL's governance bodies. But until November 2005, its president was a previous Managing Director of IBM Germany/Europe and President of the German Industry Association BDI. A subsidiary of the association, *LeibnizX*, supports value creation from the results of its member institute's research with a focus on spin-off creation and on the stimulation of entrepreneurship.
- The *Fraunhofer Society* (Fraunhofer Gesellschaft, FHG) undertakes applied research of direct utility to the Public and Private Sector and of wide benefit to society in its approx. 80 research units. Their services are solicited by customers and contractual partners in industry, the service sector and public administration. More than 900 Million Euro of FHG's annual research budget of over one Billion Euro is generated through contract research. Roughly two thirds of FHG's contract research revenue is derived from contracts

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<sup>9</sup> For more details, see the description under [http://www.wipo.int/sme/en/best\\_practices/garching\\_innovation.htm](http://www.wipo.int/sme/en/best_practices/garching_innovation.htm), or Garching Innovation's homepage <http://www.garching-innovation.de/>  
<sup>10</sup> In Germany often referred to as 'Blue List Institutes'

<sup>11</sup> 86 Leibniz Institutes were evaluated regularly by the German Science Council (Wissenschaftsrat) between 1995 and 2000. The Leibniz Senate has been responsible for the evaluation process since 2002. In the past, results of the evaluation have even led to the closure of institutes.

with industry and from publicly financed research projects. The remaining one third is contributed by the German Federal and Länder Governments, partly as a means of enabling the institutes to pursue more fundamental research in areas that are likely to become relevant to industry and society in five to ten years' time<sup>12</sup>.

- In addition, there are seven *Academies of Science*, represented by the *Union of the German Academies of Sciences and Humanities*. The Union coordinates the so-called 'Academies' Programme', a major German research programme in the fields of cultural studies and the humanities.

Complementing Scientific and Research Societies, Germany's approximately 350 Higher Education Institutions are the second pillar of Public Sector research. Individually as well as through the *German Rectors' Conference* (Hochschulrektorenkonferenz, HRK) they participate intensively in research and education policy debates. The HRK acts as the forum for the higher education institutions' joint opinion-forming process and as their political and public 'voice'. In this role, it provides member institutions with information, formulates and represents policy positions and advises Federal and Länder political and administrative bodies.

Research-cooperation between Public Sector research and the Private Sector is widespread and has a multitude of forms, ranging from the funding of academic (e.g. masters- and PhD-) research projects to knowledge and technology transfer and collaborative R&D projects. Universities receive more than 12% of their total funding for R&D from the enterprise sector, which is among the highest figures in OECD countries<sup>13</sup>. To enhance this support, most universities seek increasingly an active involvement of the Private Sector. The example of the Technical University Munich (TUM) illustrates this. Private Sector representatives are members of two of TUM's major governance bodies, the university council (Hochschulrat) and the board of trustees (Kuratorium). In addition, there is a trend towards the appointment of new professors with industry experience, for example in the engineering sciences.

On behalf of Federal and Länder Ministries, more than 20 *programme-managing organisations* (called 'Projektträger') administer project-based public support for R&D and innovation activities (e.g. collaborative research funding programmes). These independent organisations work on a contractual basis and provide a 'full service', including quality control and pre-evaluation proposals and applications, preparation of funding decisions, programme monitoring, project controlling and public relations. In many cases, they support the ministries also in the conceptual design of programmes and in stakeholder debates (e.g. conferences).

### **c. Private Sector**

The Private Sector is coordinating and representing its interests through its industry associations. Their umbrella organisation, the *Federal German Industry Association* (Bundesverband der Deutschen Industrie, BDI) has permanent staff allocated to research and innovation policy issues in its Technology and Innovation Policy Department. In addition, a permanent working group on research and technology, consisting of high level representatives of member companies, serves as a central platform for discussion of actual research policy issues, the development of Private Sector positions and the preparation and co-ordination of communication with policy makers. The BDI maintains permanent contact and discussions with BMBF and other research-policy-making institutions, issues own statements on a regular basis, initiates studies on priority issues, organises workshops and conferences and launches own initiatives. For example, in December 2005 an 'Innovation Indicator Germany' was launched in collaboration with the Deutsche Telekom Foundation, aiming at providing measures for the German innovation performance and relevant framework conditions as a basis for recommendations for improvement.<sup>14</sup>

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<sup>12</sup> See Chapter 3 for an example of Private Sector involvement in the governance of the Fraunhofer Institutes.

<sup>13</sup> Source: European Trend Chart on Innovation, *Annual Innovation Policy Trends and Appraisal Report Germany 2004-2005*.

<sup>14</sup> See Chapter 5.2 for recent examples of BDI initiatives.

Many of Germany's important sectoral industry associations maintain complementary activities with an emphasis on their specific research issues. For example, the German Association for optical, medical and mechatronic technologies *SPECTARIS* has established a permanent working group on research support and funding as a part of its mission to represent its members' interests vis-à-vis policy makers. This working group addresses the technological state-of-the-art as well as national and international research funding programmes. If appropriate, representatives of the Public Sector (for example of the agency which administers the BMBF's funding) may be invited to meetings of the working group.<sup>15</sup> In some cases, industry associations even initiate and fund research on their own initiative, for example the *German Chemical Industry Association* (VCI) through its *Fonds der Chemischen Industrie*.

The umbrella organisation of the German Chambers of Industry and Commerce, the *Association of German Chambers of Industry and Commerce* (DIHK)<sup>16</sup> has a department 'Economic policy, medium sized businesses and innovation', specialising among other subjects in national and European research, technology and innovation policy. The DIHK issues also regularly statements on actual research and innovation policies. In addition, the regional chambers (Industrie- und Handelskammern, IHKs) provide a variety of research- and innovation-related services to their members.

The *German Federation of Industrial Research Associations* (AiF; *Arbeitsgemeinschaft industrieller Forschungsvereinigungen "Otto von Guericke" e.V.*) promotes applied R&D for the benefit of small and medium-sized enterprises (SME). Organised by the Private Sector, the AiF supports the efficient usage and advancement of R&D programmes in order to increase the competitive strengths of SMEs through its industry-based innovations network, covering a multitude of industrial research associations, SMEs and associated research institutions. AiF works as a bridge between industry and science and provides practice-driven research and innovation consultancy support. In addition, it acts as an agency for the management of governmental R&D-support-measures targeting SMEs and Universities of Applied Sciences (Fachhochschulen).

In addition, Private Sector enterprises act both as important performers of publicly funded research (with 6.5% of BERD<sup>17</sup>) and as providers of funds for Public Sector research.

Funds from private *non-profit foundations* are contributing less than 0,5% of overall German research investment. Typical examples include the funding of projects (e.g. by *Volkswagen Stiftung*), funding of university chairs and completely privately funded research institutes (e.g. *Hasso Plattner Institut*). Beyond funding, some private foundations play also an important role as 'idea foundries' and 'motor of reforms' (e.g. *Stifterverband für die Deutsche Wissenschaft*, *Bertelsmann Stiftung*).

Other important stakeholders with close relations to the Private Sector are the unions. Both the *Federation of German Trade Unions* and some sector-specific trade unions such as IG Metall (Metal workers), Verdi (Services) and IG BCE (Construction, chemical and energy industries) are active participants in research and innovation policy debates. For example, IG BCE had supported, together with the industry sector organisation VCI and the Federal Ministry of Economy in 1998 a study on occupational effects of innovation in the chemical industry. As the 'think tank' of the trade union umbrella organisation DGB, the Hans-Böckler-Foundation funds own research projects on actual policy topics and prepares positions and statements also in the areas of research and innovation policy.

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<sup>15</sup> Other important actors on this level include the automobile industry association VDA, the chemical industry association VCI, the ICT industry association BITKOM, the electric industry association ZVEI, the machinery equipment industry association VDMA, the association for electrical and information technology VDE and the professional associations of engineers VDI. In addition, there are sector-specific associations with a specific research focus, for example the German Association of research-based pharmaceutical companies VfA.

<sup>16</sup> With the exception of handicraft businesses, the free professions and farms, companies registered in Germany are required by law to join a chamber. Thus, DIHK lists more than three million companies and entrepreneurs, ranging from large multinational companies to one person businesses.

<sup>17</sup> 2003 data; source: ODEC MSTI database 2005.

### 2. National research policy decisions and Private Sector involvement<sup>18</sup>

#### Instigation and design stages

Private Sector interaction in research policy making is well anchored in the German Science and Innovation System both at the level of the formal preparation of decisions and at a less formal level of personal interaction and permanent exchange. A multitude of institutional and personal relations, discussion platforms (e.g. conferences and workshops) and pro-active contributions (studies, white papers, etc.) ensure a permanent debate among stakeholders.

Typically, the instigation and formulation of national research and innovation policies proceed in three steps:

- (1) The need for important research policy action is identified by the Federal Parliament (Deutscher Bundestag) and/or by the Federal Government: The parliament's Committee on Education, Research and Technology Assessment holds regular formal hearings on research policy topics. As a basis for conclusions and recommendations formulated by the Committee, expert testimonies are invited, from which an important part comes from Private Sector representatives. Complementing this on the governmental level, the BMBF initiates for example ad-hoc workshops or expert studies to identify and evaluate possible research policy topics and pursues a continuous dialogue with stakeholders, including the Private Sector, as a complementary source of ideas and initiatives. Foresight studies, conferences<sup>19</sup> and other instruments are used in addition to create awareness and to stimulate the debate. For example, FUTUR, the German research dialogue, was launched under the auspices of the BMBF to identify important societal issues and to analyse how research might contribute to their solution. 22% of the experts invited by the BMBF to represent all groups of German society came from the Private Sector.

Another source of policy initiatives can be proactive Private Sector contributions, which are typically brought forward by industry associations, for example through white papers, press statements and consultations. In addition, industry associations or Private Sector-supported institutions often initiate studies to highlight important policy issues or to monitor research and innovation performance, framework conditions, etc. A typical example is the annual ranking of university research published by the Centre for the development of higher education institutions (Centrum für Hochschulentwicklung CHE)<sup>20</sup>.

- (2) Based on these inputs, detailed research policies are formulated by the responsible ministry, typically the BMBF. The Private Sector can be involved in research policy design in an advisory role, typically through participation of individual representatives in ad hoc advisory groups or through consultations with industry associations. Evaluation studies can also be a valuable source for the design of new research policy measures or the continuation and/or modification of already existing policies (see Chapter 5.3 for details).
- (3) Decisions on the implementation of the designed research strategies are taken by the responsible ministry (in most cases BMBF, but also BMWi or other ministries with sectoral responsibilities). The Private Sector is not a formal part of such decisions. There is general agreement that decisions related to research policy design and launch are the sole responsibility of Public Sector policy makers.

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<sup>18</sup> Focus on Private Sector involvement in research policy. Other policy decisions concerning relevant research framework conditions (e.g. legal, fiscal) are taken by the responsible federal ministries (e.g. the Federal Ministry of Finance, BMF, for tax measures) in consultation with BMBF and BMWA. The private Sector again has no formal participation in such decisions, but can considerably influence these decisions through proactive interventions and in an advisory role.

<sup>19</sup> See as an example: *Benchmarking Industry - Science Relationships*, Proceedings of the Joint German-OECD Conference held in Berlin, October 16-17, 2000.

<sup>20</sup> CHE was founded in 1994 as a joint initiative of the Bertelsmann foundation and the German Rectors' Conference to promote the development of higher education. It is mostly funded by Bertelsmann foundation, but free in the choice of its work programme.

### Implementation and Assessment/revision stages

Under the auspices of the responsible Federal Ministry, the implementation of research policies is usually administered by a specialised external service provider ('Projekträger'; see description on page 5). The Private Sector is not formally involved in the operative management of such programmes and/or in related funding and other decisions. However, representatives of the Private Sector may take part for example as jury members in competitive funding schemes or as members of advisory groups, steering committees, etc.<sup>21</sup> Another form of involvement may be through membership in advisory bodies which accompany the implementation of important policy measures.<sup>22</sup>

Conferences and status symposia, organised by the ministry, are a frequently used form of interaction during the implementation phase. In such symposia, the status of research programmes and other important research issues, strategic and scientific options, etc. are presented and discussed with stakeholders and a broader research and policy community<sup>23</sup>.

As the central element of research policy assessment, evaluation studies, initiated usually by the responsible ministry, are common practice in Germany. These analyse the achievement of research programme objectives, effectiveness and efficiency of the programme, the need for further policy measures, etc. Often, such evaluations serve at the same time as a starting point for formulating "next generation" research policies. The Private Sector and other stakeholders are involved through intensive consultations (see Chapter 5.3 for details).

### Observations: Possible barriers and current initiatives

Private Sector involvement takes mostly place through an advisory role in the instigation and design stages. This policy process and the distribution of roles are widely accepted. There is also a broad consensus that decisions to launch new policies and their implementation are the sole responsibility of the Public Sector. The careful consideration of Private Sector contributions in the instigation and design stages and an efficient evaluation system are the key to ensure that research policies are as close as possible to the needs of the Private Sector.

In the described German research policy governance system, the multitude of levels of decision making, decision makers and stakeholders involved on the Federal, Länder and regional level creates a considerable level of complexity. As a consequence, decision processes may be slowed down or endangered to become 'diluted' by compromises between policy making or stakeholder groups with different objectives. In addition, there is a danger that related policy decision processes become less transparent for Private Sector and other stakeholders and that their possibilities to express their views and needs efficiently is hampered by the multitude of Public Sector actors with which they have to interact.

Despite all efforts to stimulate research and innovation activities of SMEs, 87% of total Private Sector R&D expenditure in Germany in 2003 was spent by large companies with 500 or more employees (in particular large multinational corporations in the automobile, electronics, mechanical engineering, chemical and pharmaceutical sectors). Accordingly, these companies are also by far the most visible and engaged players in research policy debates. The current split of responsibilities between BMBF (which is responsible for fundamental and applied research policy) and BMWi (which focuses on technology development and SME-oriented policy measures) is also not helpful to overcome this 'SME gap'.

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<sup>21</sup> Chapter 5.4 and in the case study BioRegio describe this type of Private Sector involvement.

<sup>22</sup> For example, the *National Ethics Council* ('Nationaler Ethik-Rat') was inaugurated June 8, 2001 as a national forum for interdisciplinary discourse between the natural sciences, medicine, theology and philosophy, and the social and legal sciences, and to express views on ethical issues relating to new developments in the field and on their consequences for the individual and society. These views have a considerable impact on the formulation and implementation of research policies in the Life Science area. The Council has up to 25 members, who represent the scientific, medical, theological, philosophical, social, legal, ecological and economic worlds and are appointed for a four-year term by the Federal Chancellor. The National Ethics Council is independent and bound solely by the terms of reference laid down in its founding decree. It determines its own work programme and procedures.

<sup>23</sup> Example: Regular status symposia in the federal materials research programme MaTech.



In recent years, both sides have made efforts to increase their interaction, working in particular towards more leverage from Public Sector investment in research, the development of research networks and joint initiatives in priority action fields. For this purpose, the stakeholders seek to strengthen ways of interaction which go beyond the traditional advisory role of the Private Sector in public research policy formulation. The objective is to stimulate a stronger orientation of research policy towards fields with a high Potential for leveraging joint Public and Private Sector research. A recent example are the initiative *Partner für Innovation*, launched on the initiative of chancellor Schröder in January 2004 and the subsequent initiatives *Research Union Economy-Science* and *Council for Innovation and Research* launched by the new German government in 2006 as platforms for joint initiatives in research and innovation. These involve representatives of all actors of the German Research and Innovation System, including the Private Sector (see Chapter 5.1 for details and Chapter 5.2 for comparable Private Sector initiatives).

### 3. Other important examples of policy decisions with Private Sector involvement

#### Länder and regional research strategies<sup>24</sup>

Some states (Länder) of the federation have initiated own programmes to support research and innovation in areas or for target groups with particular regional importance (For example, Bavaria promotes collaborative research and development of research-oriented Networks in a variety of technology areas<sup>25</sup>). Typically, the responsibility for research and innovation-related activities is split between Ministries of Science (sometimes called Ministry of Cultural Affairs) and Ministries of Economy (or equivalent). Even though there are differences between the Länder in the degree to which they formulate explicit own research policies and allocate funds to them, their overall research policy instigation, design, implementation and evaluation processes follow similar patterns as described in Chapter 2, including Private Sector involvement therein, driven by Länder ministries and regional stakeholders.

Some of the Länder have also extended the traditional model of technology transfer to a dedicated initiative to speed up the transfer of scientific progress to commercial innovation. The most prominent example is Baden-Württemberg's Steinbeis-Foundation, which has built a network of over 4.000 experts, provides R&D and related services and operates a Steinbeis Transfer Network consisting of over 600 Steinbeis Transfer Centres (STCs), Steinbeis Transfer Institutes (STIs), subsidiaries and equity holdings in companies. Services are performed by a commercial organisation (Steinbeis GmbH & Co. KG). Membership of Private Sector representatives in the Steinbeis Board of trustees, together with representatives of other stakeholder groups, ensures intensive direct Private Sector involvement and a strong orientation towards practical needs.

#### Governance of research institutes

Beyond the research policy approaches of their parent institutions described on pages 3 ff., many individual institutes of Germany's research associations seek also a direct involvement of Private Sector know how in their operations. The example of the Fraunhofer Institutes illustrates this. Governing boards attached to each institute act as advisors to the director(s) of the institute and to the Executive Board on matters concerning the research orientation and structural changes of the institute. They consist of representatives of science, industry, business and other societal groups. For each institute, approximately twelve governing board members are appointed by the Executive Board with the approval of the institute director(s). Annual board meetings are attended by at least one Executive Board member.

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<sup>24</sup> Another important focus of both federal and Länder research and innovation policies is the stimulation of research- and innovation-based clusters. This approach is described in Chapter 5.4.

<sup>25</sup> For details see the activities of the Bavarian Ministry of Science, Research and Art (<http://www.stmwfk.bayern.de/forschung/foerderprogramme.html>) and of the Bavarian Ministry of Economy, Infrastructure, Transport and Technology (<http://www.stmwivt.bayern.de/technologie/technologie.html>); Cluster initiative under <http://www.stmwivt.bayern.de/cluster/inhalt.html>

### 4. Overview: Types and extent of Private Sector involvement<sup>26</sup>

Private Sector interaction in research policy decision making takes place in a variety of ways:

- Traditionally, a variety of forms of *networking, general dialogue and informal involvement* precede formal decision and decision preparing processes. Both sides are committed to maintain a permanent working relationship and a continuous exchange of views through regular meetings, etc. In addition, foresight studies and conferences are used to create awareness. To foster personal networks and mutual understanding, *Partner für Innovation* has proposed also to revitalise previous programmes for a temporary *staff exchange* between the Public and the Private Sector.
- Most involvement of the Private Sector takes place in an *advisory role*, without formal participation in resulting policy decisions. Most prominent examples for this type of involvement are ad hoc advisory groups for research policy instigation and design.
- *Formal involvement* in research policy design, implementation and related decisions is traditionally not used extensively. Responsibility for design of research policies and related decisions is clearly with policy makers, the Private Sector contributes typically as advisor but not as (co-)decision maker.
- Following the example of BioRegio, German policy has sought to strengthen *joint activities* between the Public and the Private Sector on the operative level. For this purpose, the use of specific, competition based instruments has been extended to other areas (e.g. the programme InnoRegio).
- Industry associations and private foundations are also driving their *proactive involvement* in the policy debate through a variety of forms, including white papers and other statements and initiation and funding of “idea foundries” for specific thematic areas.
- *Research funding* is used extensively by individual companies and to a limited extent by Private Sector foundations and associations to stimulate research in Public Sector institutions and collaborative research.

### 5. Selected useful examples of transferable approaches and experiences

Several useful practices with a potential to be transferred to other Science and Innovation Systems have been mentioned already in previous chapters. Additional good practices are outlined in the following sections<sup>27</sup>:

#### 5.1 Recent initiatives of the German government

Upon the initiative of the former chancellor Schröder, *Partner für Innovation* (‘Partners for Innovation’) was founded in 2004 as a joint initiative with the objective to get people, institutions and companies in Germany excited about innovative ideas and inventions, to foster innovation in Germany and to encourage and to support the implementation of innovative concepts in areas of high importance for German society and economy. For this purpose, a high level working group, chaired by the chancellor and involving top representatives of the Private Sector and of other stakeholder groups has identified 13 priority themes. Working groups, consisting of representatives of the relevant stakeholder groups and supported by a professional support structure were established to identify, develop and implement “lighthouse” projects in these areas. Private Sector representatives participate as members in all working groups and have the leadership in approximately half of them. Since its foundation, this initiative has yielded already a considerable amount of valuable innovation projects which are driven by the members of the initiative. In addition, working groups on structural issues, e.g. the group on exchange processes between the Private Sector, research and politics (lead by the BDI) are developing valuable proposals for improving the German Science and Innovation System.

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<sup>26</sup> See Table 1 in Appendix 1 for a detailed overview of current use of identified instruments.

<sup>27</sup> Representative examples to highlight good practices. Not intended to serve as a comprehensive list or description.

After the recent elections, the new German government has taken up this initiative and constituted two new bodies. The *Research Union Economy-Science* ('Forschungsunion Wirtschaft-Wissenschaft') held its first meeting June 23, 2006 as a new top-level advisory council which focuses on advising the Federal Minister of Education and Research on the implementation of the German government's Hightech-Strategy. It consists of 13 members of which 7 are Private Sector representatives and is chaired jointly by one enterprise representative and one research public research representative. In a complementary role, the *Council for Innovation and Research* ('Rat für Innovation und Wachstum'), chaired by the Chairman of the Supervisory board of one Germany's largest global industrial firms, was constituted in May 2006 to advise the German Chancellor on related issues, e.g. the faster conversion of research results into commercially relevant technologies and products.

### 5.2 Research policy initiatives of the Federal German Industry Association BDI

Having been already one of the core members of *Partner für Innovation*, the German Federal Industry Association BDI has launched in Spring 2006 a new platform for debate and initiatives, *BDI initiativ* (BDI initiativ – Innovationsstrategien und Wissensmanagement). This initiative aims to develop proposals for the advancement of the German Research and Innovation System, to foster science-industry links and to promote the intensification of research and innovation activities in view of the Barcelona target.

Beyond these general activities, the BDI takes also initiatives in specific focus areas. For example, the initiative *Vitale Gesellschaft* was launched in 2003 with the objective to strengthen Germany's position as a leading Life Science competence centre and to contribute to the progress and sustainability of the German health system. In this initiative, important Private Sector companies, industry associations and research institutions seek to develop and to promote joint propositions on how to strengthen the German health system and in particular on how to improve its research and innovation performance. One of its most important objectives is to stimulate a considerable growth of German Public and Private Sector research in Life Sciences. For this purpose, the initiative has proposed measures to improve the framework conditions for pharmaceutical research, identified priority research fields and suggested Public-Private-Partnerships and ways to achieve a better integration of Public and Private Sector research in the Life Sciences. In addition, *Vitale Gesellschaft* organises high-level debates, for example a recent strategy debate with the Federal Minister of Health, Mai 16, 2006, or a symposium *Economic factor Health – opportunities and potentials for Germany*, April 20, 2005, to discuss ways to improve the links between Public Sector policies and the research and innovation potential of the German Industry in the Life Science sector.

### 5.3 Evaluation of research programmes

Evaluation studies are an integral part of a systematic process to assess and define research policies and programmes. They assess the achievement of programme objectives, effectiveness and efficiency of the programme and the need for further policy action and develop recommendations for further policy measures. The perceptions of Private Sector representatives (e.g. from enterprises which have participated in research projects, typically a cross-section of larger companies, SME's and start-ups is sought) have a high weight. Interview programmes, questionnaires, and other means to include Private Sector actors are an important part of such evaluation studies. Typical topics include the leverage achieved in the transfer of knowledge generated in research to new technologies/products, factors affecting the efficiency of collaborative research, innovation and research needs of Private Sector actors, etc.

The example of the new materials research programme WING illustrates this process:

#### *Step 1: Analysis*

An evaluation study analysed the predecessor programme MaTech extensively. This study provided insights into the structure and results of the programme, strengths, weaknesses and opportunities of its implementation, future research needs and the need for further policy measures. Private Sector representatives were involved in this

process through interviews with key industry representatives, through questionnaires, and as members of evaluation study steering committees.

### *Step 2: Evaluation*

Based on the results of this analysis, it was the evaluator's task to identify further policy options and to provide a first understanding of their potential impact (e.g.: 'Do nothing' versus 'continuation of current funding programme' versus 're-orientation towards other instruments or target groups', etc.). This part of the evaluation study served as input for the following policy decision process. The evaluation results were validated through an intensive discussion process, involving the steering committee and an extended expert group (in a complementary workshop).

### *Step 3: Formulation of next generation policy*

On this basis the ministry formulates a new draft policy. This task is often supported by an advisory group composed of experts and representatives of the stakeholders (including industry, SME's, etc.). In comparable exercises, BMBF has also been using expert and stakeholder working groups to develop proposals for specific elements.

Even if Private Sector involvement in the described process of policy evaluation seems to be rather informal, it can be very powerful. The shift of focus of federal support for German materials research from a materials focus (initial program MatFo) towards an application focus (partially realized already in the intermediate MaTech Programme until 2004, further strengthened in the actual programme WING) clearly reflects perceptions expressed by the Private Sector. Especially its representatives had argued that this would be necessary to strengthen and accelerate the conversion materials knowledge to innovative technologies and products.

## **5.4 Fostering sectoral and regional innovation clusters (Example BioRegio)<sup>28</sup>**

The involvement of Private Sector actors in regional and/or sectoral research and innovation policy development and implementation has become an important BMBF priority. The objective is to stimulate the development of innovation clusters where Public and Private Sector actors interact efficiently in seamless innovation processes, from scientific knowledge generation to market success, in high potential growth sectors. For this purpose, the BMBF has extended its successful use of new competitive schemes, which encourage the formation of regional/sectoral networks, clusters and centres of excellence. The prototype of this type of policy measures was the programme BioRegio, which is described in detail in a separate case study (see the case study *BioRegio* in this study).

## **5.5 *Stifterverband für die Deutsche Wissenschaft*: Private Sector platform for the advance of science, research and education**

The *Stifterverband* (Founders' Association) is a joint Private Sector campaign in which more than 3,000 companies, industrial associations and individuals have become organised to promote science and the humanities, research, and education. Its activities, financed exclusively with the charitable donations of its members and sponsors, aim to identify structural problems in the German scientific system, to develop solutions for them and to initiate their implementation through initial funding. For this purpose, the *Stifterverband* provides funds, stimulates the public debate about research policy issues (for example through the organisation of conferences and the traditional 'Villa-Hügel' discussions) and co-operates with other scientific organisations which fund research (e.g. DFG and MPG).

Activities with special importance under the aspect of Private Sector interaction in research policy decision making include:

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<sup>28</sup> See also the detailed description in the case study BioRegio.

## Country Profile: Germany

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- *Science statistics*

As the only private institution in Germany, the Stifterverband collects systematically data about research activities of Private Sector enterprises and other collaborative research institutions and prepares a set of indicators for research policy use.

- *Contributions to research policy debate*

Through own publications and as (co-)initiator of studies, the Stifterverband contributes to the German research policy debate. An example for this is the 'research ranking' initiative, which has been developed in collaboration with DFG to provide more transparency and a yardstick to measure the quality of research at higher education institutions.

- *Academic and other prizes*

In collaboration with the major academic organisations, the Stifterverband awards five academic prizes to demonstrate the significance of science and the humanities to the public. In addition, from 2005 the Stifterverband awards the title 'Science City' each year to a city that actively promotes higher education and research, champions its networking with industry and culture and strives to open up science and the humanities to the public.

- *Wissenschaftszentrum Bonn (Science Centre Bonn)*

With the Wissenschaftszentrum Bonn, the Stifterverband has created a forum where higher education and research, politics and the public can meet to exchange views and to discuss. The centre hosts a multitude of conferences, symposia, meetings, lectures and press conferences. Several important national academic organisations, as well as international ones, have set up their offices at the Wissenschaftszentrum.

**Appendix 1: Overview of identified instruments for Private Sector involvement and their use in Germany**

Instrument		Intensity of use	Initiated by	Used for	Used in				Examples and remarks
					Instigation	Design	Implement.	Review	
General dialogue	Insight studies, roadmapping, foresight	Occasional	Public Sector	Awareness & identification of emerging technologies & trends	✓				FUTUR
	Conferences	Occasional	Both sides	Discussion platform	✓		✓		Conf. Science-Industry relationship
	Brainstorming / task forces	Occasional	Public Sector	Identification of priorities and possible policy actions	✓	✓			
Informal decision involvement	Evaluation studies	Regular	Public Sector	Programme review, identification of policy needs	✓	✓		✓	Programme evaluation studies
	Advisory groups	Regular	Public Sector	Participation in design, evaluation, etc.	✓	✓			Wissenschaftsrat
	Informal consultations	Regular	Public Sector	Exchange of viewpoints between stakeholders	✓	✓	✓	✓	
	Formal consultations	Frequent	Public Sector	“Official” opinion	✓	✓	✓	✓	
Formal decision involvement	Task force	Beginning to use	Public Sector	Joint policy development	✓	✓			„Partner für Innovation“
	Participation in decision making bodies (observer status)	Not common	Public Sector	Decision involvement					
	Participation in decision making bodies with (co-) decision right	Not common	Public Sector	Decision involvement, shared responsibility			✓		BioRegio selection committee
	Administrative / supervisory boards	Growing	Public Sector	Private Sector representatives involved in important institutional decisions		✓	✓		Boards of MPG, etc.
Joint activities	Initiation of networks	Occasional	Public Sector	Stimulation of joint Public-Private Sector initiatives			✓		Bio Regio
	Co-financing of projects / programmes	Regular	Both sides	Sharing of cost / risks			✓		
	Public Private Partnership	Occasional	Both sides	Pooling of resources			✓		
Staff interaction	(Temporary) Staff exchange	Occasional	Both sides	Enhance mutual understanding and mobility			✓		Previous experiences + recommendation of Partner für Innovation
	Staff mobility	Occasional	Public Sector	Private Sector expertise in research leadership positions					MPG directors, univ. professors
Unsolicited contributions	Statements, studies, white papers, etc.	Frequent	Private Sector	Express views, recommend changes, influence decisions	✓	(✓)			
	Dialogue platforms	Occasional	Private Sector	Initiate / facilitate dialogue with public sector	✓	✓			Stifterverband
	Research funding	Frequent	Private Sector	Initiate / support research in desired areas			✓		

Table 1: Overview of instruments used for Private Sector involvement

### Appendix 2: Selected relevant sources and literature

#### 1. General and country information

Bundesministerium für Bildung und Forschung (BMBF), *Bundesbericht Forschung 2004*, Bonn/Berlin, 2004

Bundesministerium für Bildung und Forschung, *Bericht zur technologischen Leistungsfähigkeit Deutschlands 2006*, Bonn/Berlin, 2006

Bundesministerium für Bildung und Forschung (BMBF), *Forschung und Innovation in Deutschland 2006*, Bonn/Berlin 2006

Rainer Frietsch, ENIP-Country Report *National Report on S&T Data; Indicators Production Germany*, Fraunhofer Institute for Systems and Innovation Research, <http://www.enip-europe.org>

Organisation for Economic Co-operation and Development (OECD), *OECD Science, Technology and Industry Outlook 2004, Country Response to Policy Questionnaire*, Paris, 2004

European Trend Chart on Innovation, *Annual Innovation Policy Trends and Appraisal Report Germany 2004-2005*

#### 2. Important actors

<a href="http://www.bundestag.de">http://www.bundestag.de</a>	German National Parliament (Bundestag)
<a href="http://www.bundestag.de/parlament/gremien15/index.html">http://www.bundestag.de/parlament/gremien15/index.html</a>	Committee on Education, Research and Technology Assessment of the Bundestag
<a href="http://www.tab.fzk.de">http://www.tab.fzk.de</a>	Office of Technology Assessment
<a href="http://www.bmbf.de">http://www.bmbf.de</a>	Federal Ministry for Education and Research (BMBF)
<a href="http://www.bmwi.de/">http://www.bmwi.de/</a>	Federal Ministry of Economics and Technology (BMWi)
<a href="http://www.blk-bonn.de/">http://www.blk-bonn.de/</a>	Bund-Länder-Kommission
<a href="http://www.kmk.org/index00.htm">http://www.kmk.org/index00.htm</a>	Kultusminister-Konferenz
<a href="http://www.hrk.de">http://www.hrk.de</a>	German University Rector's Conference
<a href="http://www.wissenschaftsrat.de/">http://www.wissenschaftsrat.de/</a>	Wissenschaftsrat
<a href="http://www.dfg.de/">http://www.dfg.de/</a>	Deutsche Forschungsgemeinschaft (DFG)
<a href="http://www.mpg.de/english/portal/index.html">http://www.mpg.de/english/portal/index.html</a>	Max-Planck-Gesellschaft
<a href="http://www.helmholtz.de/">http://www.helmholtz.de/</a>	Helmholtz-Gemeinschaft
<a href="http://www.wgl.de/extern/englisch/index.html">http://www.wgl.de/extern/englisch/index.html</a>	Leibniz Gesellschaft
<a href="http://www.fraunhofer.de/fhg/EN/index.jsp">http://www.fraunhofer.de/fhg/EN/index.jsp</a>	Fraunhofer-Gesellschaft
<a href="http://www.wgl.de/leibnizx/">http://www.wgl.de/leibnizx/</a>	'LeibnizX'
<a href="http://www.akademienunion.de/">http://www.akademienunion.de/</a>	Union of the German Academies of Sciences and Humanities
<a href="http://www.stifterverband.de">http://www.stifterverband.de</a>	Stifterverband für die Deutsche Wissenschaft
<a href="http://www.bdi-online.de/de/fachabteilungen/start_technologie_innovation.htm">http://www.bdi-online.de/de/fachabteilungen/start_technologie_innovation.htm</a>	Bundesverband der Deutschen Industrie (BDI); Committee on/department for research and technology policy
<a href="http://www.dihk.de/">http://www.dihk.de/</a>	Association of German Chambers of Industry and Commerce (DIHK)

### 3. Other

<a href="http://www.futur.de">http://www.futur.de</a>	German Research dialogue FUTUR
<a href="http://www.ethikrat.org/">http://www.ethikrat.org/</a>	National Ethics Council
<a href="http://www.innovationsinitiative-deutschland.de/">http://www.innovationsinitiative-deutschland.de/</a>	Initiative "Partner für Innovation"
<a href="http://www.steinbeis.de">http://www.steinbeis.de</a>	Steinbeis Foundation
<a href="http://www.bioregio.com/english/einf.htm">http://www.bioregio.com/english/einf.htm</a>	BioRegio and following initiatives (Bio regions in Germany)
<a href="http://fonds.vci.de/template_downloads/tmp_0/FinVer04.pdf?DokNr=82500&amp;p=111">http://fonds.vci.de/template_downloads/tmp_0/FinVer04.pdf?DokNr=82500&amp;p=111</a>	Fonds der Chemischen Industrie
<a href="http://www.che.de/cms/?getObject=74&amp;getLang=de">http://www.che.de/cms/?getObject=74&amp;getLang=de</a>	University research ranking of <i>Centrum für Hochschulentwicklung</i>

### 4. Further information and feedback

This country profile has been prepared by Dr. Michael Braun. For further information and feedback, please contact the responsible author under [Michael.Braun@proneos.com](mailto:Michael.Braun@proneos.com)